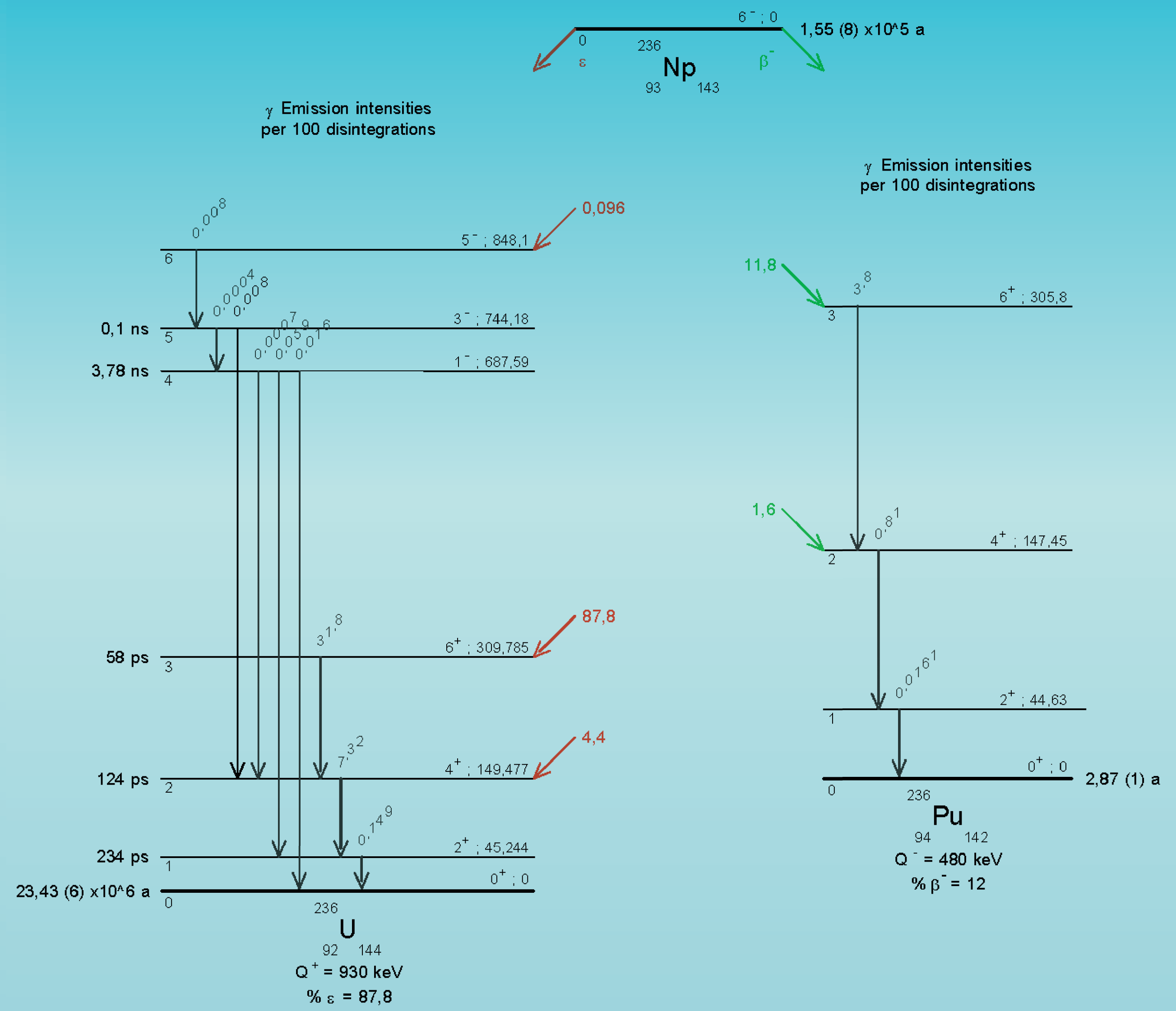
Library of Recommended Actinide Decay Data, 2011



Technical Editors
M.A. Kellett, A.L. Nichols

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LIBRARY OF RECOMMENDED ACTINIDE DECAY DATA, 2011

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The Agency's Statute was approved on 23 October 1956 by the Conference on the Statute of the IAEA held at United Nations Headquarters, New York; it entered into force on 29 July 1957. The Headquarters of the Agency are situated in Vienna. Its principal objective is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world".

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FOREWORD

A major objective of the nuclear data programme within the IAEA is to devise and promote improvements in the quality of nuclear data used in science and technology. Work of this nature was performed by participants in an IAEA coordinated research project (CRP) formulated in 2005 to produce an updated decay data library of important actinides recommended for adoption in various nuclear applications. The specific objectives of this project were to improve the accuracy of heavy element and actinide decay data in order to: determine more accurately the effects of these recommended data on fission reactor fuel cycles; aid in improved assessments of nuclear waste management procedures; provide more reliable decay data for nuclear safeguards; assess with greater confidence the environmental impact of specific actinides and other heavy element radionuclides generated through their decay chains; and extend the scientific knowledge of actinide decay characteristics for nuclear physics research and non-energy applications.

Some CRP participants were able to perform a number of highly precise measurements, based on the availability of suitable source materials, and systematic in depth evaluations of the requested decay data. These requested data consisted primarily of half-lives, and α, β^-, EC/β^+, Auger electron, conversion electron, X ray and γ ray energies and emission probabilities, all with uncertainties expressed at the 1σ confidence level.

The IAEA established a CRP entitled Updated Decay Data Library for Actinides in mid-2005. During the course of discussions at the coordinated research meetings, the participants agreed to undertake work programmes of measurements and evaluations, to be completed by the end of 2010. The results of the evaluation studies undertaken by the CRP are presented in Annex I. Annexes II–V include descriptions of the sources of the evaluated decay data and each individual evaluation process in detail, as well as data files in the Evaluated Nuclear Structure Data File (ENSDF) format and in the Evaluated Nuclear Data File (ENDF) format.

The IAEA is grateful to members of the Decay Data Evaluation Project and laboratories affiliated with the International Committee for Radionuclide Metrology for their assistance and support in the work. Particular appreciation is extended to V. Chisté and C. Dulieu from the Laboratoire National Henri Becquerel, France, for their assistance in the preparation of Annexes I and II. The IAEA officer responsible for this publication was M.A. Kellett of the Division of Physical and Chemical Sciences.

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† Deceased.

CONTENTS

1. INTRODUCTION

1.1. BACKGROUND

Actinides and their natural decay products are important in the nuclear fuel cycles of all operational and proposed fission reactor systems. Thus, such decay data are directly applicable to a wide range of energy related applications that are based on power generation, fuel manufacture, reprocessing and waste storage, encompassing facility design, safety assessments, waste management and safeguards/proliferation issues. Non-energy related applications of note include nuclear medicine and related functional studies, quality control in various production processes, safeguards to ensure non-proliferation, and addressing many forms of concern in health and safety. Extensive measurement programmes have been undertaken over the past fifty years to address the need for accurate actinide decay data. An additional and necessary feature of this process of data improvement involves the regular assessment and evaluation of published nuclear structure and decay data in order to recognize the evolution and existence of highly satisfactory datasets, and to clearly identify the remaining problems and inadequacies to be addressed, and hopefully to be resolved in future studies.

A previous IAEA coordinated research project (CRP) from 1978 to 1986 resulted in the preparation of a library of recommended actinide decay data, and also provided the catalyst for a series of data measurements that continued into the 1990s [1]. A comprehensive review was undertaken in 2000 [2], in which the status of and requirements for improved actinide decay data were reassessed on the basis of existing decay data libraries (Table 1). Highly relevant decay data studies had been performed over the previous 15 years prior to this particular review, but these data were not combined with earlier datasets, evaluated and incorporated into the recommended IAEA data files of 1986. Furthermore, actinide decay data measurements have been undertaken since 2000, and also need to be considered in future evaluations.

Recommendations have been made in recent years within the nuclear science community that the actinide decay data and their decay chains should be re-evaluated in order to reformulate and update the existing internationally accepted IAEA data files. The International Nuclear Data Committee is a body of external advisers invited by the IAEA to comment in detail on nuclear data matters. At their biennial meetings in May 2002 and 2004, they requested that the IAEA consider the establishment of a CRP entitled Updated Decay Data Library for Actinides that should focus on new measurements and a comprehensive assessment and re-evaluation of the existing data.

1.2. OBJECTIVES

Well defined decay data for actinides and their decay chains are important to the nuclear power industry, particularly in the reprocessing of irradiated fuel and the storage of the resulting products and wastes under controlled conditions. A recommended list of 85 actinides and heavy element decay products evolved from the meetings of the CRP, along with justifications for their inclusion in such a comprehensive tabulation (Table 2). Various efforts were also made to ensure that the planned objectives and ongoing work of the CRP were known to the worldwide community of decay data measurers and evaluators [3–5].

1.2.1. Composition of the coordinated research project

Eight research centres and laboratories formally participated in the CRP by performing the required measurements and evaluations:

(a) Argonne National Laboratory[1], United States of America (represented by F.G. Kondev);
(b) China Nuclear Data Center, China Institute of Atomic Energy, China (represented by Huang Xiaolong);
(c) Radionuclide Metrology Laboratory, Horia Hulubei National Institute of Physics and Nuclear Engineering, Romania (represented by A. Luca);

[1] Work at Argonne National Laboratory was supported by the US Department of Energy, Office of Nuclear Physics, under contract No. DE-AC02-06CH11357.

(d) IAEA (represented by A.L. Nichols);
(e) Laboratoire National Henri Becquerel/Commissariat à l'énergie atomique, France (represented by M.-M. Bé);
(f) National Physical Laboratory, United Kingdom (represented by A. Pearce);
(g) V.G. Khlopin Radium Institute, Russian Federation (represented by V.P. Chechev);
(h) Variable Energy Cyclotron Centre, India (represented by G. Mukherjee).

Various co-workers played important roles in ensuring that the agreed decay data evaluations were undertaken, and their input to the CRP is acknowledged.

1.2.2. Requirements

At the beginning of the CRP, some of the decay data requirements identified prior to and during the course of a previous CRP on Decay Data of the Transactinium Nuclides (1978–1985/1986) still remained to be addressed [1]. The status of much of the actinide decay data of direct application to the fission fuel cycles had also been reassessed in 2000 [2], and provided a sound basis for discussions at the first two coordinated research meetings in 2005 and 2007 [6, 7]. Along with the more familiar actinides, more comprehensive efforts were made to identify and evaluate the natural decay products of ^{235,238}U and ^{232}Th through specific protactinium, actinium, radium, francium, radon, astatine, polonium and bismuth radionuclides to lead, thallium and mercury.

1.2.3. Measurements

New measurements of specific decay data parameters were encouraged throughout the course of the CRP, dependent mainly on the need for improved data and the availability of suitable source materials. These experimental measurements included the determination of ^{240}Pu and ^{245,246}Cm half-lives [8–12], α particle emission probabilities of ^{243,246}Cm and ^{250}Cf [9–12] by means of passivated implanted planar silicon detectors and a magnetic spectrograph, and relative and absolute emission probabilities of X rays and γ rays in the β^- decay of ^{233}Pa and α decay of ^{243}Cm by means of a low energy photon spectrometer and coaxial germanium detectors [12–14]. The deliberately low counting rates in the α particle studies suppressed spurious effects that have previously affected the determination of the α particle intensities, while the γ ray spectra assisted greatly in the redefinition of some of the stronger γ emissions along with the observation and quantification of several new transitions that were introduced into the proposed decay schemes.

1.2.4. Evaluations

Decay data were evaluated from the open literature and laboratory reports published over a considerable period of time leading up to the end of 2008. Agreed evaluation procedures were adopted on the basis of international Decay Data Evaluation Project (DDEP) methodology [15] — the user is referred to a number of the most relevant parallel publications by the Bureau international des poids et mesures (BIPM) [16–20], and the following pages of the BIPM and DDEP web sites:

— http://www.bipm.org/en/publications/monographie-ri-5.html
— http://www.nucleide.org/DDEP_WG/DDEPdata.htm

All evaluations were based on the available experimental data, supplemented with the judicious adoption of well established theory if necessary. Well defined evaluation procedures were strictly applied to derive the recommended half-lives and decay data [15].

1.3. SCOPE

The IAEA, in Technical Reports Series No. 261 [1], published recommended half-lives for 124 radionuclides, γ ray energies and emission probabilities for 47 radionuclides, and α particle energies and emission probabilities for 29 radionuclides, although all new measurements and decay data evaluations at that time focused on only 23 radionuclides (of which two contained additional decay chain data (^{229}Th and ^{232}U)).

A list of 85 radionuclides evolved from the CRP meetings in 2005 [6] and 2007 [7], embracing actinides and their decay products of importance in both energy and non-energy applications. Members of the CRP reviewed and modified the list of actinides and decay products to be included in the updated IAEA actinide decay data library. All CRP meetings were held in Vienna in 2005 [6], 2007 [7] and 2009 [21] to monitor progress, promote measurements, implement the agreed evaluation methodology, and agree upon the final recommended datasets, as presented in this publication.

One of a number of agreed aims was to undertake comprehensive decay data evaluations with much greater detail than the earlier CRP initiative of 1978–1986. The decay data of each one of the 85 radionuclides was re-evaluated within this CRP as an international exercise led mainly by laboratories involved in the DDEP [15–20, 22, 23].

1.4. UPDATE OF THE DATABASE

A major requirement has been to redefine and improve the consistency and uniformity of the IAEA actinide decay data library. This objective was achieved through the adoption of an agreed evaluation methodology that provides consistent and high quality results. A further aim and expectation is that users of such data in both energy and non-energy applications will accept the data in this publication and introduce the recommended values into their work.

Annex I[2] provides an assembly of the recommended self-consistent decay data, covering half-lives, and α, β^-, EC/β^+, γ and X ray energies and emission probabilities of the selected radionuclides. More detailed technical descriptions of the evaluations are described in Annex II (on the accompanying CD-ROM). This detail was judged to be essential in order to record and demonstrate the quality of the resulting data files, and allows the reader to trace the origins of the nuclear data used to determine the recommended values.

The recommended data have been made available in two internationally agreed formats, so as to facilitate the integration of the recommended decay data files into the computational systems of Member States: data in the Evaluated Nuclear Structure Data File (ENSDF) format can be found in Annex III, and in the Evaluated Nuclear Data File (ENDF-6) format in Annex IV. A comprehensive list of the 85 nuclei evaluated is given in Annex V. Annexes II–V are on the accompanying CD-ROM.

TABLE 1. ACTINIDE DECAY DATA — STATUS, 2000 [2]

Radionuclide	Data type[a]	Accuracy achieved (%)[b]	Requirements
^{228}Th decay chain	$T_{1/2}$	0.1–0.9	Overall, desired data accuracy has been achieved
	P_γ^{c}	2–5	
^{229}Th decay chain	$T_{1/2}$	2	Possible need for marginal improvements
	P_γ^{c}	1–3	
^{230}Th	$T_{1/2}$	0.4	Desired data accuracy has been achieved
^{232}Th decay chain	$T_{1/2}$	0.4	No known stringent requirements — however, data need to be reassessed (^{232}Th/^{233}U nuclear fuel cycle)
	P_γ	—	
^{233}Th	$T_{1/2}$	0.5	P_β and P_γ requirements are not satisfied
	P_β	~10	
	P_γ	~10	
^{231}Pa	$T_{1/2}$	0.3	Possible need for marginal improvements in P_α and P_γ
	P_α	2–7	
	P_γ	2–5	

[2] The annexes have been prepared from the original material as submitted for publication and have not been edited by the editorial staff of the IAEA.

TABLE 1. ACTINIDE DECAY DATA — STATUS, 2000 [2] (cont.)

Radionuclide	Data type[a]	Accuracy achieved (%)[b]	Requirements
^{233}Pa	$T_{1/2}$	0.4	Requirements for more accurate P_β data
	P_β	~10	
	P_γ	1	
^{232}U	$T_{1/2}$	0.7	Desired data accuracy has been achieved
	P_α	1	
	P_γ	1–2	
^{233}U	$T_{1/2}$	0.1	Data need to be reassessed ($^{232}Th/^{233}U$ nuclear fuel cycle)
	$(T_{1/2})_{SF}$	—	
	P_α	1–2	
	P_X[d]	—	
	P_γ	1–2	
^{234}U	$T_{1/2}$	0.1	Desired data accuracy has been achieved
	$(T_{1/2})_{SF}$	~50	
	P_α	0.03–1	
	P_γ	1–2	
^{235}U	$T_{1/2}$	0.1	Requirement for more accurate P_α and P_γ data (particularly low energy γ rays (<120 keV))
	$(T_{1/2})_{SF}$	~50	
	P_α	5–12	
	P_γ	1	
^{236}U	$T_{1/2}$	0.1	Requirements for more accurate P_α and P_γ data
	$(T_{1/2})_{SF}$	3	
	P_α	5–15	
	P_γ	10	
^{237}U	P_γ	2–3	Requirements for more accurate P_γ data for the main γ ray transitions
^{238}U	$T_{1/2}$	0.1	P_α measurements have improved accuracy to 2%, so that a better defined decay scheme can be constructed
	$(T_{1/2})_{SF}$	1.2	
	P_α	5–20	
	P_X[d]	—	
	P_γ	13	
^{239}U	$T_{1/2}$	0.2	Possible need for better defined P_β data (decay heat calculations)
	P_β	2–20	
	P_γ	2	
^{236}Np	$T_{1/2}$	10	Requirements for more accurate $T_{1/2}$ and P_β data
	BF	2	
	P_β	?	
	P_γ	2	
^{236m}Np	$T_{1/2}$	2	Desired data accuracy has been achieved
	BF	2	
^{237}Np	$T_{1/2}$	0.5	Significant efforts were expended to measure P_α, P_γ, P_X and P_e (i.e. electron spectra); however, a consistent and comprehensive decay scheme has yet to evolve due to the underlying complexity
	P_α	20	
	P_X[d]	—	
	P_γ	1–2	
^{238}Np	$T_{1/2}$	0.1	Requirements for more accurate P_γ data
	P_γ	5	

TABLE 1. ACTINIDE DECAY DATA — STATUS, 2000 [2] (cont.)

Radionuclide	Data type[a]	Accuracy achieved (%)[b]	Requirements
^{239}Np	$T_{1/2}$	0.2	Possible need for better defined P_β data (decay heat calculations)
	P_β	2–15	
	P_γ	1–2	
^{236}Pu	$T_{1/2}$	3	Requirements for more accurate P_α and P_γ data
	P_α	1–3	
	P_γ	30	
^{237}Pu	$T_{1/2}$	0.1	Desired data accuracy would appear to have been achieved
	P_X[d]	—	
^{238}Pu	$T_{1/2}$	0.3	Desired data accuracy has been achieved
	$(T_{1/2})_{SF}$	4	
	P_α	<1	
	P_X[d]	2–3	
	P_γ	1–2	
^{239}Pu	$T_{1/2}$	0.1	Desired data accuracy has been achieved, with the derivation of a complex and comprehensive decay scheme
	P_α	1–2	
	P_X[d]	3	
	P_γ	<1	
^{240}Pu	$T_{1/2}$	0.1	Possible need for marginal improvements in P_α and P_γ data
	$(T_{1/2})_{SF}$	3	
	P_α	1–2	
	P_X[d]	3	
	P_γ	1–2	
^{241}Pu	$T_{1/2}$	0.7	Concerns associated with $T_{1/2}$ have been assuaged; desired data accuracy has been achieved
	$(T_{1/2})_{SF}$	0.8	
	P_γ	1–2	
^{242}Pu	$T_{1/2}$	0.3	Requirements for better characterized P_X; other parameters are reasonably well defined
	$(T_{1/2})_{SF}$	1.5	
	P_α	<1	
	P_X[d]	—	
	P_γ	2–5	
^{241}Am	$T_{1/2}$	0.15	Requirements for improved accuracy in P_X and P_γ data; significant efforts have been made to determine P_γ (59.54 keV)
	P_α	1–2	
	P_X[d]	3	
	P_γ	1–10	
^{242}Am	$T_{1/2}$	0.1	Desired data accuracy has been achieved
	BF	1	
^{242m}Am	$T_{1/2}$	1.4	Requirements for improved accuracy in P_X; α decay mode has been well defined
	BF	0.03	
	P_X[d]	—	
^{243}Am	$T_{1/2}$	0.2	Both P_α and P_γ measurements are merited, and such studies were performed to improve the accuracy of these data
	P_α	0.5–20	
	P_X[d]	—	
	P_γ	2	

TABLE 1. ACTINIDE DECAY DATA — STATUS, 2000 [2] (cont.)

Radionuclide	Data type[a]	Accuracy achieved (%)[b]	Requirements
^{242}Cm	$T_{1/2}$	0.04	Desired data accuracy has been achieved
	$(T_{1/2})_{SF}$	2	
	P_{γ}	4–20	
^{243}Cm	$T_{1/2}$	0.3	While the major γ ray emissions are reasonably well characterized, some of the lower intensity transitions are poorly defined
	P_{α}	1–3	
	P_X[d]	—	
	P_{γ}	2–10	
^{244}Cm	$T_{1/2}$	0.3	Desired data accuracy has been achieved
	$(T_{1/2})_{SF}$	0.4	
	P_{α}	<1	
	P_X[d]	3	
	P_{γ}	2–10	
^{248}Cm	$T_{1/2}$	1	Requirements for more accurate P_X and P_{γ} data
	P_{α}	<1	
	P_X[d]	–	
	P_{γ}	~5	
^{250}Cf	$T_{1/2}$	0.7	Challenging requirements for $T_{1/2}$ and $(T_{1/2})_{SF}$ need to be addressed (0.2 and 2%, respectively)
	$(T_{1/2})_{SF}$	4	
^{252}Cf	$T_{1/2}$	0.3	Discrepant $T_{1/2}$ data
	$(T_{1/2})_{SF}$	0.3	

[a] $T_{1/2}$: total half-life; $(T_{1/2})_{SF}$: spontaneous fission half-life; BF: branching fraction; P_{α}: α particle emission probability; P_{β}: β particle emission probability; P_X: X ray emission probability; P_{γ}: γ ray emission probability.

[b] Uncertainties for α particle, β particle, X ray and γ ray emission probabilities apply to the major transitions only, corresponding to the 1σ confidence level.

[c] The listed requirements for decay chain radionuclides represent those for the more prominent transitions of all members of the decay chain.

[d] P_X refers to L X ray emission probabilities.

TABLE 2. SELECTED ACTINIDES AND THEIR DECAY CHAINS

Radionuclide	Origins	Applications
^{206}Hg	^{238}U (4n + 2) decay chain	
^{206}Tl	^{238}U (4n + 2) decay chain	
^{207}Tl	^{235}U (4n + 3) decay chain	
^{208}Tl	^{232}Th 4n decay chain	
^{209}Tl	^{237}Np (4n + 1) decay chain	
^{210}Tl	^{238}U (4n + 2) decay chain	
^{209}Pb	^{237}Np (4n + 1) decay chain	
^{210}Pb	^{238}U (4n + 2) decay chain	
^{211}Pb	^{235}U (4n + 3) decay chain	
^{212}Pb	^{232}Th 4n decay chain	
^{214}Pb	^{238}U (4n + 2) decay chain	
^{210}Bi	^{238}U (4n + 2) decay chain	
^{211}Bi	^{235}U (4n + 3) decay chain	
^{212}Bi	^{232}Th 4n decay chain	Therapeutic nuclear medicine — monoclonal antibody attachment
^{213}Bi	^{237}Np (4n + 1) decay chain	Therapeutic nuclear medicine — monoclonal antibody attachment
^{214}Bi	^{238}U (4n + 2) decay chain	
^{215}Bi	^{235}U (4n + 3) decay chain	
^{210}Po	^{238}U (4n + 2) decay chain	
^{211}Po	^{235}U (4n + 3) decay chain	Therapeutic nuclear medicine (short lived daughter of ^{211}At)
^{212}Po	^{232}Th 4n decay chain	
^{213}Po	^{237}Np (4n + 1) decay chain	
^{214}Po	^{238}U (4n + 2) decay chain	
^{215}Po	^{235}U (4n + 3) decay chain	
^{216}Po	^{232}Th 4n decay chain	
^{218}Po	^{238}U (4n + 2) decay chain	
^{211}At		Therapeutic nuclear medicine — monoclonal antibody attachment, and also used with ^{18}F for in vivo studies
^{215}At	^{235}U (4n + 3) decay chain	
^{217}At	^{237}Np (4n + 1) decay chain	
^{218}At	^{238}U (4n + 2) decay chain	
^{219}At	^{235}U (4n + 3) decay chain	
^{217}Rn	^{237}Np (4n + 1) decay chain	
^{218}Rn	^{238}U (4n + 2) decay chain	
^{219}Rn	^{235}U (4n + 3) decay chain	
^{220}Rn	^{232}Th 4n decay chain	
^{222}Rn	^{238}U (4n + 2) decay chain	
^{221}Fr	^{237}Np (4n + 1) decay chain	
^{223}Fr	^{235}U (4n + 3) decay chain	
^{223}Ra	^{235}U (4n + 3) decay chain	Therapeutic nuclear medicine — monoclonal antibody attachment
^{224}Ra	^{232}Th 4n decay chain	
^{225}Ra	^{237}Np (4n + 1) decay chain	
^{226}Ra	^{238}U (4n + 2) decay chain	Primary efficiency calibration standard
^{228}Ra	^{232}Th 4n decay chain	
^{225}Ac	^{237}Np (4n + 1) decay chain	Therapeutic nuclear medicine — monoclonal antibody attachment (noteworthy decay chain predecessor of ^{213}Bi)
^{227}Ac	^{235}U (4n + 3) decay chain	Therapeutic nuclear medicine — monoclonal antibody attachment (parent of ^{223}Ra)

TABLE 2. SELECTED ACTINIDES AND THEIR DECAY CHAINS (cont).

Radionuclide	Origins	Applications
^{228}Ac	^{232}Th 4n decay chain	
^{228}Th	^{232}Th 4n decay chain	Primary efficiency calibration standard; therapeutic nuclear medicine — monoclonal antibody attachment (noteworthy decay chain predecessor of ^{212}Bi)
^{229}Th	^{237}Np (4n + 1) decay chain	Mass determination in (4n + 1) decay chain; therapeutic nuclear medicine — monoclonal antibody attachment (parent of ^{225}Ac)
^{231}Th	^{235}U (4n + 3) decay chain	
^{232}Th	^{232}Th 4n decay chain	Th–U fuel cycle
^{233}Th		
^{234}Th	^{238}U (4n + 2) decay chain	
^{231}Pa	^{235}U (4n + 3) decay chain	Non-destructive assay
^{233}Pa	^{237}Np (4n + 1) decay chain	Mass determination
^{234}Pa	^{238}U (4n + 2) decay chain	
^{234m}Pa	^{238}U (4n + 2) decay chain	Environmental studies
^{232}U		Shielding calculations
^{233}U	^{237}Np (4n + 1) decay chain	Th–U fuel cycle and environmental studies
^{234}U	^{238}U (4n + 2) decay chain	Mass determination and non-destructive assay
^{235}U		Mass determination and non-destructive assay
^{236}U		Mass determination and non-destructive assay
^{237}U		Non-destructive assay
^{238}U		Non-destructive assay
^{239}U		Decay heat
^{236}Np		^{232}U production
^{236m}Np		^{232}U production
^{237}Np		Mass determination and environmental studies
^{238}Np		
^{239}Np		Decay heat and detector efficiency calibration standard
^{238}Pu		Non-destructive assay
^{239}Pu		Non-destructive assay and environmental studies
^{240}Pu		Non-destructive assay and environmental studies
^{241}Pu		Non-destructive assay
^{242}Pu		Non-destructive assay and environmental studies
^{241}Am		Primary efficiency calibration standard; diagnostic nuclear medicine — heart imaging and detection of osteoporosis
^{242}Am		^{244}Cm production and Am mass determination
^{242m}Am		^{244}Cm production and Am mass determination
^{243}Am		Long term storage and environmental studies
^{244}Am		^{244}Cm production
^{244m}Am		^{244}Cm production
^{242}Cm		Non-destructive assay
^{243}Cm		Non-destructive assay and environmental studies
^{244}Cm		Non-destructive assay and environmental studies
^{245}Cm		Long term storage and environmental studies
^{246}Cm		Long term storage and environmental studies
^{252}Cf		Neutron standard; therapeutic nuclear medicine — treatment of cervical, melanoma and brain carcinomas

2. EVALUATION METHODOLOGY

Data were evaluated from the open literature and available laboratory reports published over a considerable period of time. Omissions of individual values had to be justified by the evaluator on the basis of their perceived quality and validity or other specific grounds.

Evaluation efforts focused on measurements of the half-lives and absolute emission probabilities of the various decay processes (e.g. α, β^-, EC/β^+, Auger electrons, conversion electrons, X rays and γ rays). Transition energies were most frequently derived from well defined evaluations of the nuclear level energies [24] and tabulations of X ray, Auger electron and electron subshell binding energies [25–28], although other references were cited when suitable data were not available from these particular sources. Emission probabilities of the K and L X rays, and K and L Auger electrons were calculated by means of the EMISSION program for radionuclides with EC and γ transitions (adoption of EMISSION version 4.01, 28 January 2003, with the EMISSION database extended to $Z = 96$) [29, 30].

2.1. AVERAGING PROCESS

The recommended decay data consist of the weighted average of the published values in which the weights have been taken to be the inverse of the squares of the overall uncertainties. A set of data is defined as self-consistent if the probability of χ^2 exceeding the calculated value is 1% or less. When the data in a set are inconsistent, the method of limitation of the relative weight is recommended. If any particular weight contributes over 50% of the total, the corresponding uncertainty is increased, so that the contribution of the value to the sum of the weights will be less than 50%. The weighted average is then recalculated and adopted if the probability of χ^2 exceeding the recalculated value is greater than 1%; otherwise, the weighted or unweighted mean is chosen according to whether or not the 1σ uncertainty on each mean value includes the other term — the basis for the latter choice is that it may be unreasonable to use the weighted average if the data do not comprise a consistent set.

2.2. DATA CONSISTENCY

Under certain circumstances, an applications library needs to contain decay data that are complete and consistent. The normal procedure would be to evaluate and prepare individual files that have been internally tested for consistency between the various recommended parameters that constitute the decay scheme (i.e. α, β^-, EC, β^+ and γ transitions). Hopefully, consistency within a particular radionuclidic decay scheme evolves during the evaluation process.

The consistency of a recommended set of decay data can be determined by calculating the percentage deviation between the effective Q-value:

$$\text{effective } Q\text{-value} = \sum_{i=1}^{\text{all BF}} Q_i \times \text{BF}_i \tag{1}$$

where Q_i and BF_i are the Q-value and branching fraction of the ith decay mode (i.e. weighted sum of the evaluated Q-values of the radionuclide), and the calculated Q-value:

$$\text{calculated } Q\text{-value} = \sum_{i}^{\text{all }\alpha} E_{\alpha_i} P_{\alpha_i} + \sum_{j}^{\text{all }\beta} E_{\beta_j} P_{\beta_j} + \sum_{k}^{\text{all }\gamma} E_{\gamma_k} P_{\gamma_k} + \sum_{l}^{\text{all ce}} E_{\text{ce}_l} P_{\text{ce}_l} + \cdots\cdots \tag{2}$$

where $E_{\alpha_i}, E_{\beta_j}, E_{\gamma_k}, E_{\text{ce}_l}$, etc. and $P_{\alpha_i}, P_{\beta_j}, P_{\gamma_k}, P_{\text{ce}_l}$, etc. are the energies and emission probabilities of the ith α particle, jth β particle, kth γ ray, lth conversion electron, etc. of the individual decay process.

The consistency of the recommended decay scheme data (expressed as percentage deviation) can be quantified by the simple equation:

$$\% \text{ consistency} = \left[\frac{(\text{effective } Q\text{-value}) \; - \; (\text{calculated } Q\text{-value})}{(\text{effective } Q\text{-value})}\right] \times 100 \qquad (3)$$

Consistency checks for the recommended decay data files were undertaken for the actinides and their natural decay products, and are listed in Table 3. Percentage deviations above 5% are regarded as high and imply a poorly defined decay scheme; a value of less than 5% indicates the construction of a reasonably consistent decay scheme. However, while there are merits in undertaking such a form of statistical analysis, subsequent adjustments to improve consistency may not always be appropriate.

2.3. STATUS

Brief summaries of the inadequacies found during the decay scheme evaluations of each individual radionuclide are given in the comments section of Table 3. All of these observations are entirely based on individual attempts to evaluate and derive comprehensive and consistent decay schemes and their associated decay data. Under such circumstances, new data requirements have primarily been driven almost exclusively by the evaluators' desire for perceived reliability and completeness, rather than due consideration of the relative importance of each specific radionuclide. While the healthy iterative process of measurements and evaluations is critical to logical and systematic improvements to decay data, the real need for further experimental studies also depends on the relative importance of accruing improved data for the purpose of application as well as basic research.

Some of the newly recommended decay data for the actinides and particularly the natural decay products are based on rather old measurements, while some other equivalent measurements have been shown to be disparate. New experimental studies would be extremely beneficial if the particular radionuclide plays an important role in intermediate term and long term fuel management (and, more specifically, will be recycled and re-irradiated). Inconsistencies were observed when comparisons were made between the population and depopulation of the daughter nuclear levels, most notably when deriving transition probabilities from experimentally determined α particle and γ ray emission probabilities (e.g. ^{224}Ra and ^{226}Ra). All of these irregularities and other anomalies are noted in Table 3, and are described within the detailed comments of Annex II.

These latest efforts to evaluate and assemble comprehensive decay schemes for actinides and their decay products have significantly improved the consistency and overall quality of the resulting recommended decay data. Evaluated nuclear data include: half-lives; Q-values; branching fractions; energies, emission probabilities and other transition properties of α, β^-, EC/β^+, Auger electrons, conversion electrons, X rays and γ rays; and the uncertainties of all of the parameters corresponding to the 1σ confidence level. The CRP participants believe that these data represent significant improvements when compared with the contents of other existing decay data files and libraries, and should be internationally accepted as improvements in the definition and quantification of the decay schemes of the actinides and their decay chain products.

TABLE 3. DECAY DATA EVALUATIONS, CONSISTENCY AND COMMENTS

Radionuclide	Evaluator[a]	Consistency[b]	Comments
^{206}Hg	ANL	0(9)%	The recommended half-life is the weighted mean of three measurements from the 1960s (with two values from the same author) — new measurements are merited. A simple decay scheme of three β and five γ transitions was derived from the available measurements.
^{206}Tl	ANL	0.00(6)%	An extensive set of eight half-life measurements made between 1941 and 1972 was used to derive the recommended half-life. A simple decay scheme dominated by the transition (99.885%) was proposed from the available measurements.
^{207}Tl	ANL	0.0(5)%	The recommended half-life is the weighted mean of four measurements carried out between 1931 and 1967. A simple decay scheme dominated by the transition (99.729%) was derived from the available measurements.
^{208}Tl	IAEA	0.2(3)%	The half-life is the weighted mean of four measurements, with the uncertainty increased artificially to encompass the most precise study. A consistent decay scheme has been derived, assuming no direct β decay to the 2614.55 keV and ground states of ^{208}Pb (based on spin-parity considerations).
^{209}Tl	ANL	1(1)%	Half-life measurements are scarce — further studies are merited. The proposed decay scheme is dominated by the transition (97.70%). However, a significant number of observed γ ray transitions have not been identified within the recommended decay scheme (while 15 were successfully assigned, 11 remain unplaced) — further γ ray studies are required to clarify and resolve existing difficulties.
^{210}Tl	LNHB	0(3)%	The decay scheme is based mainly on measurements published in 1964 — many β^- particle emission probabilities are uncertain, and no evidence exists for transitions with energies >3 MeV. Further β^- particle emission probability measurements are strongly recommended to resolve these discrepancies.
^{209}Pb	ANL	0.0(3)%	The recommended half-life is the weighted mean of five measurements undertaken from 1941 to 1972. A very simple decay scheme consists of only one β^- transition directly to the ground state of ^{209}Bi.
^{210}Pb	LNHB	–0.6(15)%	Recently measured L X rays are not self-consistent, and do not agree with values deduced from the decay scheme — further X ray measurements would assist in determining the origin of these discrepancies.
^{211}Pb	ANL	–0.1(6)%	Experimental data for the half-life are very scarce — new measurements are required to confirm two previous studies in 1932 and 1965. A significant number of observed γ ray transitions have not been identified within the recommended decay scheme (while 22 were successfully assigned, 18 remain unplaced) — further γ ray measurements are required to clarify and resolve existing difficulties, and should include γ–γ coincidence studies.
^{212}Pb	IAEA	0.2(12)%	The recommended half-life is the weighted mean of three old measurements — further studies are merited to determine this value with greater confidence. A reasonably simple decay scheme has been constructed from the γ ray measurements — five distinct γ ray emissions were identified with ^{212}Pb decay in these studies. Although low energy γ ray transitions have been postulated to exist in the decay scheme (with energies between 40 and 60 keV), this possibility was rejected on the basis of insufficient experimental evidence in the open literature. Further studies are required to resolve this issue, and confirm the correctness of the proposed decay scheme.

TABLE 3. DECAY DATA EVALUATIONS, CONSISTENCY AND COMMENTS (cont.)

Radionuclide	Evaluator[a]	Consistency[b]	Comments
^{214}Pb	LNHB	–0.5(15)%	There is only one half-life measurement from 1931 — further measurements are recommended. Problems associated with calculating internal conversion coefficients suggest that new measurements of the multipolarities and mixing ratios of the γ transitions would be beneficial.
^{210}Bi	LNHB	0.00(10)%	The decay scheme is based mainly on α particle emission probabilities measured prior to 1962, with no direct measurements of the β^- particle and X ray emission probabilities. The most recent half-life measurement dates back to 1959. β^- particle and X ray emission probability measurements are strongly recommended to give greater confidence in the proposed decay scheme.
^{211}Bi	IFIN-HH	–0.004(7)%	Although the relatively old experimental half-life data are consistent, further measurements would be beneficial. New K X ray, α and β^- particle emission probabilities are required, because these data show discrepancies.
^{212}Bi	IAEA	0.12(24)%	The recommended half-life is the unweighted mean of two somewhat old measurements (from 1914 and 1961) — further studies are merited to determine this value with greater confidence. The 39.858 keV γ ray is particularly important in the α branch, and further measurements are required to determine the emission probability of this transition with greater confidence.
^{213}Bi	CNDC	0.1(5)%	New half-life measurements are recommended.
^{214}Bi	LNHB	0.3(5)%	There is only one half-life measurement from 1956 — further measurements would be beneficial.
^{215}Bi	IAEA	0(8)%	A reasonably complex but inadequate decay scheme has been constructed from a single set of γ ray measurements. Direct β^- feeding to the ground state of the daughter ^{215}Po has not been determined with confidence. The evaluators resorted to comparisons with the β^- decay of other odd–even Bi radionuclides and β^- decay theory (fifth power law of the β^- end point energy) in order to define the β^- and γ ray emission probabilities in absolute terms. Further experimental studies are required to derive the decay scheme, particularly the absolute γ ray emission probabilities and direct β^- feeding to the ground state of the daughter ^{215}Po.
^{210}Po	LNHB	0.0000(18)%	The decay scheme is based mainly on γ ray emission probabilities measured prior to 1957, with no direct measurements of the α particle and X ray emission probabilities. The most recent half-life measurement dates back to 1964. Both α particle and X ray emission probability measurements are strongly recommended to give greater confidence in the proposed decay scheme.
^{211}Po	IFIN-HH	0.00(3)%	Although the relatively old experimental half-life data are consistent, further measurements would be beneficial.
^{212}Po	IAEA	0.000(2)%	Extremely short lived radionuclide (half-life of 0.300(2) μs).
^{213}Po	CNDC	0.03(14)%	Further measurements of γ ray and α particle emission probabilities are required.
^{214}Po	LNHB	0.0000(15)%	Indirect and inadequate experimental data — new direct measurements of α particle and γ ray emission probabilities are required.
^{215}Po	KRI	0.01(3)%	The decay scheme is incomplete — measurements of weak γ ray transitions in α decay and β^- particle emission probabilities in β^- decay are required.

TABLE 3. DECAY DATA EVALUATIONS, CONSISTENCY AND COMMENTS (cont.)

Radionuclide	Evaluator[a]	Consistency[b]	Comments
^{216}Po	IAEA	0.000(10)%	The recommended half-life is the weighted mean of three somewhat old measurements and a more recent study — further measurements are merited. A simple decay scheme was derived from γ ray studies that were also used to calculate the two proposed α particle emission probabilities. Measurements of the emission probabilities of the α particles and γ rays are required to confirm the validity of the proposed decay scheme.
^{218}Po	LNHB	0.000(4)%	The decay scheme is based on β^- emission measurements undertaken in 1952 — new measurements of α and β^- particle emission probabilities are required.
^{211}At	IAEA	–0.01(17)%	A reasonably simple decay scheme has been constructed from α particle and γ ray measurements, and studies of the α branching fraction.
^{215}At	KRI	0.00(5)%	The decay scheme is not fully complete — weak α transitions are possible due to higher ^{211}Bi levels known from ^{211}Pb β^- decay, but not yet observed in ^{215}At α decay.
^{217}At	CNDC	0.02(3)%	The minor β^- decay branch of ^{217}At has not been studied, and further measurements of the γ ray and α particle emission probabilities for the main α branch are required.
^{218}At	LNHB	0.82(18)%	Early experimental data from 1948 and 1958 — new measurements of α and β^- particle emission probabilities are required.
^{219}At	IAEA	0.0(3)%	Little of substance can be gleaned from the literature. Hence, a simple decay scheme has been tentatively constructed; it is assumed that only α and β^- feed directly to the ground states of the daughters ^{215}Bi and ^{219}Rn, although these processes have been neither observed satisfactorily nor quantified experimentally. Spectral studies are required to assemble and quantify the decay scheme with much greater confidence.
^{217}Rn	CNDC	0.00(6)%	A very simple decay scheme was constructed for single α particle decay to the ^{213}Po ground state.
^{218}Rn	LNHB	0.00(4)%	Indirect and inadequate experimental data — new direct measurements of α and β^- particle emission probabilities are required.
^{219}Rn	IAEA	0.0(10)%	A reasonably comprehensive and consistent decay scheme has been derived from a combination of α particle and γ ray measurements.
^{220}Rn	IAEA	–0.001(20)%	The recommended half-life is the weighted mean of five rather disparate measurements — further studies are merited. A simple decay scheme was derived from γ ray studies that were also used to calculate α particle emission probabilities. Measurements of the α particle emission probabilities are required to confirm the validity of the proposed decay scheme.
^{222}Rn	LNHB	0.002(12)%	Early measurements of α particle emission probabilities — further such studies are required.
^{221}Fr	CNDC	0.08(4)%	Measurement of the γ ray emission probability for the 218.1 keV γ ray deemed to be necessary.
^{223}Fr	CNDC	–1(11)%	Accurate measurement of the γ ray emission probability for the 204.9 keV γ ray deemed to be necessary.
^{223}Ra	KRI	0.8(22)%	For a number of daughter ^{219}Rn levels, there is disagreement between the measured probabilities of α transitions and values deduced from the $P_{(\gamma+ce)}$ balance. Further measurements are needed to determine the γ ray transitions and ^{223}Ra α decay scheme with greater precision.

TABLE 3. DECAY DATA EVALUATIONS, CONSISTENCY AND COMMENTS (cont.)

Radionuclide	Evaluator[a]	Consistency[b]	Comments
^{224}Ra	IAEA	0.00(7)%	The recommended half-life represents the least squares weighted mean of two somewhat old studies and a much more recent measurement — further measurements are required to determine the half-life with greater confidence. There is an unsatisfactory lack of agreement between the derivation of the decay scheme by means of the measured γ ray emission probabilities, compared with an equivalent procedure involving the measured α particle emission probabilities. Both the measurement and spectral analysis techniques used to determine the γ ray emission probabilities were judged to be more reliable and, therefore, preference was given to α particle emission probabilities derived by calculation from the recommended γ ray emission probabilities and their theoretical internal conversion coefficients (hence, the preparation of a highly consistent decay scheme). However, measurements of α particle and γ ray emission probabilities remain inconsistent, and further spectroscopic studies are required.
^{225}Ra	CNDC	0(3)%	Measurements of the half-life are deemed necessary, as well as the emission probability for the 40.1 keV γ ray.
^{226}Ra	LNHB	0.00(6)%	Only two sets of inconsistent data are known to exist for the α particle emission probabilities — further measurements are required. X ray measurements would also prove useful.
^{228}Ra	IFIN-HH	0(13)%	Although the relatively old experimental half-life data are consistent, further measurements would be beneficial. Measured data for β^- transition probabilities are inconsistent with the proposed decay scheme derived from γ ray emission probabilities — further measurements are required.
^{225}Ac	CNDC	–1(3)%	There are only two measurements of half-life (the most recent in 1950) — further measurements are desirable. New measurements of γ ray and α particle emission probabilities are required in order to help resolve the inconsistency seen with the 99.65 and 99.90 keV γ rays.
^{227}Ac	KRI	–1.2(19)%	The data for β^- and γ ray emission probabilities are only approximate — more accurate measurements would generate confidence in the derived decay scheme.
^{228}Ac	NPL	5(5)%	The placement of γ ray transitions in the decay scheme leads to inconsistencies in the β^- transitions. Further investigation of the γ ray emissions may help to assemble a more consistent decay scheme.
^{228}Th	IAEA	–0.1(7)%	A reasonably well defined decay scheme was derived from a combination of α particle and γ ray measurements. Although a consistent decay scheme was derived, further detailed α particle measurements are required to develop and support the overall correctness of the proposed decay scheme.
^{229}Th	VECC	–3(1)%	A reasonably complete decay scheme was formulated with more than 200 γ rays. However, there are 26 unplaced γ rays. Efficient coincidence measurements are needed to place them in the level scheme of ^{225}Ra, and aid in reducing the percentage deviation. There was some evidence of α decay from the first excited state at 7.6 eV — more studies are needed to confirm this form of decay from this nuclear level.
^{231}Th	CNDC	3(20)%	Further measurements are required of γ ray emission probabilities for γ rays <120 keV — a relatively large dataset with some inconsistencies.
^{232}Th	NPL	0.3(17)%	A reasonable set of half-life data which are consistent. There are few published data and a large spread in the γ ray emission probabilities. More precise α particle emission probability measurements would help support the decay scheme.

TABLE 3. DECAY DATA EVALUATIONS, CONSISTENCY AND COMMENTS (cont.)

Radionuclide	Evaluator[a]	Consistency[b]	Comments
^{233}Th	KRI	–0.2(3)%	Data on γ ray emission probabilities have been taken mainly from recent measurements from 2008. Precise measurements of β transitions are required.
^{234}Th	IFIN-HH	0(6)%	Although the relatively old experimental half-life data are consistent, further measurements would be beneficial. Measured data for $β^-$ transition probabilities are inconsistent, with the decay scheme derived from γ ray emission probabilities — further measurements are required. X ray measurements would also be useful — no such data exist.
^{231}Pa	NPL	1.0(23)%	The half-life data are unsatisfactory and there is a strong need for new measurements. Further measurements of low energy γ transitions and α particle emission probabilities are also required to develop a more reliable decay scheme.
^{233}Pa	KRI	0(4)%	Precise measurements of the low energy γ rays and L X rays with a pure source of ^{233}Pa would prove beneficial.
^{234}Pa	CNDC	–6(3)%	The proposed decay scheme is based mainly on one set of measurements, in which the total intensity $ΣI(β^-)$ is overstated (110%). Twenty eight observed γ rays with 3.2% of the total intensity were not placed in the proposed decay scheme. Further measurements are needed to determine the γ transitions and the decay scheme with greater precision.
^{234m}Pa	CNDC	0.00(21)%	The isomeric γ transition energy is uncertain (<10 keV). Sixteen γ rays with 0.018% total intensity were not placed in the proposed decay scheme. Further accurate measurements of the absolute emission probability of the 1001.026 keV γ ray are required.
^{232}U	NPL	0.0(8)%	A consistent decay scheme has been assembled. The half-life data are sparse and inconsistent, and further measurements would be beneficial.
^{233}U	VECC	0.4(6)%	The samples used for the measurements are enriched to 99.9% ^{233}U, although a small amount of impurity may arise from ^{232}Th. The extensive and complex decay scheme is reasonably complete and consistent, and was obtained from several sets of measurements. The excitation energy of the first excited state in the daughter ^{229}Th has been measured to be 7.6 eV, a value significantly higher than previously estimated (~4 eV). However, the half-life of this metastable state is not well known — a recent study indicates a half-life value of either <6 h or >20 d at the 99% confidence level — further measurements are required.
^{234}U	LNHB	0.00(4)%	Further measurement of the γ ray and α particle emission probabilities is required — all published results are from the same laboratory/group.
^{235}U	CNDC	0.6(3)%	New half-life measurements are recommended.
^{236}U	IFIN-HH	0(6)%	Further measurements of α particle emission probabilities are required, as only one known set of measurements is published. X ray measurements would also be useful — no reported data exist.
^{237}U	KRI	0(4)%	Early experimental half-life data are poor — further measurements are required. Precise measurements of the $β^-$ transition energies and probabilities would prove beneficial.
^{238}U	LNHB	0.0(7)%	Further measurements of the half-life and α particle emission probabilities are required.
^{239}U	KRI	0(3)%	A number of reported γ rays were not placed in the decay scheme — although further measurements are merited, the total relative intensity of these unplaced γ rays is only ~0.5% of all observed γ rays.

TABLE 3. DECAY DATA EVALUATIONS, CONSISTENCY AND COMMENTS (cont.)

Radionuclide	Evaluator[a]	Consistency[b]	Comments
^{236}Np	KRI	0(9)%	There are inadequate experimental data, including two conflicting measurements of the EC/β^- branching ratio — further measurements are required.
^{236m}Np	KRI	0(11)%	There are inadequate experimental data, including measurements of the EC/β^- branching ratio — further measurements are required.
^{237}Np	KRI	–0.2(4)%	The proposed decay scheme cannot be considered complete since the α feedings measured directly in the ^{237}Np α decay and those deduced from the γ ray intensity balances of the nuclear levels are not in good agreement — further measurements are required.
^{238}Np	KRI	–0.1(24)%	The approximate data available for β^- transition probabilities are inconsistent with the decay scheme derived from γ ray emission probabilities — further measurements are required.
^{239}Np	KRI	0.9(21)%	Discrepant measured data for β^- transition probabilities are in poor agreement with the decay scheme derived from γ ray emission probabilities — further measurements are required.
^{238}Pu	KRI	0.00(9)%	Some expected weak γ ray transitions were not observed directly in ^{238}Pu α decay, but were adopted from the measured decay data of ^{234}Pa and ^{234}Np.
^{239}Pu	KRI	0.00(12)%	Determination of the multipolarities of the low energy γ rays would be beneficial.
^{240}Pu	KRI	0.01(15)%	Some expected weak γ ray transitions were not observed directly in ^{240}Pu α decay, but were adopted from the decay of ^{236}Pa and ^{236}Np, and from nuclear reaction data. The α transitions to ^{236}U highly excited levels with energies of 958, 960 and 967 keV were not observed. They are expected from level spin data, and γ rays can be expected to de-excite these levels. Measurements would be beneficial.
^{241}Pu	KRI	0.0(10)%	There is an ambiguity in the placement of the 121.2 keV γ ray transition in the ^{237}U level scheme due to a doublet (7/2+, 11/2+) near 204 keV — further measurements are required.
^{242}Pu	KRI	0.00(25)%	Weak α transitions to some highly excited ^{238}U levels have not been observed — measurements would be beneficial.
^{241}Am	KRI	–0.02(14)%	A number of γ ray transitions (27.03, 54.1 and 95.0 keV) require more detailed measurement, including associated conversion electron emission probabilities.
^{242}Am	IAEA	0(3)%	There are only three sets of half-life data — further measurements are required. A spectroscopic γ ray study is also required as no emission probability measurements exist — the γ ray energies were constructed from the level scheme, and emission probabilities from $P_{ce}/P_{\beta-}$ data.
^{242m}Am	IAEA	1.9(18)%	The recommended half-life represents the least squares weighted mean of two somewhat old studies — further measurements are required to determine the half-life with greater confidence. A simple IT decay mode dominates the decay scheme of ^{242m}Am — the small α branch is complex, and many features of this decay mode remain unresolved. Conversion electron data for the 48.60 keV IT γ ray transition are lacking, and such measurements are merited. Arguably, further accurate high resolution γ ray spectroscopy studies are also required to develop and complete the rather complex α decay mode.
^{243}Am	LNHB	–0.02(8)%	Further measurements of the half-life are merited. New measurements of the γ ray and α particle emission intensities should help to improve the decay scheme balance.

TABLE 3. DECAY DATA EVALUATIONS, CONSISTENCY AND COMMENTS (cont.)

Radionuclide	Evaluator[a]	Consistency[b]	Comments
^{244}Am	IAEA	0(6)%	There is only one half-life measurement — further measurements are required. A spectroscopic γ ray study is also required — γ ray energies are constructed from a level scheme, and the emission probabilities adjusted as necessary (only one reference quantifies data uncertainties).
^{244m}Am	IAEA	0(13)%	There are only two half-life measurements from the 1950s, neither of which quote uncertainties — further measurements are required. Spectroscopic γ ray studies are also required as there is only one known set of data for the γ ray emission probabilities.
^{242}Cm	KRI	–0.04(10)%	Accurate measurements of the 44, 102, 157 and 210 keV γ rays are required.
^{243}Cm	KRI	–0.3(6)%	Accurate measurements of a number of γ ray transitions with energies less than 200 keV are required. These transitions were not observed in the ^{243}Cm α decay and were derived from measurements of the decay of ^{239}Np and ^{239}Am.
^{244}Cm	KRI	0.0(6)%	Some weak γ ray transitions have not been observed in ^{244}Cm α decay and were taken from the ^{240}Np β^- decay and ^{240}Am electron capture decay — direct measurements of ^{244}Cm α decay are required.
^{245}Cm	KRI	–0.3(5)%	The half-life measurement results show discrepancies — further measurements are required.
^{246}Cm	ANL	0.0(3)%	The recommended half-life is the weighted mean of five measurements carried out between 1969 and 2007 (some of these data were corrected for changes in the reference ^{244}Cm and ^{250}Cf half-lives). However, discrepancies remain, and further studies are merited. Emission probabilities for the two γ rays within the proposed decay scheme have not been measured directly, and were simply calculated from the recommended $\alpha_{0,1}$ and $\alpha_{0,2}$ emission probabilities as determined from experimental studies.
^{252}Cf	LNHB	–0.1(4)%	Accurate measurements of the α particle emission probabilities are required.

[a] Evaluators are designated by their affiliation: ANL: Argonne National Laboratory, USA; CNDC: China Nuclear Data Center, China Institute of Atomic Energy, China; IAEA: International Atomic Energy Agency; IFIN-HH: Horia Hulubei National Institute of Physics and Nuclear Engineering, Romania; KRI: V.G. Khlopin Radium Institute, Russian Federation; LNHB: Laboratoire National Henri Becquerel, France; NPL: National Physical Laboratory, United Kingdom; VECC: Variable Energy Cyclotron Centre, India.

[b] Uncertainty on the final significant figure or figures is quoted in parentheses, and is generally expressed at the 1σ confidence level: hence, −0.1(4)% means −0.1% ± 0.4%; 0.000(12)% means 0.000% ± 0.012%; and 0.3(21)% means 0.3% ± 2.1%.

3. CONCLUSIONS

A set of recommended decay schemes and decay data were produced and assembled by CRP participants to update an IAEA decay data library of actinides and their natural decay products. These studies resulted in the formulation of significantly improved decay parameters for a range of actinides and decay chain nuclides from ^{252}Cf to ^{206}Hg, including the 4n + 2 (^{238}U), 4n + 3 (^{235}U) and 4n (^{232}Th) natural decay chains, and the artificially produced 4n + 1 (^{237}Np/^{233}U) decay chain.

The achievements of the CRP include the following:

— Measurements of the half-lives, and α particle and γ ray emission probabilities of specific actinides;
— Extension of the evaluated database to include requested decay chains and other actinide radionuclides of importance in non-energy related applications;
— Evaluation of all existing relevant data published up to the end of 2008;
— Preparation of this report which summarizes and documents the recommended decay data of the actinides and natural decay products of primary importance in fission energy operations and studies, along with specific radionuclides chosen for various non-energy applications.

One important expectation is that the resulting data will be internationally accepted as a significant contribution to improving the quality of the decay data of the actinides and other heavy elements that constitute their known decay chains.

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Annex I

RECOMMENDED DECAY DATA

Tabulations of the recommended decay data for the 85 radionuclides are presented in this annex. The radionuclides are ordered by atomic number.

The data presented include:

— Recommended half-lives ($T_{1/2}$), Q-values and decay modes;
— Transition probabilities, nature and log *ft* data for β^- transitions;
— Transition probabilities, nature, log *ft* and shell capture probabilities for electron capture transitions;
— Energies and emission probabilities for the different radiations:
  - Alpha particles;
  - Electrons (β^- emission, Auger and conversion electrons);
  - X rays.
— Gamma ray energies, transition and emission probabilities, multipolarities and total internal conversion coefficients.

1 Units

s	second
min	minute
h	hour
d	day
y	year (1 y = 365.242 198 78 d or 31 556 925.26 s)
eV	electronvolt (1 eV = 1.602 176 462 (63) $\times 10^{-19}$ J)
keV	kiloelectronvolt (1 keV = 1000 eV)

2 Particles and quanta

α	alpha particle
β^+	positron from β^+ decay
β^-	electron from β^- decay
γ	gamma quantum, photon emitted when a nucleus decays to a lower energy state
ec	internal conversion electron
ec_K	internal conversion electron, ejected from the K shell
ec_L	internal conversion electron, ejected from the L shell
ec_M	internal conversion electron, ejected from the M shell
ec_{M+}	internal conversion electron, ejected from the M and higher shells
ec_N	internal conversion electron, ejected from the N shell
ec_{N+}	internal conversion electron, ejected from the N and higher shells
ec_O	internal conversion electron, ejected from the O shell
e_A	Auger electron
e_{AK}	K-Auger electron
e_{AL}	L-Auger electron
KLL	KLL-Auger electron
KLX	KLX-Auger electron (X=M, N)
KXY	KXY-Auger electron (X=M, N; Y=M, N)
X	X-ray quantum, photon emitted during the rearrangement of the atomic shells
XK	X-ray quantum, photon emitted during the rearrangement of the atomic K shell
XL	X-ray quantum, photon emitted during the rearrangement of the atomic L shell

3 Energies

Q_α	total energy of alpha decay
Q_{β^-}	total energy of β^-decay
Q_{EC}	total energy of electron capture (EC) decay
Q_{IT}	total energy of isomeric transition decay

4 Transitions, probabilities, emission intensities and conversion coefficients

$\alpha_{x,y}$	transition by α decay between level x and level y
$\beta^-_{x,y}$	transition by β^- decay between level x and level y
$\epsilon_{x,y}$	transition by electron capture (EC) between level x and level y
P_K	K-shell capture probability for an electron capture (EC) transition
P_L	L-shell capture probability for an electron capture (EC) transition

P_M	M-shell capture probability for an electron capture (EC) transition
P_{M+}	M- and higher-shells capture probability for an electron capture (EC) transition ($P_K + P_L + P_M + \ldots = 1$)
$\gamma_{x,y}$	γ-ray emission between level x and level y
P_γ	γ-ray emission probability for a given transition (not including conversion electrons)
P_{ce}	conversion electron emission probability for a given transition
$P_{\gamma+ce}$	total transition probability for a given transition (including conversion electrons) $P_{\gamma+ce} = P_\gamma + P_{ce}$
α_K	K-shell internal conversion coefficient
α_L	total L-shell internal conversion coefficient
α_M	total M-shell internal conversion coefficient
α_{M+}	total M- and higher-shells internal conversion coefficient
α_N	total N-shell internal conversion coefficient
α_{N+}	total N- and higher-shells internal conversion coefficient
α_π	internal-pair formation coefficient
$\alpha_{T(ICC)}$	total internal conversion coefficient ($\alpha_T = \alpha_K + \alpha_L + \alpha_M + \ldots$)
α_T	total conversion coefficient ($\alpha_T = \alpha_K + \alpha_L + \alpha_M + \ldots + \alpha_\pi$)

5 Other physical quantities and abbreviations

E0, E1, E2, EL	electric monopole, dipole, quadrupole, 2L-pole
log ft	logarithm of the comparative half-life in β^- or EC decay
J	quantum number of total angular momentum
K, L, M, ...	electron shells
K/L	ratio $P_{ce_K}/P_{ce_L} = \alpha_K/\alpha_L$
K/LM	ratio $P_{ce_K}/(P_{ce_L} + P_{ce_M}) = \alpha_K/(\alpha_L + \alpha_M)$
K/LMN	ratio $P_{ce_K}/(P_{ce_L} + P_{ce_M} + P_{ce_N}) = \alpha_K/(\alpha_L + \alpha_M + \alpha_N)$
KLX/KXY	ratio $P_{A_{KLX}}/P_{A_{KXY}}$
L	orbital angular momentum quantum number
m_0	electron rest mass
max	maximum
min	minimum
avg	average
Z	atomic number of an element
A	mass number of an isotope
N	number of neutrons in an isotope, $N = A - Z$
M1, M2, ML	magnetic dipole, quadrupole, 2L-pole
$\bar{\nu}$	average total number of spontaneous fission neutrons
$T_{1/2}$	half-life (= total half-life for multiple decay modes)
λ	decay constant, $\lambda = ln2/T_{1/2}$
δ	mixing ratio of different multipolarities
π	parity

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	8.32	(7)	min
Q_{β^-}	:	1308	(20)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,3}$	659 (20)	3.0 (4)	1st forbidden non-unique	5.41
$\beta^-_{0,2}$	1003 (20)	35 (7)	1st forbidden non-unique	5.24
$\beta^-_{0,0}$	1308 (20)	62 (7)	1st forbidden non-unique	5.67

3 Electron Emissions

		Energy keV		Electrons per 100 disint.	Energy keV
e_{AL}	(Tl)	5.25 - 15.32		5.1 (4)	
e_{AK}	(Tl)			0.30 (7)	
	KLL	54.587 - 59.954	}		
	KLX	66.37 - 72.86	}		
	KXY	78.12 - 85.50	}		
$ec_{2,0\ K}$	(Tl)	219.366 (6)		8.0 (15)	
$ec_{2,0\ L}$	(Tl)	289.549 - 292.238		1.35 (26)	
$ec_{2,0\ M}$	(Tl)	301.192 - 302.507		0.31 (6)	
$ec_{2,0\ N}$	(Tl)	304.050 - 304.777		0.080 (15)	
$ec_{3,2\ K}$	(Tl)	258.99 (17)		0.122 (24)	
$ec_{3,2\ L}$	(Tl)	329.17 - 331.86		0.0204 (41)	
$ec_{3,0\ K}$	(Tl)	563.89 (5)		0.0906 (18)	
$ec_{3,0\ L}$	(Tl)	634.07 - 636.76		0.01498 (30)	
$\beta^-_{0,3}$	max:	659 (20)		3.0 (4)	avg: 203 (7)
$\beta^-_{0,2}$	max:	1003 (20)		35 (7)	avg: 330 (8)
$\beta^-_{0,0}$	max:	1308 (20)		62 (7)	avg: 450 (8)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Tl)	8.9531 — 14.7362	2.9 (4)	
$XK\alpha_2$	(Tl)	70.8325	2.3 (5)	} Kα

		Energy keV		Photons per 100 disint.	
XKα_1	(Tl)	72.8725		3.9 (8)	}
XKβ_3	(Tl)	82.118	}		
XKβ_1	(Tl)	82.577	}	1.32 (25)	Kβ_1'
XKβ_5''	(Tl)	83.115	}		
XKβ_2	(Tl)	84.838	}		
XKβ_4	(Tl)	85.134	}	0.39 (8)	Kβ_2'
XKO$_{2,3}$	(Tl)	85.444	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Tl)	265.832 (5)	0.014 (7)	E2	0.1603 (23)	0.012 (6)
$\gamma_{2,0}$(Tl)	304.896 (6)	36 (7)	M1	0.375 (6)	26 (5)
$\gamma_{3,2}$(Tl)	344.52 (17)	0.70 (14)	M1	0.269 (4)	0.55 (11)
$\gamma_{3,1}$(Tl)	383.59 (6)	0.014 (7)	M1(+E2)	0.13 (8)	0.012 (6)
$\gamma_{3,0}$(Tl)	649.42 (5)	2.3 (3)	M1	0.0501 (7)	2.2 (3)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	4.202	(11)	min
Q_{β^-}	:	1532.4	(6)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,2}$	366.0 (8)	0.110 (14)	1st forbidden	6
$\beta^-_{0,1}$	729.3 (6)	0.0051 (3)	1st forbidden unique	8.6
$\beta^-_{0,0}$	1532.4 (6)	99.885 (14)	1st forbidden	5.2

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AK}	(Pb)		0.0034 (6)	
	KLL	56.028 - 61.669	}	
	KLX	68.181 - 74.969	}	
	KXY	80.3 - 88.0	}	
$ec_{2,0\ K}$	(Pb)	1078.4	0.093 (11)	
$ec_{2,0\ L}$	(Pb)	1150.54 - 1151.20	0.017 (3)	
$\beta^-_{0,2}$	max:	366.0 (8)	0.110 (14)	avg: 104.52 (25)
$\beta^-_{0,1}$	max:	729.3 (6)	0.0051 (3)	avg: 232.39 (21)
$\beta^-_{0,0}$	max:	1532.4 (6)	99.885 (14)	avg: 538.86 (25)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9.19 — 15.217		0.035 (4)	
$XK\alpha_2$	(Pb)	72.8049		0.026 (3)	} $K\alpha$
$XK\alpha_1$	(Pb)	74.97		0.044 (5)	}
$XK\beta_3$	(Pb)	84.451	}		
$XK\beta_1$	(Pb)	84.937	}	0.0150 (17)	$K\beta_1'$
$XK\beta_5''$	(Pb)	85.47	}		
$XK\beta_2$	(Pb)	87.238	}		
$XK\beta_4$	(Pb)	87.58	}	0.0045 (6)	$K\beta_2'$
$XKO_{2,3}$	(Pb)	87.911	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{2,1}$(Pb)	363.3 (5)	0.00015 (15)	E2	0.0663 (20)	0.00014 (14)
$\gamma_{1,0}$(Pb)	803.06 (3)	0.0051 (3)	E2	0.01030 (31)	0.0050 (3)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	4.774	(12)	min
Q_{β^-}	:	1418	(5)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,2}$	520 (5)	0.271 (10)	1st forbidden non-unique	6.15
$\beta^-_{0,1}$	848 (5)	<0.00008	1st forbidden unique	>10.8
$\beta^-_{0,0}$	1418 (5)	99.729 (10)	1st forbidden non-unique	5.11

3 Electron Emissions

		Energy keV		Electrons per 100 disint.	Energy keV
e_{AL}	(Pb)	5.33 - 15.82		0.00333 (6)	
e_{AK}	(Pb)			0.000202 (23)	
	KLL	56.028 - 61.669	}		
	KLX	68.181 - 74.969	}		
	KXY	80.3 - 88.0	}		
$\beta^-_{0,2}$	max:	520	(5)	0.271 (10)	avg: 155.0 (17)
$\beta^-_{0,1}$	max:	848	(5)	<0.00008	avg: 273.2 (18)
$\beta^-_{0,0}$	max:	1418	(5)	99.729 (10)	avg: 492.5 (21)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9.186 — 15.2169		0.00201 (6)	
XKα_2	(Pb)	72.8049		0.00154 (6)	} Kα
XKα_1	(Pb)	74.97		0.00258 (10)	}
XKβ_3	(Pb)	84.451	}		
XKβ_1	(Pb)	84.937	}	0.00088 (4)	Kβ_1'
XKβ_5''	(Pb)	85.47	}		
XKβ_2	(Pb)	87.238	}		
XKβ_4	(Pb)	87.58	}	0.000266 (12)	Kβ_2'
XKO$_{2,3}$	(Pb)	87.911	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{2,1}$(Pb)	328.10 (12)	0.00189 (19)	[M1]	0.334 (5)	0.00142 (14)
$\gamma_{1,0}$(Pb)	569.698 (2)	0.00189 (19)	E2	0.0216 (3)	0.00185 (19)
$\gamma_{2,0}$(Pb)	897.77 (12)	0.269 (9)	M1+0.8%E2	0.0233 (4)	0.263 (9)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	3.058	(6)	min
Q_{β^-}	:	4999.0	(17)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100		Nature	log ft
$\beta^-_{0,23}$	518.3 (17)	0.052	(5)	1st forbidden non-unique	6.67
$\beta^-_{0,21}$	615.7 (17)	0.017	(5)	1st forbidden non-unique	7.41
$\beta^-_{0,20}$	640.3 (17)	0.045	(4)	1st forbidden non-unique	7.04
$\beta^-_{0,19}$	675.1 (17)	0.005	(2)	Allowed	8.1
$\beta^-_{0,18}$	702.4 (17)	0.102	(11)	1st forbidden non-unique	6.82
$\beta^-_{0,17}$	737.1 (17)	0.002	(1)	1st forbidden non-unique	8.6
$\beta^-_{0,13}$	818.6 (17)	0.231	(9)	1st forbidden non-unique	6.7
$\beta^-_{0,12}$	873.7 (17)	0.174	(9)	1st forbidden non-unique	6.92
$\beta^-_{0,8}$	1003.6 (17)	0.007	(3)	1st forbidden non-unique	8.5
$\beta^-_{0,7}$	1037.8 (17)	3.17	(4)	1st forbidden non-unique	5.92
$\beta^-_{0,6}$	1052.4 (17)	0.048	(3)	1st forbidden non-unique	7.76
$\beta^-_{0,5}$	1079.0 (17)	0.63	(4)	1st forbidden non-unique	6.68
$\beta^-_{0,4}$	1290.5 (17)	24.1	(2)	1st forbidden non-unique	5.38
$\beta^-_{0,3}$	1523.9 (17)	22.1	(5)	1st forbidden non-unique	5.69
$\beta^-_{0,2}$	1801.3 (17)	49.2	(6)	1st forbidden non-unique	5.61

3 Electron Emissions

		Energy keV		Electrons per 100 disint.	Energy keV
e_{AL}	(Pb)	5.262 - 10.398		4.50 (13)	
e_{AK}	(Pb)			0.27 (3)	
	KLL	56.028 - 61.669	}		
	KLX	68.181 - 74.969	}		
	KXY	80.3 - 88.0	}		
$ec_{3,2\ K}$	(Pb)	189.36 (2)		2.86 (13)	
$ec_{3,2\ L}$	(Pb)	261.51 - 264.33		0.49 (2)	
$ec_{3,2\ M+}$	(Pb)	273.52 - 277.37		0.15 (1)	
$ec_{4,2\ K}$	(Pb)	422.73 (2)		1.88 (2)	
$ec_{4,2\ L}$	(Pb)	494.88 - 497.70		0.32	
$ec_{4,2\ M+}$	(Pb)	506.89 - 510.74		0.098	
$ec_{2,1\ K}$	(Pb)	495.18 (2)		1.25 (1)	
$ec_{2,1\ L}$	(Pb)	567.33 - 570.15		0.34	
$ec_{2,1\ M+}$	(Pb)	579.33 - 583.19		0.109	
$ec_{1,0\ \alpha}$	(Pb)	1592.51 (1)		0.0369 (6)	
$ec_{1,0\ K}$	(Pb)	2526.51 (1)		0.170 (3)	
$ec_{1,0\ L}$	(Pb)	2598.65 - 2601.48		0.0291 (4)	

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		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,23}$	max:	518.3	(17)	0.052 (5)	avg:	154.3 (6)
$\beta^-_{0,21}$	max:	615.7	(17)	0.017 (5)	avg:	187.7 (6)
$\beta^-_{0,20}$	max:	640.3	(17)	0.045 (4)	avg:	196.4 (6)
$\beta^-_{0,19}$	max:	675.1	(17)	0.005 (2)	avg:	208.6 (6)
$\beta^-_{0,18}$	max:	702.4	(17)	0.102 (11)	avg:	218.3 (6)
$\beta^-_{0,17}$	max:	737.1	(17)	0.002 (1)	avg:	230.8 (6)
$\beta^-_{0,13}$	max:	818.6	(17)	0.231 (9)	avg:	260.4 (6)
$\beta^-_{0,12}$	max:	873.7	(17)	0.174 (9)	avg:	280.8 (6)
$\beta^-_{0,8}$	max:	1003.6	(17)	0.007 (3)	avg:	329.7 (7)
$\beta^-_{0,7}$	max:	1037.8	(17)	3.17 (4)	avg:	342.8 (7)
$\beta^-_{0,6}$	max:	1052.4	(17)	0.048 (3)	avg:	348.4 (7)
$\beta^-_{0,5}$	max:	1079.0	(17)	0.63 (4)	avg:	358.6 (7)
$\beta^-_{0,4}$	max:	1290.5	(17)	24.1 (2)	avg:	441.5 (7)
$\beta^-_{0,3}$	max:	1523.9	(17)	22.1 (5)	avg:	535.4 (7)
$\beta^-_{0,2}$	max:	1801.3	(17)	49.2 (6)	avg:	649.5 (7)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9.184 — 15.216		2.75 (12)	
XKα_2	(Pb)	72.8049		2.03 (5)	} Kα
XKα_1	(Pb)	74.97		3.42 (7)	}
XKβ_3	(Pb)	84.451	}		
XKβ_1	(Pb)	84.937	}	1.17 (3)	Kβ_1'
XKβ_5''	(Pb)	85.47	}		
XKβ_2	(Pb)	87.238	}		
XKβ_4	(Pb)	87.58	}	0.353 (11)	Kβ_2'
XKO$_{2,3}$	(Pb)	87.911	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{5,4}$(Pb)	211.52 (2)	0.38 (2)	M1+3%E2	1.096 (17)	0.18 (1)
$\gamma_{4,3}$(Pb)	233.37 (2)	0.51 (2)	[M1+33%E2]	0.66 (3)	0.31 (1)
$\gamma_{7,4}$(Pb)	252.71 (2)	1.26 (3)	[M1+14%E2]	0.616 (15)	0.78 (2)
$\gamma_{3,2}$(Pb)	277.37 (2)	10.1 (5)	[M1+0.04%E2]	0.529 (8)	6.6 (3)
$\gamma_{7,3}$(Pb)	486.08 (2)	0.055 (4)	[M1]	0.1164 (17)	0.049 (4)
$\gamma_{4,2}$(Pb)	510.74 (2)	24.8 (2)	[M1+0.25%E2]	0.1019 (16)	22.5 (2)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{2,1}$(Pb)	583.187 (2)	86.7 (3)	E2	0.0205 (3)	85.0 (3)
$\gamma_{18,4}$(Pb)	588.108 (18)	0.06 (1)	[M1]	0.0704 (10)	0.06 (1)
$\gamma_{12,3}$(Pb)	650.27 (2)	0.043 (5)	[M1]	0.0541 (8)	0.041 (5)
$\gamma_{13,3}$(Pb)	705.34 (2)	0.023 (4)	[M1]	0.0438 (7)	0.022 (4)
$\gamma_{5,2}$(Pb)	722.26 (2)	0.25 (4)	M1+8.8%E2	0.0387 (7)	0.24 (4)
$\gamma_{6,2}$(Pb)	748.87 (2)	0.048 (3)	[M1]	0.0375 (6)	0.046 (3)
$\gamma_{7,2}$(Pb)	763.45 (2)	1.86 (2)	[M1+1.0%E2]	0.0354 (5)	1.80 (2)
$\gamma_{-1,1}$(Pb)	808.32 (13)	0.030 (7)			0.030 (7)
$\gamma_{18,3}$(Pb)	821.48 (2)	0.042 (4)	M1	0.0295 (5)	0.041 (4)
$\gamma_{-1,2}$(Pb)	835.90 (11)	0.076 (11)			0.076 (11)
$\gamma_{3,1}$(Pb)	860.53 (2)	12.7 (1)	[M1+0.02%E2]	0.0262 (4)	12.4 (1)
$\gamma_{20,3}$(Pb)	883.59 (2)	0.032 (3)	[M1]	0.0244 (4)	0.031 (3)
$\gamma_{12,2}$(Pb)	927.64 (2)	0.131 (7)	[M1]	0.0216 (3)	0.128 (7)
$\gamma_{13,2}$(Pb)	982.70 (2)	0.208 (8)	[M1]	0.0186 (3)	0.204 (8)
$\gamma_{4,1}$(Pb)	1093.90 (2)	0.44 (1)	E2	0.00560 (8)	0.44 (1)
$\gamma_{19,2}$(Pb)	1126.24 (2)	0.005 (2)	E1	0.00203 (3)	0.005 (2)
$\gamma_{20,2}$(Pb)	1160.96 (2)	0.011 (3)	[M1]	0.01214 (17)	0.011 (3)
$\gamma_{21,2}$(Pb)	1185.57 (2)	0.017 (5)	[M1]	0.01151 (17)	0.017 (5)
$\gamma_{23,2}$(Pb)	1283.04 (2)	0.052 (5)	[M1]	0.00943 (14)	0.052 (5)
$\gamma_{8,1}$(Pb)	1380.89 (2)	0.007 (3)	[M1]	0.00785 (11)	0.007 (3)
$\gamma_{17,1}$(Pb)	1647.32 (2)	0.002 (1)	[M1]	0.00518 (8)	0.002 (1)
$\gamma_{20,12}$(Pb)	1744.12 (2)	0.002 (1)	[M1]	0.00457 (7)	0.002 (1)
$\gamma_{1,0}$(Pb)	2614.511 (10)	100	E3	0.00246 (4)	99.755 (4)

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(Theoretical ICC)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	2.161	(7)	min
Q_{β^-}	:	3976	(8)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,10}$	587 (8)	0.420 (22)		
$\beta^-_{0,9}$	615 (8)	0.10 (3)		
$\beta^-_{0,8}$	906 (8)	0.645 (16)	1st forbidden	6.3
$\beta^-_{0,7}$	1071 (8)	0.70 (9)	1st forbidden	6.5
$\beta^-_{0,6}$	1451 (8)	0.070 (15)	Allowed	8
$\beta^-_{0,5}$	1515 (8)	0.031 (16)	1st forbidden unique	9.2
$\beta^-_{0,4}$	1660 (8)	0.32 (11)	1st forbidden	7.5
$\beta^-_{0,3}$	1827 (8)	97.70 (15)	1st forbidden	5.2
$\beta^-_{0,2}$	1944 (8)	<0.1	Allowed	>8.3

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Pb)	5.34 - 15.82	13.23 (15)	
e_{AK}	(Pb)		0.77 (9)	
	KLL	56.028 - 61.669	}	
	KLX	68.181 - 74.969	}	
	KXY	80.3 - 88.0	}	
$ec_{3,2\ K}$	(Pb)	29.22 (8)	17.51 (48)	
$ec_{3,2\ L}$	(Pb)	101.36 - 104.18	3.39 (9)	
$ec_{3,2\ M}$	(Pb)	113.37 - 114.74	0.799 (20)	
$ec_{3,2\ N}$	(Pb)	116.33 - 117.08	0.200 (5)	
$ec_{4,2\ K}$	(Pb)	195.61 (14)	0.057 (28)	
$ec_{2,1\ K}$	(Pb)	377.13 (8)	2.34 (7)	
$ec_{2,1\ L}$	(Pb)	449.27 - 452.09	0.786 (23)	
$ec_{2,1\ M}$	(Pb)	461.28 - 462.65	0.197 (6)	
$ec_{2,1\ N}$	(Pb)	464.24 - 464.99	0.0497 (15)	
$ec_{3,1\ K}$	(Pb)	494.35 (8)	0.0491 (40)	
$ec_{3,1\ L}$	(Pb)	566.49 - 569.31	0.0100 (8)	
$ec_{8,3\ K}$	(Pb)	832.43 (14)	0.01142 (33)	
$ec_{1,0\ K}$	(Pb)	1478.94 (5)	0.2340 (42)	
$ec_{1,0\ L}$	(Pb)	1551.08 - 1553.90	0.0396 (6)	
$\beta^-_{0,10}$	max:	587 (8)	0.420 (22)	avg: 177.8 (28)
$\beta^-_{0,9}$	max:	615 (8)	0.10 (3)	avg: 187.4 (28)
$\beta^-_{0,8}$	max:	906 (8)	0.645 (16)	avg: 292.9 (30)

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,7}$	max:	1071	(8)	0.70 (9)	avg:	355.5 (31)
$\beta^-_{0,6}$	max:	1451	(8)	0.070 (15)	avg:	505.9 (33)
$\beta^-_{0,5}$	max:	1515	(8)	0.031 (16)	avg:	518.1 (31)
$\beta^-_{0,4}$	max:	1660	(8)	0.32 (11)	avg:	591.2 (33)
$\beta^-_{0,3}$	max:	1827	(8)	97.70 (15)	avg:	660.0 (34)
$\beta^-_{0,2}$	max:	1944	(8)	<0.1	avg:	709.0 (34)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9.186 — 15.2169		8.04 (14)	
$XK\alpha_2$	(Pb)	72.8049		5.85 (10)	} $K\alpha$
$XK\alpha_1$	(Pb)	74.97		9.84 (16)	}
$XK\beta_3$	(Pb)	84.451	}		
$XK\beta_1$	(Pb)	84.937	}	3.36 (8)	$K\beta'_1$
$XK\beta''_5$	(Pb)	85.47	}		
$XK\beta_2$	(Pb)	87.238	}		
$XK\beta_4$	(Pb)	87.58	}	1.016 (28)	$K\beta'_2$
$XKO_{2,3}$	(Pb)	87.911	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{3,2}$(Pb)	117.224 (7)	100	E1	0.295 (5)	77.22 (27)
$\gamma_{4,2}$(Pb)	284.04 (23)	0.21 (10)	[M1]	0.495 (7)	0.14 (7)
$\gamma_{5,3}$(Pb)	311.5 (3)	0.031 (15)	[E2]	0.1034 (15)	0.028 (14)
$\gamma_{6,3}$(Pb)	375.5 (2)	0.070 (15)			0.070 (15)
$\gamma_{2,1}$(Pb)	465.128 (24)	100	E2	0.0350 (5)	96.62 (5)
$\gamma_{-1,1}$(Pb)	469.7 (3)	0.12 (3)			0.12 (3)
$\gamma_{3,1}$(Pb)	582.4 (2)	0.374 (29)	[M2]	0.200 (3)	0.312 (24)
$\gamma_{4,1}$(Pb)	748.3 (2)	0.080 (21)	[E1]	0.00428 (6)	0.080 (21)
$\gamma_{7,3}$(Pb)	755.6 (3)	0.114 (21)	[M1]	0.0366 (6)	0.11 (2)
$\gamma_{-1,2}$(Pb)	860.5 (3)	0.26 (4)			0.26 (4)
$\gamma_{7,2}$(Pb)	873.5 (4)	0.59 (8)	[E1]	0.00320 (5)	0.59 (8)
$\gamma_{-1,3}$(Pb)	890.0 (4)	0.12 (3)			0.12 (3)
$\gamma_{-1,4}$(Pb)	902.8 (4)	0.10 (2)			0.10 (2)
$\gamma_{8,3}$(Pb)	920.43 (11)	0.645 (15)	[M1]	0.0220 (3)	0.631 (15)
$\gamma_{-1,5}$(Pb)	970.3	0.054 (15)			0.054 (15)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{10,3}$(Pb)	1239.66 (11)	0.420 (22)			0.420 (22)
$\gamma_{9,2}$(Pb)	1329.29 (16)	0.10 (3)			0.10 (3)
$\gamma_{1,0}$(Pb)	1566.93 (5)	100	E2	0.00294 (5)	99.707 (5)
$\gamma_{-1,6}$(Pb)	1661.1 (5)	0.10 (2)			0.10 (2)
$\gamma_{-1,7}$(Pb)	1673.2 (4)	0.48 (4)			0.48 (4)
$\gamma_{-1,8}$(Pb)	1781.7 (5)	0.04 (2)			0.04 (2)
$\gamma_{-1,9}$(Pb)	2005.3 (2)	0.020 (5)			0.020 (5)
$\gamma_{-1,10}$(Pb)	2032.1 (5)	0.001			0.001
$\gamma_{3,0}$(Pb)	2149 (1)	0.015 (5)	[M4]	0.01529 (22)	0.015 (5)
$\gamma_{4,0}$(Pb)	2315.80 (21)	0.0289 (21)	[E3]	0.00292 (4)	0.0288 (21)
$\gamma_{-1,11}$(Pb)	2548.2	0.015 (6)			0.015 (6)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	1.30	(3)	min
Q_{β^-}	:	5482	(12)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,11}$	1380 (12)	∼2		6.2
$\beta^-_{0,10}$	1603 (12)	∼7		5.9
$\beta^-_{0,9}$	1860 (12)	∼24		5.6
$\beta^-_{0,8}$	2024 (12)	∼10	Allowed	6.1
$\beta^-_{0,7}$	2413 (12)	∼10	2nd forbidden unique	6.4
$\beta^-_{0,3}$	4290 (12)	∼31	Allowed	6.9
$\beta^-_{0,2}$	4386 (12)	∼13	Allowed	7.3

3 Electron Emissions

		Energy keV	Electrons per 100 disint.		Energy keV
$ec_{3,2\ K}$	(Pb)	∼9	∼16		
$ec_{3,2\ L}$	(Pb)	81.1392 - 83.9648	∼12		
$ec_{3,2\ M}$	(Pb)	93.1493 - 94.5160	∼3.2		
$ec_{2,1\ K}$	(Pb)	208 (3)	5.3 (7)		
$ec_{2,1\ L}$	(Pb)	280.1392 - 282.9648	3.15 (42)		
$ec_{2,1\ M}$	(Pb)	292.1493 - 293.5160	0.81 (11)		
$ec_{2,1\ N}$	(Pb)	295.1064 - 295.8637	0.205 (27)		
$ec_{1,0\ K}$	(Pb)	711.6 (3)	0.803 (12)		
$ec_{1,0\ L}$	(Pb)	783.7 - 786.6	0.1746 (25)		
$ec_{1,0\ M}$	(Pb)	795.7 - 797.1	0.0421 (6)		
$ec_{1,0\ N}$	(Pb)	798.7 - 799.5	0.01066 (16)		
$ec_{4,1\ K}$	(Pb)	982 (20)	0.022 (9)		
$ec_{-1,1\ L}$	(Pb)	67.1392 - 69.9648	∼20		
$ec_{-1,1\ M}$	(Pb)	79.1493 - 80.5160	∼6		
$ec_{-1,2\ K}$	(Pb)	268 (10)	0.88 (45)		
$ec_{-1,2\ L}$	(Pb)	340.1392 - 342.9648	0.15 (8)		
$ec_{-1,2\ M}$	(Pb)	352.1493 - 353.5160	0.035 (18)		
$ec_{-1,3\ K}$	(Pb)	294 (10)	0.55 (37)		
$ec_{-1,3\ L}$	(Pb)	366.1392 - 368.9648	0.09 (6)		
$ec_{-1,3\ M}$	(Pb)	378.1493 - 379.5160	0.022 (15)		
$\beta^-_{0,11}$	max:	1380 (12)	∼2	avg:	477 (13)
$\beta^-_{0,10}$	max:	1603 (12)	∼7	avg:	568 (14)
$\beta^-_{0,9}$	max:	1860 (12)	∼24	avg:	674 (10)
$\beta^-_{0,8}$	max:	2024 (12)	∼10	avg:	743 (10)
$\beta^-_{0,7}$	max:	2413 (12)	∼10	avg:	907 (7)

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,3}$	max:	4290	(12)	~31	avg:	1721 (11)
$\beta^-_{0,2}$	max:	4386	(12)	~13	avg:	1763 (5)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9.186 — 15.217			
$XK\alpha_2$	(Pb)	72.805		7 (4)	} $K\alpha$
$XK\alpha_1$	(Pb)	74.97		11 (6)	}
$XK\beta_3$	(Pb)	84.451	}		
$XK\beta_1$	(Pb)	84.937	}	3.8 (19)	$K\beta_1'$
$XK\beta_5''$	(Pb)	85.47	}		
$XK\beta_2$	(Pb)	87.238	}		
$XK\beta_4$	(Pb)	87.58	}	1.1 (6)	$K\beta_2'$
$XKO_{2,3}$	(Pb)	87.911	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{-1,1}$(Pb)	83 (30)	30 (6)	[E2]	~14	~1.98 (40)
$\gamma_{3,2}$(Pb)	97 (30)	40 (20)	M1+E2	~9	~4 (2)
$\gamma_{2,1}$(Pb)	296 (3)	89 (11)	E2	0.120 (5)	79 (10)
$\gamma_{-1,2}$(Pb)	356 (10)	5.0 (25)	[M1]	0.270 (22)	4 (2)
$\gamma_{-1,3}$(Pb)	382 (10)	3.7 (24)	[M1]	0.223 (17)	3 (2)
$\gamma_{11,9}$(Pb)	480 (36)	2 (1)			2 (1)
$\gamma_{-1,4}$(Pb)	670 (20)	2 (1)			2 (1)
$\gamma_{1,0}$(Pb)	799.6 (3)	100	E2	0.01042 (31)	98.969 (30)
$\gamma_{7,5}$(Pb)	860 (30)	6.9 (20)			6.9 (20)
$\gamma_{-1,5}$(Pb)	910 (30)	3 (2)			3 (2)
$\gamma_{4,1}$(Pb)	1070 (20)	11.9 (49)	[E1]	0.00222 (7)	11.9 (49)
$\gamma_{5,2}$(Pb)	1110 (20)	6.9 (20)			6.9 (20)
$\gamma_{9,6}$(Pb)	1210 (20)	16.8 (40)			16.8 (40)
$\gamma_{6,2}$(Pb)	1310 (20)	20.8 (49)			20.8 (49)
$\gamma_{5,1}$(Pb)	1410 (20)	4.9 (20)			4.9 (20)
$\gamma_{-1,6}$(Pb)	1490 (20)	2 (1)			2 (1)
$\gamma_{-1,7}$(Pb)	1540 (30)	2 (1)			2 (1)
$\gamma_{8,4}$(Pb)	1590 (30)	2 (1)			2 (1)
$\gamma_{-1,8}$(Pb)	1650 (30)	2 (1)			2 (1)
$\gamma_{10,4}$(Pb)	2010 (30)	6.9 (20)			6.9 (20)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{-1,9}$(Pb)	2090 (30)	4.9 (20)			4.9 (20)
$\gamma_{7,1}$(Pb)	2280 (12)	3 (2)			3 (2)
$\gamma_{8,2}$(Pb)	2360 (30)	7.9 (30)			7.9 (30)
$\gamma_{9,3}$(Pb)	2430 (30)	8.9 (30)			8.9 (30)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	3.277	(15)	h
Q_{β^-}	:	644.0	(12)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,0}$	644.0 (12)	100	1st forbidden non-unique	5.54

3 Electron Emissions

		Energy keV	Electrons per 100 disint.		Energy keV
$\beta^-_{0,0}$	max:	644.0 (12)	100	avg:	197.35 (42)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	22.23	(12)	y
Q_{β^-}	:	63.5	(5)	keV
Q_α	:	3792	(20)	keV
β^-	:	100		%
α	:	1.9	(4)	$\times 10^{-6}$ %

2 β^- Transitions

	Energy keV	Probability × 100		Nature	log ft
$\beta^-_{0,1}$	17.0 (5)	80.2	(13)	1st forbidden	5.5
$\beta^-_{0,0}$	63.5 (5)	19.8	(13)	1st forbidden	7.8

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,0}$	3720 (20)	0.0000019 (4)

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Bi)	5.3 - 10.7	36.0 (9)	
e_{AK}	(Bi)			
$ec_{1,0\ L}$	(Bi)	30.152 - 33.120	58 (1)	
$ec_{1,0\ M}$	(Bi)	42.540 - 43.959	13.65 (25)	
$ec_{1,0\ N}$	(Bi)	45.601 - 46.382	3.50 (6)	
$\beta^-_{0,1}$	max:	17.0 (5)	80.2 (13)	avg: 4.3 (1)
$\beta^-_{0,0}$	max:	63.5 (5)	19.8 (13)	avg: 16.3 (1)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.
XL	(Bi)	9.4207 — 15.7084	22.0 (5)

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Bi)	46.539 (1)	80.2 (13)	M1	17.86 (25)	4.252 (40)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	36.1	(2)	min
Q_{β^-}	:	1367	(6)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,10}$	96 (6)	0.0172 (15)	1st forbidden non-unique	5.93
$\beta^-_{0,9}$	133 (6)	0.0009 (3)		
$\beta^-_{0,8}$	171 (6)	0.019 (4)		
$\beta^-_{0,7}$	257 (6)	1.06 (4)	1st forbidden non-unique	5.58
$\beta^-_{0,6}$	263 (6)	0.0047 (7)		
$\beta^-_{0,5}$	286 (6)	0.0570 (24)		
$\beta^-_{0,3}$	535 (6)	6.32 (9)	1st forbidden non-unique	5.73
$\beta^-_{0,2}$	600 (6)	<0.09	1st forbidden non-unique	>7.7
$\beta^-_{0,1}$	962 (6)	1.57 (9)	1st forbidden non-unique	7.21
$\beta^-_{0,0}$	1367 (6)	91.28 (12)	1st forbidden non-unique	5.99

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Bi)	5.42 - 16.34	0.782 (18)	
e_{AK}	(Bi)		0.029 (4)	
	KLL	57.491 - 63.419	}	
	KLX	70.025 - 77.105	}	
	KXY	82.53 - 90.52	}	
$ec_{7,4\ K}$	(Bi)	4.60 (5)	0.050 (18)	
$ec_{7,4\ L}$	(Bi)	78.74 - 81.71	0.086 (17)	
$ec_{7,4\ M}$	(Bi)	91.13 - 92.55	0.0229 (44)	
$ec_{3,2\ L}$	(Bi)	48.916 - 51.885	0.389 (21)	
$ec_{3,2\ M}$	(Bi)	61.305 - 62.724	0.092 (5)	
$ec_{3,2\ N}$	(Bi)	64.366 - 65.147	0.0234 (13)	
$ec_{1,0\ K}$	(Bi)	314.308 (9)	0.36 (3)	
$ec_{1,0\ L}$	(Bi)	388.446 - 391.415	0.079 (3)	
$ec_{1,0\ M}$	(Bi)	400.835 - 402.254	0.0191 (7)	
$ec_{3,1\ K}$	(Bi)	336.624 (15)	0.264 (7)	
$ec_{3,1\ L}$	(Bi)	410.76 - 413.73	0.0451 (12)	
$ec_{3,1\ M}$	(Bi)	423.15 - 424.57	0.01059 (29)	
$ec_{7,1\ K}$	(Bi)	614.149 (25)	0.01833 (48)	
$ec_{2,0\ K}$	(Bi)	676.154 (13)	0.0194 (13)	
$ec_{3,0\ K}$	(Bi)	741.458 (12)	0.080 (8)	
$ec_{3,0\ L}$	(Bi)	815.596 - 818.565	0.0136 (14)	

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,10}$	max:	96	(6)	0.0172 (15)	avg:	25.0 (17)
$\beta^-_{0,9}$	max:	133	(6)	0.0009 (3)	avg:	35.0 (17)
$\beta^-_{0,8}$	max:	171	(6)	0.019 (4)	avg:	45.6 (18)
$\beta^-_{0,7}$	max:	257	(6)	1.06 (4)	avg:	71.0 (18)
$\beta^-_{0,6}$	max:	263	(6)	0.0047 (7)	avg:	72.8 (18)
$\beta^-_{0,5}$	max:	286	(6)	0.0570 (24)	avg:	79.7 (19)
$\beta^-_{0,3}$	max:	535	(6)	6.32 (9)	avg:	159.8 (21)
$\beta^-_{0,2}$	max:	600	(6)	<0.09	avg:	182.2 (21)
$\beta^-_{0,1}$	max:	962	(6)	1.57 (9)	avg:	313.3 (23)
$\beta^-_{0,0}$	max:	1367	(6)	91.28 (12)	avg:	470.9 (24)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Bi)	9.4207 — 15.7084		0.494 (13)	
XKα_2	(Bi)	74.8157		0.228 (10)	} Kα
XKα_1	(Bi)	77.1088		0.381 (17)	}
XKβ_3	(Bi)	86.835	}		
XKβ_1	(Bi)	87.344	}	0.130 (6)	K$\beta_1^{'}$
XK$\beta_5^{''}$	(Bi)	87.862	}		
XKβ_2	(Bi)	89.732	}		
XKβ_4	(Bi)	90.074	}	0.0399 (20)	K$\beta_2^{'}$
XKO$_{2,3}$	(Bi)	90.421	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{3,2}$(Bi)	65.304 (18)	0.59 (3)	M1	6.61 (10)	0.077 (4)
$\gamma_{7,4}$(Bi)	95.13 (5)	0.19 (3)	M1+74.3%E2	9.3 (4)	0.018 (3)
$\gamma_{5,2}$(Bi)	313.96 (4)	0.0268 (21)			0.0268 (21)
$\gamma_{7,2}$(Bi)	342.83 (3)	0.035 (6)	[M1,E2]	0.20 (12)	0.029 (4)
$\gamma_{2,1}$(Bi)	361.846 (16)	0.049 (6)	[M1,E2]	0.17 (11)	0.042 (3)
$\gamma_{1,0}$(Bi)	404.834 (9)	4.30 (7)	M1+54.8%E2	0.122 (8)	3.83 (6)
$\gamma_{3,1}$(Bi)	427.150 (15)	2.13 (5)	M1+0.05%E2	0.1783 (25)	1.81 (4)
$\gamma_{8,2}$(Bi)	429.65 (6)	0.008 (3)			0.008 (3)
$\gamma_{10,2}$(Bi)	504.07 (6)	0.0059 (8)			0.0059 (8)
$\gamma_{4,1}$(Bi)	609.55 (4)	0.033 (9)			0.033 (9)
$\gamma_{5,1}$(Bi)	675.81 (4)	0.0181 (9)			0.0181 (9)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{7,1}$(Bi)	704.675 (25)	0.492 (10)	M1+0.05%E2	0.0476 (7)	0.47 (1)
$\gamma_{2,0}$(Bi)	766.680 (13)	0.64 (4)	M1	0.0382 (6)	0.62 (4)
$\gamma_{3,0}$(Bi)	831.984 (12)	3.60 (5)	M1+13.8%E2	0.028 (3)	3.50 (5)
$\gamma_{10,1}$(Bi)	865.92 (6)	0.0046 (2)			0.0046 (2)
$\gamma_{4,0}$(Bi)	1014.38 (4)	0.0173 (5)			0.0173 (5)
$\gamma_{5,0}$(Bi)	1080.64 (4)	0.0121 (5)			0.0121 (5)
$\gamma_{6,0}$(Bi)	1103.52 (20)	0.0047 (7)			0.0047 (7)
$\gamma_{7,0}$(Bi)	1109.509 (23)	0.118 (3)	[M1]	0.01472 (21)	0.116 (3)
$\gamma_{8,0}$(Bi)	1196.33 (5)	0.0103 (4)			0.0103 (4)
$\gamma_{9,0}$(Bi)	1234.3 (4)	0.0009 (3)			0.0009 (3)
$\gamma_{10,0}$(Bi)	1270.75 (6)	0.0068 (12)			0.0068 (12)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	10.64	(1)	h
Q_{β^-}	:	569.9	(19)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,3}$	154.6 (19)	4.99 (21)	1st forbidden	5.35
$\beta^-_{0,2}$	331.3 (19)	81.7 (11)	1st forbidden	5.18
$\beta^-_{0,0}$	569.9 (19)	13.3 (11)	1st forbidden	6.74

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Bi)	5.35 - 10.66	21.4 (7)	
e_{AK}	(Bi)		1.29 (15)	
	KLL	57.49 - 63.42	}	
	KLX	70.03 - 77.11	}	
	KXY	82.53 - 90.52	}	
$ec_{1,0\ K}$	(Bi)	24.657 (5)	3.45 (16)	
$ec_{1,0\ L}$	(Bi)	98.80 - 101.76	0.61 (3)	
$ec_{1,0\ M+}$	(Bi)	111.18 - 115.18	0.19 (1)	
$ec_{2,0\ K}$	(Bi)	148.106 (2)	30.9 (10)	
$ec_{2,0\ L}$	(Bi)	222.24 - 225.21	5.37 (17)	
$ec_{2,0\ M+}$	(Bi)	234.63 - 238.63	1.73 (5)	
$ec_{3,1\ K}$	(Bi)	209.563 (12)	1.21 (20)	
$ec_{3,1\ L}$	(Bi)	283.70 - 286.67	0.21 (4)	
$ec_{3,1\ M+}$	(Bi)	296.090 - 300.086	0.066 (11)	
$\beta^-_{0,3}$	max:	154.6 (19)	4.99 (21)	avg: 41.1 (5)
$\beta^-_{0,2}$	max:	331.3 (19)	81.7 (11)	avg: 93.5 (6)
$\beta^-_{0,0}$	max:	569.9 (19)	13.3 (11)	avg: 171.7 (7)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Bi)	9.42 — 15.709	13.8 (6)	
XKα_2	(Bi)	74.8157	10.07 (18)	} Kα

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		Energy keV		Photons per 100 disint.	
$XK\alpha_1$	(Bi)	77.1088		16.9 (3)	}
$XK\beta_3$	(Bi)	86.835	}		
$XK\beta_1$	(Bi)	87.344	}	5.77 (13)	$K\beta_1'$
$XK\beta_5''$	(Bi)	87.862	}		
$XK\beta_2$	(Bi)	89.732	}		
$XK\beta_4$	(Bi)	90.074	}	1.77 (5)	$K\beta_2'$
$XKO_{2,3}$	(Bi)	90.421	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Bi)	115.183 (5)	4.87 (19)	[M1]	6.8 (1)	0.624 (23)
$\gamma_{2,1}$(Bi)	123.449 (5)	0.198 (19)	[E2]	2.80 (4)	0.052 (5)
$\gamma_{3,2}$(Bi)	176.640 (11)	0.157 (15)	[M1]	2.02 (3)	0.052 (5)
$\gamma_{2,0}$(Bi)	238.632 (2)	81.6 (11)	[M1]	0.872 (13)	43.6 (5)
$\gamma_{3,1}$(Bi)	300.089 (12)	4.66 (21)	[M1]	0.464 (7)	3.18 (14)
$\gamma_{3,0}$(Bi)	415.272 (11)	0.17 (3)	[M1]	0.192 (3)	0.144 (22)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	26.916	(44)	min
Q_{β^-}	:	1019	(11)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,9}$	180 (11)	2.762 (22)	Allowed	4.5
$\beta^-_{0,8}$	222 (11)	0.0196 (27)	Allowed	6.9
$\beta^-_{0,7}$	485 (11)	1.047 (17)	1st forbidden	6.2
$\beta^-_{0,5}$	667 (11)	46.52 (37)	1st forbidden	5.1
$\beta^-_{0,4}$	729 (11)	41.09 (39)	1st forbidden	5.2
$\beta^-_{0,0}$	1019 (11)	9.2 (7)	1st forbidden	6.3

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Bi)	5.3 - 16.4	19.8 (3)	
e_{AK}	(Bi)		0.80 (9)	
	KLL	57.49 - 63.42	}	
	KLX	70.02 - 77.10	}	
	KXY	82.45 - 90.52	}	
$ec_{1,0\ L}$	(Bi)	36.8400 - 39.8089	10.39 (31)	
$ec_{1,0\ M}$	(Bi)	49.2284 - 50.6479	2.46 (8)	
$ec_{1,0\ N}$	(Bi)	52.2893 - 53.0704	0.641 (20)	
$ec_{4,1\ K}$	(Bi)	151.471 (3)	5.26 (16)	
$ec_{4,1\ L}$	(Bi)	225.610 - 228.578	0.908 (28)	
$ec_{4,1\ M}$	(Bi)	237.998 - 239.417	0.214 (7)	
$ec_{4,1\ N}$	(Bi)	241.059 - 241.840	0.0560 (17)	
$ec_{3,0\ K}$	(Bi)	168.34 (3)	0.32 (1)	
$ec_{3,0\ L}$	(Bi)	242.48 - 245.45	0.0551 (17)	
$ec_{3,0\ M}$	(Bi)	254.87 - 256.29	0.01298 (38)	
$ec_{4,0\ K}$	(Bi)	204.698 (2)	7.22 (23)	
$ec_{4,0\ L}$	(Bi)	278.836 - 281.805	1.291 (40)	
$ec_{4,0\ M}$	(Bi)	291.225 - 292.644	0.305 (10)	
$ec_{4,0\ N}$	(Bi)	294.286 - 295.067	0.0797 (25)	
$ec_{5,0\ K}$	(Bi)	261.406 (2)	9.26 (29)	
$ec_{5,0\ L}$	(Bi)	335.544 - 338.513	1.584 (46)	
$ec_{5,0\ M}$	(Bi)	347.933 - 349.352	0.373 (11)	
$ec_{5,0\ N}$	(Bi)	350.994 - 351.775	0.0975 (29)	
$\beta^-_{0,9}$	max:	180 (11)	2.762 (22)	avg: 50 (3)
$\beta^-_{0,8}$	max:	222 (11)	0.0196 (27)	avg: 62 (3)

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,7}$	max:	485	(11)	1.047 (17)	avg:	145 (4)
$\beta^-_{0,5}$	max:	667	(11)	46.52 (37)	avg:	207 (4)
$\beta^-_{0,4}$	max:	724	(11)	41.09 (39)	avg:	227 (4)
$\beta^-_{0,0}$	max:	1019	(11)	9.2 (7)	avg:	337 (4)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Bi)	9.42 — 16.36		12.42 (22)	
$XK\alpha_2$	(Bi)	74.8157		6.26 (12)	} $K\alpha$
$XK\alpha_1$	(Bi)	77.1088		10.47 (20)	}
$XK\beta_3$	(Bi)	86.835	}		
$XK\beta_1$	(Bi)	87.344	}	3.59 (9)	$K\beta'_1$
$XK\beta''_5$	(Bi)	87.862	}		
$XK\beta_2$	(Bi)	89.732	}		
$XK\beta_4$	(Bi)	90.074	}	1.10 (4)	$K\beta'_2$
$XKO_{2,3}$	(Bi)	90.421	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Bi)	53.2275 (21)	14.71 (42)	M1+E2	12.88 (39)	1.060 (7)
$\gamma_{-1,0}$(Bi)	107.22 (9)	0.0068 (14)			0.0068 (14)
$\gamma_{-1,1}$(Bi)	137.45 (30)	0.045 (18)			0.045 (18)
$\gamma_{-1,2}$(Bi)	141.3 (6)	0.027 (14)			0.027 (14)
$\gamma_{-1,3}$(Bi)	170.07 (6)	0.0146 (27)			0.0146 (27)
$\gamma_{3,2}$(Bi)	196.20 (5)	0.069 (9)			0.069 (9)
$\gamma_{3,1}$(Bi)	205.68 (9)	0.0114 (23)			0.0114 (23)
$\gamma_{-1,4}$(Bi)	216.47 (7)	0.0100 (23)			0.0100 (23)
$\gamma_{4,1}$(Bi)	241.997 (3)	13.72 (20)	M1(+E2)	0.888 (27)	7.268 (22)
$\gamma_{3,0}$(Bi)	258.87 (3)	0.924 (13)	M1	0.737 (22)	0.5318 (36)
$\gamma_{7,3}$(Bi)	274.80 (5)	0.504 (15)	M1+E2	0.392 (12)	0.362 (10)
$\gamma_{4,0}$(Bi)	295.224 (2)	27.29 (26)	M1+E2	0.482 (14)	18.414 (36)
$\gamma_{9,7}$(Bi)	305.26 (3)	0.0324 (22)	[E1]	0.0295 (9)	0.0315 (21)
$\gamma_{6,2}$(Bi)	314.32 (7)	0.077 (6)			0.077 (6)
$\gamma_{6,1}$(Bi)	323.83 (4)	0.0287 (32)			0.0287 (32)
$\gamma_{5,0}$(Bi)	351.932 (2)	46.96 (37)	M1(+E2)	0.319 (10)	35.60 (7)
$\gamma_{9,6}$(Bi)	462.00 (7)	0.213 (6)			0.213 (6)
$\gamma_{7,1}$(Bi)	480.43 (2)	0.3838 (49)	M1(+E2)	0.1384 (42)	0.3371 (41)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{9,5}$(Bi)	487.09 (7)	0.438 (6)	(E1)	0.01058 (32)	0.433 (6)
$\gamma_{7,0}$(Bi)	533.66 (2)	0.192 (10)	[M1,E2]	0.06 (4)	0.182 (6)
$\gamma_{8,3}$(Bi)	538.41 (8)	0.0196 (27)			0.0196 (27)
$\gamma_{9,4}$(Bi)	543.81 (7)	0.050 (9)	E1+M2	0.00843 (25)	0.050 (9)
$\gamma_{9,3}$(Bi)	580.13 (3)	0.372 (6)	(E1)	0.00740 (22)	0.369 (6)
$\gamma_{-1,5}$(Bi)	765.96 (9)	0.053 (8)			0.053 (8)
$\gamma_{9,1}$(Bi)	785.96 (9)	1.068 (13)	E1	0.00410 (12)	1.064 (13)
$\gamma_{9,0}$(Bi)	839.04 (9)	0.589 (8)	(E1)	0.00363 (11)	0.587 (8)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	5.012	(5)	d
Q_{β^-}	:	1162.1	(8)	keV
Q_{α}	:	5042.7	(18)	keV
β^-	:	99.99986	(2)	%
α	:	1.40	(15)	$\times 10^{-4}$ %

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,0}$	1162.1 (8)	99.99986 (2)	1st forbidden	8

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,2}$	4650 (4)	0.000084 (9)
$\alpha_{0,1}$	4687 (4)	0.000056 (6)

4 Electron Emissions

	Energy keV	Electrons per 100 disint.	Energy keV
$\beta^-_{0,0}$	max: 1162.1 (8)	99.99986 (2)	avg: 389.2 (3)

5 Photon Emissions

5.1 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_{γ} × 100
$\gamma_{1,0}$(Tl)	265.832 (5)	0.000056 (6)	E2	0.1603 (23)	0.000048 (5)
$\gamma_{2,0}$(Tl)	304.896 (6)	0.000084 (9)	M1	0.375 (6)	0.000061 (7)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	2.15	(2)	min
Q_α	:	6750.33	(46)	keV
Q_{β^-}	:	574	(5)	keV
α	:	99.724	(4)	%
β^-	:	0.276	(4)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,0}$	574 (5)	0.276 (4)	1st forbidden	5.99

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,1}$	6278.5 (9)	16.16 (23)
$\alpha_{0,0}$	6622.4 (6)	83.56 (23)

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Tl)	5.18 - 15.31	1.617 (21)	
e_{AK}	(Tl)		0.096 (11)	
	KLL	54.587 - 59.954	}	
	KLX	66.37 - 72.86	}	
	KXY	78.12 - 85.50	}	
$ec_{1,0\ K}$	(Tl)	265.50 (4)	2.59 (5)	
$ec_{1,0\ L}$	(Tl)	335.68 - 338.37	0.446 (9)	
$ec_{1,0\ M}$	(Tl)	347.33 - 348.64	0.1044 (22)	
$ec_{1,0\ N}$	(Tl)	350.18 - 350.91	0.0263 (5)	
$\beta^-_{0,0}$	max:	574 (5)	0.276 (4)	avg: 172.9 (18)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Tl)	8.9531 — 14.7362		0.929 (19)	
$XK\alpha_2$	(Tl)	70.8325		0.726 (16)	} $K\alpha$
$XK\alpha_1$	(Tl)	72.8725		1.225 (27)	}
$XK\beta_3$	(Tl)	82.118	}		
$XK\beta_1$	(Tl)	82.577	}	0.417 (11)	$K\beta_1'$
$XK\beta_5''$	(Tl)	83.115	}		
$XK\beta_2$	(Tl)	84.838	}		
$XK\beta_4$	(Tl)	85.134	}	0.124 (4)	$K\beta_2'$
$XKO_{2,3}$	(Tl)	85.444	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Tl)	351.03 (4)	16.16 (24)	M1+E2	0.243 (4)	13.00 (19)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	60.54	(6)	min
Q_{β^-}	:	2252.1	(17)	keV
Q_α	:	6207.26	(3)	keV
$Q_{\alpha*}$	:	8954.12	(11)	keV
β^-	:	64.06	(7)	%
$\beta^- n$	:	0.014	(1)	%
α	:	35.93	(7)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,6}$	446.1 (17)	0.68 (4)	1st forbidden non-unique	6.67
$\beta^-_{0,5}$	451.2 (17)	0.032 (4)	1st forbidden non-unique	8.03
$\beta^-_{0,4}$	572.7 (17)	0.21 (4)	1st forbidden non-unique	7.55
$\beta^-_{0,3}$	631.4 (17)	1.90 (3)	1st forbidden non-unique	6.74
$\beta^-_{0,2}$	739.4 (17)	1.44 (1)	1st forbidden non-unique	7.094
$\beta^-_{0,1}$	1524.8 (17)	4.50 (6)	1st forbidden non-unique	7.718
$\beta^-_{0,0}$	2252.1 (17)	55.31 (9)	1st forbidden non-unique	7.267

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,8}$	5302 (2)	0.000040 (4)
$\alpha_{0,7}$	5344 (2)	0.00036 (3)
$\alpha_{0,6}$	5481.4 (3)	0.0050 (4)
$\alpha_{0,4}$	5606.60 (5)	0.43 (3)
$\alpha_{0,3}$	5625.7 (4)	0.060 (3)
$\alpha_{0,2}$	5768.29 (6)	0.61 (3)
$\alpha_{0,1}$	6051.04 (3)	25.1 (1)
$\alpha_{0,0}$	6090.14 (3)	9.7 (1)
$^*\alpha_{1,0}$	9498.78 (11)	0.0024 (2)
$^*\alpha_{4,0}$	10432.94 (11)	0.0010 (1)
$^*\alpha_{5,0}$	10552.1 (2)	0.0106 (7)

* Long-range α.

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Tl)	5.182 - 10.132	12.2 (4)	
e_{AK}	(Tl)		0.0069 (8)	
	KLL	54.587 - 59.954	}	

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		Energy keV		Electrons per 100 disint.		Energy keV
	KLX	66.37 - 72.86	}			
	KXY	78.12 - 85.50	}			
e_{AL}	(Po)	5.434 - 10.934		0.0833 (25)		
e_{AK}	(Po)			0.0048 (6)		
	KLL	58.978 - 65.205	}			
	KLX	71.902 - 79.289	}			
	KXY	84.8 - 93.1	}			
$ec_{1,0\ L}$	(Tl)	24.511 - 27.200		19.06 (23)		
$ec_{1,0\ M}$	(Tl)	36.154 - 39.469		4.46 (5)		
$\beta^-_{0,6}$	max:	446.1 (17)		0.68 (4)	avg:	130.1 (6)
$\beta^-_{0,5}$	max:	451.2 (17)		0.032 (4)	avg:	131.7 (6)
$\beta^-_{0,4}$	max:	572.7 (17)		0.21 (4)	avg:	172.4 (6)
$\beta^-_{0,3}$	max:	631.4 (17)		1.90 (3)	avg:	192.7 (6)
$\beta^-_{0,2}$	max:	739.4 (17)		1.44 (1)	avg:	230.8 (6)
$\beta^-_{0,1}$	max:	1524.8 (17)		4.50 (6)	avg:	533.1 (7)
$\beta^-_{0,0}$	max:	2252.1 (17)		55.31 (9)	avg:	834.2 (7)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Tl)	8.953 — 14.738		7.1 (3)	
$XK\alpha_2$	(Tl)	70.8325		0.0525 (23)	} $K\alpha$
$XK\alpha_1$	(Tl)	72.8725		0.089 (4)	}
$XK\beta_3$	(Tl)	82.118	}		
$XK\beta_1$	(Tl)	82.577	}	0.0301 (14)	$K\beta'_1$
$XK\beta''_5$	(Tl)	83.115	}		
$XK\beta_2$	(Tl)	84.838	}		
$XK\beta_4$	(Tl)	85.134	}	0.0089 (5)	$K\beta'_2$
$XKO_{2,3}$	(Tl)	85.444	}		
XL	(Po)	9.658 — 16.213		0.0563 (24)	
$XK\alpha_2$	(Po)	76.864		0.0388 (8)	} $K\alpha$
$XK\alpha_1$	(Po)	79.293		0.0647 (13)	}
$XK\beta_3$	(Po)	89.256	}		
$XK\beta_1$	(Po)	89.807	}	0.0223 (6)	$K\beta'_1$
$XK\beta''_5$	(Po)	90.363	}		
$XK\beta_2$	(Po)	92.263	}		
$XK\beta_4$	(Po)	92.618	}	0.00693 (20)	$K\beta'_2$
$XKO_{2,3}$	(Po)	92.983	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Tl)	39.858 (4)	26.0 (3)	[M1]	23.3 (4)	1.07 (1)
$\gamma_{4,2}$(Tl)	164.80 (6)	0.010 (1)	(E2)	0.816 (12)	0.0055 (6)
$\gamma_{5,3}$(Po)	180.2 (2)	0.0095 (40)	M1	2.08 (3)	0.0031 (12)
$\gamma_{2,1}$(Tl)	288.18 (5)	0.46 (3)	M1+0.64%E2	0.436 (7)	0.32 (2)
$\gamma_{2,0}$(Tl)	328.04 (5)	0.158 (4)	[M1]	0.308 (5)	0.121 (3)
$\gamma_{3,1}$(Tl)	433.5 (4)	0.013 (1)	[M1]	0.1453 (21)	0.011 (1)
$\gamma_{4,1}$(Tl)	452.98 (4)	0.38 (3)	(M1)	0.1293 (18)	0.34 (3)
$\gamma_{3,0}$(Tl)	473.4 (4)	0.047 (3)	[M1+E2]	0.074 (10)	0.044 (3)
$\gamma_{4,0}$(Tl)	492.84 (4)	0.04 (1)	E2	0.0291 (4)	0.039 (10)
$\gamma_{6,1}$(Tl)	580.5 (3)	0.0011 (2)	E2	0.0198 (3)	0.0011 (2)
$\gamma_{6,0}$(Tl)	620.4 (3)	0.0039 (4)	[M1+E2]	0.037 (5)	0.0038 (4)
$\gamma_{1,0}$(Po)	727.330 (9)	6.74 (4)	E2	0.01393 (20)	6.65 (4)
$\gamma_{2,1}$(Po)	785.37 (9)	1.15 (1)	M1+0.8%E2	0.0387 (6)	1.11 (1)
$\gamma_{3,1}$(Po)	893.408 (14)	0.39 (1)	M1+0.2%E2	0.0278 (4)	0.38 (1)
$\gamma_{4,1}$(Po)	952.12 (2)	0.14 (4)	M1+30%E2	0.0190 (3)	0.14 (4)
$\gamma_{5,1}$(Po)	1073.6 (2)	0.0155 (6)	E2	0.00642 (9)	0.0154 (6)
$\gamma_{6,1}$(Po)	1078.63 (10)	0.559 (20)	M1+1.8%E2	0.01692 (24)	0.55 (2)
$\gamma_{2,0}$(Po)	1512.70 (8)	0.291 (10)	E2	0.00344 (5)	0.29 (1)
$\gamma_{3,0}$(Po)	1620.738 (10)	1.52 (3)	[M1]	0.00620 (9)	1.51 (3)
$\gamma_{4,0}$(Po)	1679.450 (14)	0.07 (1)	E2	0.00291 (4)	0.07 (1)
$\gamma_{6,0}$(Po)	1805.96 (10)	0.12 (3)	E2	0.00261 (4)	0.12 (3)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	45.59	(6)	min
Q_α	:	5983	(6)	keV
Q_{β^-}	:	1423	(5)	keV
β^-	:	97.91	(3)	%
α	:	2.09	(3)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,9}$	95 (5)	0.00039 (13)		7.68
$\beta^-_{0,8}$	304 (5)	0.0608 (20)		7.07
$\beta^-_{0,7}$	323 (5)	0.595 (17)		6.16
$\beta^-_{0,6}$	377 (5)	0.020 (4)		7.85
$\beta^-_{0,5}$	419 (5)	0.0648 (23)		7.494
$\beta^-_{0,4}$	555 (5)	0.0129 (6)	1st forbidden unique	8.597
$\beta^-_{0,3}$	822 (5)	0.0025 (19)		9.9
$\beta^-_{0,2}$	983 (5)	30.8 (4)	1st forbidden	6.07
$\beta^-_{0,1}$	1130 (5)	0.21 (9)	1st forbidden	8.45
$\beta^-_{0,0}$	1423 (5)	66.2 (4)	1st forbidden	6.316

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,1}$	5549 (10)	0.186 (5)
$\alpha_{0,0}$	5869 (10)	1.90 (4)

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Po)	5.43 - 16.86	1.7 (3)	
e_{AK}	(Po)		0.121 (19)	
	KLL	58.978 - 65.205	}	
	KLX	71.902 - 79.289	}	
	KXY	84.8 - 93.1	}	
e_{AL}	(Tl)	5.18 - 10.13	0.0107 (13)	
e_{AK}	(Tl)		0.00076 (9)	
	KLL	54.587 - 59.954	}	
	KLX	66.37 - 72.86	}	
	KXY	78.12 - 85.50	}	

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		Energy keV		Electrons per 100 disint.		Energy keV
$ec_{2,1\ L}$	(Po)	130.8 - 133.9		0.0109 (7)		
$ec_{1,0\ K}$	(Po)	199.70	(1)	0.09 (7)		
$ec_{1,0\ L}$	(Po)	275.9 - 279.0		0.025 (8)		
$ec_{2,0\ K}$	(Po)	347.34	(1)	3.81 (7)		
$ec_{2,0\ L}$	(Po)	423.51 - 426.63		0.653 (13)		
$ec_{2,0\ M}$	(Po)	436.29 - 437.76		0.1550 (27)		
$ec_{2,0\ N}$	(Po)	439.45 - 440.26		0.0392 (7)		
$ec_{1,0\ K}$	(Tl)	238.17	(2)	0.0212 (22)		
$\beta^-_{0,9}$	max:	95	(5)	0.00039 (13)	avg:	24.6 (14)
$\beta^-_{0,8}$	max:	304	(5)	0.0608 (20)	avg:	84.9 (16)
$\beta^-_{0,7}$	max:	323	(5)	0.595 (17)	avg:	90.8 (16)
$\beta^-_{0,6}$	max:	377	(5)	0.020 (4)	avg:	107.9 (16)
$\beta^-_{0,5}$	max:	419	(5)	0.0648 (23)	avg:	121.4 (17)
$\beta^-_{0,4}$	max:	555	(5)	0.0129 (6)	avg:	166.4 (17)
$\beta^-_{0,3}$	max:	822	(5)	0.0025 (19)	avg:	260.8 (19)
$\beta^-_{0,2}$	max:	983	(5)	30.8 (4)	avg:	320.4 (19)
$\beta^-_{0,1}$	max:	1130	(5)	0.21 (9)	avg:	376.8 (20)
$\beta^-_{0,0}$	max:	1423	(5)	66.2 (4)	avg:	492.2 (20)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9.6576 — 16.2129		1.14 (18)	
$XK\alpha_2$	(Po)	76.864		0.99 (15)	} $K\alpha$
$XK\alpha_1$	(Po)	79.293		1.6 (3)	}
$XK\beta_3$	(Po)	89.256	}		
$XK\beta_1$	(Po)	89.807	}	0.56 (9)	$K\beta'_1$
$XK\beta''_5$	(Po)	90.363	}		
$XK\beta_2$	(Po)	92.263	}		
$XK\beta_4$	(Po)	92.618	}	0.18 (3)	$K\beta'_2$
$XKO_{2,3}$	(Po)	92.983	}		
XL	(Tl)	8.9531 — 14.7362		0.0062 (8)	
$XK\alpha_2$	(Tl)	70.8325		0.0058 (7)	} $K\alpha$
$XK\alpha_1$	(Tl)	72.8725		0.0098 (12)	}
$XK\beta_3$	(Tl)	82.118	}		
$XK\beta_1$	(Tl)	82.577	}	0.0033 (5)	$K\beta'_1$
$XK\beta''_5$	(Tl)	83.115	}		

		Energy keV		Photons per 100 disint.	
$XK\beta_2$	(Tl)	84.838	}		
$XK\beta_4$	(Tl)	85.134	}	0.00098 (14)	$K\beta_2'$
$XKO_{2,3}$	(Tl)	85.444	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{2,1}$(Po)	147.70 (4)	0.0314 (20)	E2	1.453 (21)	0.0128 (8)
$\gamma_{1,0}$(Po)	292.80 (1)	0.55 (8)	M1+E2	0.30 (18)	0.421 (7)
$\gamma_{1,0}$(Tl)	323.70 (2)	0.1866 (37)	M1+E2	0.178 (15)	0.1584 (24)
$\gamma_{5,3}$(Po)	402.8 (3)	0.00010 (4)			0.00010 (4)
$\gamma_{2,0}$(Po)	440.44 (1)	30.77 (36)	M1	0.179 (3)	26.1 (3)
$\gamma_{4,1}$(Po)	574.9 (3)	0.00068 (16)			0.00068 (16)
$\gamma_{3,0}$(Po)	600.9 (2)	0.0026 (19)			0.0026 (19)
$\gamma_{6,2}$(Po)	604.93 (17)	0.0014 (5)			0.0014 (5)
$\gamma_{7,2}$(Po)	659.75 (2)	0.043 (6)			0.043 (6)
$\gamma_{5,1}$(Po)	710.82 (3)	0.0112 (6)			0.0112 (6)
$\gamma_{7,1}$(Po)	807.37 (1)	0.287 (14)			0.287 (14)
$\gamma_{8,1}$(Po)	826.55 (4)	0.0065 (4)			0.0065 (4)
$\gamma_{4,0}$(Po)	867.96 (2)	0.0122 (6)			0.0122 (6)
$\gamma_{9,2}$(Po)	886.66 (14)	0.00102 (19)			0.00102 (19)
$\gamma_{5,0}$(Po)	1003.58 (2)	0.0535 (22)			0.0535 (22)
$\gamma_{6,0}$(Po)	1045.67 (8)	0.019 (4)			0.019 (4)
$\gamma_{7,0}$(Po)	1100.16 (1)	0.265 (6)			0.265 (6)
$\gamma_{8,0}$(Po)	1119.42 (8)	0.0543 (20)			0.0543 (20)
$\gamma_{9,0}$(Po)	1328.2 (3)	0.00039 (13)			0.00039 (13)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	19.8	(1)	min
Q_{β^-}	:	3270	(11)	keV
Q_{α}	:	5621	(3)	keV
$Q_{\alpha*}$	:	11105	(11)	keV
β^-	:	99.979	(13)	%
α	:	0.021	(13)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,80}$	86 (11)	0.0011 (5)		6.8
$\beta^-_{0,79}$	99 (11)	0.00014 (9)	1st forbidden	7.8
$\beta^-_{0,77}$	110 (11)	0.00079 (12)		7.2
$\beta^-_{0,76}$	121 (11)	0.00019		8
$\beta^-_{0,75}$	127 (11)	0.00118 (9)		7.3
$\beta^-_{0,73}$	176 (11)	0.00037 (4)		8.2
$\beta^-_{0,72}$	188 (11)	0.0052 (7)		7.1
$\beta^-_{0,70}$	204 (11)	0.00141 (23)	1st forbidden	7.8
$\beta^-_{0,69}$	216 (11)	0.030 (5)		6.6
$\beta^-_{0,65}$	256 (11)	0.0252 (24)		6.9
$\beta^-_{0,62}$	270 (11)	0.0160 (16)		7.1
$\beta^-_{0,61}$	284 (11)	0.032 (5)		6.9
$\beta^-_{0,60}$	291 (11)	0.0165 (6)		7.2
$\beta^-_{0,58}$	309 (11)	0.00036 (14)	1st forbidden	9
$\beta^-_{0,57}$	329 (11)	0.041 (7)		7
$\beta^-_{0,56}$	336 (11)	0.00216 (32)		8.3
$\beta^-_{0,55}$	341 (11)	0.0025 (9)		8.3
$\beta^-_{0,54}$	348 (11)	0.0220 (9)		7.3
$\beta^-_{0,53}$	353 (11)	0.0014 (9)	1st forbidden	8.6
$\beta^-_{0,52}$	373 (11)	0.0046 (5)	1st forbidden	8.1
$\beta^-_{0,51}$	376 (11)	0.022 (3)		7.5
$\beta^-_{0,50}$	390 (11)	0.0115 (16)		7.8
$\beta^-_{0,49}$	400 (11)	0.0087 (4)	1st forbidden	7.9
$\beta^-_{0,48}$	409 (11)	0.0146 (20)		7.6
$\beta^-_{0,47}$	443 (11)	0.00218 (17)		8.7
$\beta^-_{0,44}$	484 (11)	0.0248 (31)		7.8
$\beta^-_{0,43}$	500 (11)	0.038 (5)		7.6
$\beta^-_{0,42}$	541 (11)	0.525 (16)		6.6
$\beta^-_{0,41}$	551 (11)	0.247 (8)		6.9
$\beta^-_{0,39}$	571 (11)	0.026 (4)		8
$\beta^-_{0,40}$	573 (11)	0.0471 (23)	1st forbidden	7.7
$\beta^-_{0,38}$	575 (11)	0.231 (15)	1st forbidden	7
$\beta^-_{0,37}$	608 (11)	0.098 (9)		7.5
$\beta^-_{0,36}$	639 (11)	0.0223 (21)		8.2
$\beta^-_{0,35}$	665 (11)	0.058 (4)		7.7
$\beta^-_{0,34}$	710 (11)	0.00018 (9)	1st forbidden	10.5
$\beta^-_{0,32}$	727 (11)	0.044 (7)	1st forbidden	8.1

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,31}$	764 (11)	0.092 (9)	1st forbidden	7.9
$\beta^-_{0,30}$	765 (11)	0.169 (10)	1st forbidden	7.6
$\beta^-_{0,29}$	788 (11)	1.227 (27)		6.8
$\beta^-_{0,28}$	822 (11)	2.76 (6)	Allowed	6.5
$\beta^-_{0,27}$	847 (11)	0.0620 (49)		8.1
$\beta^-_{0,26}$	909 (11)	0.0030 (8)		9.6
$\beta^-_{0,25}$	922 (11)	0.0014 (9)		9.9
$\beta^-_{0,24}$	977 (11)	0.558 (8)	1st forbidden	7.4
$\beta^-_{0,23}$	1004 (11)	0.187 (12)	1st forbidden	8
$\beta^-_{0,21}$	1068 (11)	5.642 (43)	1st forbidden	6.6
$\beta^-_{0,20}$	1077 (11)	0.851 (10)	1st forbidden	7.4
$\beta^-_{0,19}$	1124 (11)	0.433 (22)	1st forbidden	7.8
$\beta^-_{0,18}$	1151 (11)	4.339 (18)	1st forbidden	6.8
$\beta^-_{0,17}$	1182 (11)	0.114 (6)		8.4
$\beta^-_{0,16}$	1253 (11)	2.449 (10)	1st forbidden	7.2
$\beta^-_{0,15}$	1261 (11)	1.430 (9)	1st forbidden	7.4
$\beta^-_{0,14}$	1275 (11)	1.171 (18)		7.5
$\beta^-_{0,13}$	1382 (11)	1.584 (10)	1st forbidden	7.5
$\beta^-_{0,12}$	1423 (11)	8.147 (28)	1st forbidden	6.9
$\beta^-_{0,11}$	1506 (11)	17.10 (8)	1st forbidden	6.6
$\beta^-_{0,10}$	1529 (11)	0.116 (16)	1st forbidden	8.8
$\beta^-_{0,9}$	1540 (11)	17.494 (36)	1st forbidden	6.7
$\beta^-_{0,8}$	1557 (11)	0.170 (16)		8.7
$\beta^-_{0,7}$	1609 (11)	0.65 (6)	1st forbidden	8.2
$\beta^-_{0,6}$	1727 (11)	3.12 (4)	1st forbidden	7.6
$\beta^-_{0,5}$	1857 (11)	0.396 (46)	1st forbidden	8.6
$\beta^-_{0,4}$	1894 (11)	7.45 (5)	1st forbidden	7.4
$\beta^-_{0,1}$	2661 (11)	0.62 (20)	1st forbidden	9
$\beta^-_{0,0}$	3270 (11)	19.67 (20)	1st forbidden	7.9

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,5}$	4941 (3)	0.000052 (3)
$\alpha_{0,4}$	5023 (3)	0.000045 (3)
$\alpha_{0,3}$	5184 (3)	0.00013 (1)
$\alpha_{0,2}$	5273 (9)	0.00125 (7)
$\alpha_{0,1}$	5452 (3)	0.0116 (7)
$\alpha_{0,0}$	5516 (3)	0.0082 (5)
$^*\alpha_{1,0}$	8287 (6)	0.00012
$^*\alpha_{6,1}$	8430 (6)	0.00006
$^*\alpha_{2,0}$	8950 (6)	0.00002
$^*\alpha_{4,0}$	9080 (6)	0.0022
$^*\alpha_{6,0}$	9320 (6)	0.00005
$^*\alpha_{7,0}$	9378 (8)	0.00002

	Energy keV	Probability × 100
$^{*}\alpha_{10,0}$	9500 (6)	0.0001
$^{*}\alpha_{14,0}$	9670 (8)	0.00004
$^{*}\alpha_{17,0}$	9802 (6)	0.00012
$^{*}\alpha_{21,0}$	9907 (6)	0.00007
$^{*}\alpha_{24,0}$	10082 (6)	0.00014
$^{*}\alpha_{26,0}$	10150 (8)	0.00002
$^{*}\alpha_{32,0}$	10332 (6)	0.00008
$^{*}\alpha_{38,0}$	10505 (10)	0.00002

* Long-range α.

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Po)	5.43 - 16.86	0.934 (16)	
e_{AK}	(Po)		0.053 (7)	
	KLL	58.97 - 65.20	}	
	KLX	71.93 - 76.60	}	
	KXY	84.72 - 93.04	}	
$ec_{18,9\ K}$	(Po)	295.84 (5)	0.0800 (16)	
$ec_{18,9\ L}$	(Po)	372.01 - 375.13	0.01391 (26)	
$ec_{1,0\ K}$	(Po)	516.216 (7)	0.676 (10)	
$ec_{1,0\ L}$	(Po)	592.388 - 595.510	0.1892 (28)	
$ec_{1,0\ M}$	(Po)	605.164 - 606.640	0.0469 (7)	
$ec_{1,0\ N}$	(Po)	608.329 - 609.138	0.01201 (19)	
$ec_{4,1\ K}$	(Po)	675.259 (14)	0.060 (9)	
$ec_{5,1\ K}$	(Po)	713.07 (2)	0.01094 (17)	
$ec_{4,1\ L}$	(Po)	751.431 - 754.550	0.0127 (15)	
$ec_{6,1\ K}$	(Po)	840.959 (16)	0.0595 (25)	
$ec_{6,1\ L}$	(Po)	917.131 - 920.250	0.01014 (40)	
$ec_{9,1\ K}$	(Po)	1027.195 (15)	0.1858 (29)	
$ec_{9,1\ L}$	(Po)	1103.367 - 1106.490	0.03131 (45)	
$ec_{12,1\ K}$	(Po)	1145.015 (12)	0.0573 (8)	
$ec_{11,0\ K}$	(Po)	1671.398 (14)	0.0608 (9)	
$ec_{11,0\ L}$	(Po)	1747.57 - 1750.69	0.01012 (16)	
$\beta^-_{0,80}$	max:	86 (11)	0.0011 (5)	avg: 23 (3)
$\beta^-_{0,79}$	max:	97 (11)	0.00014 (9)	avg: 26 (3)
$\beta^-_{0,77}$	max:	110 (11)	0.00079 (12)	avg: 29 (3)
$\beta^-_{0,76}$	max:	121 (11)	0.00019	avg: 32 (3)
$\beta^-_{0,75}$	max:	127 (11)	0.00118 (9)	avg: 34 (3)
$\beta^-_{0,73}$	max:	176 (11)	0.00037 (4)	avg: 48 (3)
$\beta^-_{0,72}$	max:	188 (11)	0.0052 (7)	avg: 51 (3)
$\beta^-_{0,70}$	max:	202 (11)	0.00141 (23)	avg: 55 (3)
$\beta^-_{0,69}$	max:	216 (11)	0.030 (5)	avg: 59 (3)

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,65}$	max:	256	(11)	0.0252 (24)	avg:	71 (3)
$\beta^-_{0,62}$	max:	270	(11)	0.0160 (16)	avg:	75 (3)
$\beta^-_{0,61}$	max:	284	(11)	0.032 (5)	avg:	80 (3)
$\beta^-_{0,60}$	max:	291	(11)	0.0165 (6)	avg:	82 (3)
$\beta^-_{0,58}$	max:	307	(11)	0.00036 (14)	avg:	87 (3)
$\beta^-_{0,57}$	max:	329	(11)	0.041 (7)	avg:	93 (3)
$\beta^-_{0,56}$	max:	336	(11)	0.00216 (32)	avg:	95 (3)
$\beta^-_{0,55}$	max:	341	(11)	0.0025 (9)	avg:	97 (3)
$\beta^-_{0,54}$	max:	348	(11)	0.0220 (9)	avg:	99 (3)
$\beta^-_{0,53}$	max:	350	(11)	0.0014 (9)	avg:	100 (3)
$\beta^-_{0,52}$	max:	373	(11)	0.0046 (5)	avg:	107 (3)
$\beta^-_{0,51}$	max:	376	(11)	0.022 (3)	avg:	108 (3)
$\beta^-_{0,50}$	max:	390	(11)	0.0115 (16)	avg:	113 (3)
$\beta^-_{0,49}$	max:	400	(11)	0.0087 (4)	avg:	116 (3)
$\beta^-_{0,48}$	max:	409	(11)	0.0146 (20)	avg:	119 (4)
$\beta^-_{0,47}$	max:	443	(11)	0.00218 (17)	avg:	130 (4)
$\beta^-_{0,44}$	max:	484	(11)	0.0248 (31)	avg:	143 (4)
$\beta^-_{0,43}$	max:	500	(11)	0.038 (5)	avg:	149 (4)
$\beta^-_{0,42}$	max:	541	(11)	0.525 (16)	avg:	162 (4)
$\beta^-_{0,41}$	max:	551	(11)	0.247 (8)	avg:	166 (4)
$\beta^-_{0,40}$	max:	571	(11)	0.0471 (23)	avg:	172 (4)
$\beta^-_{0,39}$	max:	571	(11)	0.026 (4)	avg:	173 (4)
$\beta^-_{0,38}$	max:	575	(11)	0.231 (15)	avg:	174 (4)
$\beta^-_{0,37}$	max:	608	(11)	0.098 (9)	avg:	185 (4)
$\beta^-_{0,36}$	max:	639	(11)	0.0223 (21)	avg:	196 (4)
$\beta^-_{0,35}$	max:	665	(11)	0.058 (4)	avg:	205 (4)
$\beta^-_{0,34}$	max:	708	(11)	0.00018 (9)	avg:	220 (4)
$\beta^-_{0,32}$	max:	725	(11)	0.044 (7)	avg:	226 (4)
$\beta^-_{0,31}$	max:	762	(11)	0.092 (9)	avg:	240 (4)
$\beta^-_{0,30}$	max:	765	(11)	0.169 (10)	avg:	241 (4)
$\beta^-_{0,29}$	max:	788	(11)	1.227 (27)	avg:	249 (3)
$\beta^-_{0,28}$	max:	822	(11)	2.76 (6)	avg:	262 (4)
$\beta^-_{0,27}$	max:	847	(11)	0.0620 (49)	avg:	271 (4)
$\beta^-_{0,26}$	max:	909	(11)	0.0030 (8)	avg:	294 (4)
$\beta^-_{0,25}$	max:	922	(11)	0.0014 (9)	avg:	298 (4)
$\beta^-_{0,24}$	max:	977	(11)	0.558 (8)	avg:	319 (4)
$\beta^-_{0,23}$	max:	1004	(11)	0.187 (12)	avg:	329 (4)
$\beta^-_{0,21}$	max:	1066	(11)	5.642 (43)	avg:	353 (4)
$\beta^-_{0,20}$	max:	1077	(11)	0.851 (10)	avg:	357 (4)
$\beta^-_{0,19}$	max:	1122	(11)	0.433 (22)	avg:	375 (4)
$\beta^-_{0,18}$	max:	1151	(11)	4.339 (18)	avg:	386 (4)
$\beta^-_{0,17}$	max:	1182	(11)	0.114 (6)	avg:	398 (4)
$\beta^-_{0,16}$	max:	1253	(11)	2.449 (10)	avg:	425 (4)
$\beta^-_{0,15}$	max:	1259	(11)	1.430 (9)	avg:	428 (4)
$\beta^-_{0,14}$	max:	1275	(11)	1.171 (18)	avg:	434 (4)
$\beta^-_{0,13}$	max:	1380	(11)	1.584 (10)	avg:	476 (4)
$\beta^-_{0,12}$	max:	1423	(11)	8.147 (28)	avg:	493 (4)

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,11}$	max:	1506	(11)	17.10 (8)	avg:	526 (4)
$\beta^-_{0,10}$	max:	1527	(11)	0.116 (16)	avg:	535 (4)
$\beta^-_{0,9}$	max:	1540	(11)	17.494 (36)	avg:	540 (4)
$\beta^-_{0,8}$	max:	1557	(11)	0.170 (16)	avg:	547 (4)
$\beta^-_{0,7}$	max:	1609	(11)	0.65 (6)	avg:	568 (4)
$\beta^-_{0,6}$	max:	1727	(11)	3.12 (4)	avg:	616 (5)
$\beta^-_{0,5}$	max:	1855	(11)	0.396 (46)	avg:	669 (5)
$\beta^-_{0,4}$	max:	1892	(11)	7.45 (5)	avg:	685 (5)
$\beta^-_{0,1}$	max:	2661	(11)	0.62 (20)	avg:	1008 (5)
$\beta^-_{0,0}$	max:	3270	(11)	19.67 (20)	avg:	1270 (5)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9.66 — 16.21		0.627 (15)	
XKα_2	(Po)	76.864		0.426 (13)	} Kα
XKα_1	(Po)	79.293		0.710 (22)	}
XKβ_3	(Po)	89.256	}		
XKβ_1	(Po)	89.807	}	0.244 (9)	Kβ_1'
XKβ_5''	(Po)	90.363	}		
XKβ_2	(Po)	92.263	}		
XKβ_4	(Po)	92.618	}	0.0760 (29)	Kβ_2'
XKO$_{2,3}$	(Po)	92.983	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Tl)	62.5 (10)	0.0116 (7)	(M1)		0.0116 (7)
$\gamma_{2,1}$(Tl)	191.1 (18)	0.00125 (7)			0.00125 (7)
$\gamma_{11,6}$(Po)	221 (1)	0.106 (31)	[M1,E2]	0.8 (5)	0.059 (6)
$\gamma_{-1,0}$(Po)	230 (1)	0.0031 (11)		0.0585 (11)	0.0029 (10)
$\gamma_{16,11}$(Po)	252.80 (6)	0.0212 (33)	[M1]	0.809 (12)	0.0117 (18)
$\gamma_{6,3}$(Po)	268.8 (2)	0.0168 (19)	[E1]	0.0405 (6)	0.0161 (18)
$\gamma_{29,22}$(Po)	273.80 (5)	0.120 (8)			0.120 (8)
$\gamma_{42,28}$(Po)	280.95 (5)	0.062 (6)			0.062 (6)
$\gamma_{-1,1}$(Po)	304.2 (2)	0.033 (6)		0.30 (19)	0.0255 (23)
$\gamma_{14,7}$(Po)	333.350 (42)	0.0646 (41)	[E1]	0.0247 (4)	0.063 (4)
$\gamma_{-1,2}$(Po)	334.78 (8)	0.033 (5)			0.033 (5)
$\gamma_{11,5}$(Po)	348.92 (6)	0.164 (43)	[M1]	0.335 (5)	0.123 (32)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{11,4}$(Po)	386.77 (5)	0.343 (30)	[M1,E2]	0.16 (10)	0.296 (5)
$\gamma_{18,9}$(Po)	388.88 (5)	0.493 (6)	(M1)	0.250 (4)	0.394 (5)
$\gamma_{29,17}$(Po)	394.05 (8)	0.0127 (18)			0.0127 (18)
$\gamma_{35,22}$(Po)	396.01 (8)	0.0259 (18)			0.0259 (18)
$\gamma_{2,1}$(Po)	405.74 (3)	0.180 (7)	[E2]	0.0541 (8)	0.171 (7)
$\gamma_{28,14}$(Po)	452.92 (10)	0.034 (5)	[M1,E2]	0.10 (7)	0.031 (4)
$\gamma_{9,3}$(Po)	454.770 (12)	0.292 (5)	[E1]	0.01251 (18)	0.288 (5)
$\gamma_{21,10}$(Po)	461.0 (2)	0.067 (9)	[M1]	0.1581 (23)	0.058 (8)
$\gamma_{12,4}$(Po)	469.76 (7)	0.145 (18)	[M1,E2]	0.09 (6)	0.133 (15)
$\gamma_{21,9}$(Po)	474.41 (5)	0.100 (9)	[M1,E2]	0.09 (6)	0.092 (6)
$\gamma_{38,22}$(Po)	485.92 (11)	0.021 (4)			0.021 (4)
$\gamma_{29,14}$(Po)	487.95 (13)	0.028 (9)	[E1]	0.01080 (16)	0.028 (9)
$\gamma_{39,21}$(Po)	494.2 (4)	0.011 (3)			0.011 (3)
$\gamma_{31,15}$(Po)	496.90 (18)	0.0068 (18)			0.0068 (18)
$\gamma_{23,11}$(Po)	501.96 (15)	0.0181 (22)			0.0181 (22)
$\gamma_{42,22}$(Po)	519.90 (5)	0.0166 (17)			0.0166 (17)
$\gamma_{42,21}$(Po)	524.6 (2)	0.0169 (17)			0.0169 (17)
$\gamma_{6,2}$(Po)	528 (1)	0.0112 (13)	[E2]	0.0282 (5)	0.0109 (13)
$\gamma_{23,9}$(Po)	536.77 (4)	0.061 (8)			0.061 (8)
$\gamma_{21,7}$(Po)	543.0 (2)	0.093 (23)	[M1,E2]	0.06 (4)	0.088 (21)
$\gamma_{22,7}$(Po)	547.6 (3)	0.034 (3)			0.034 (3)
$\gamma_{62,28}$(Po)	551.9 (8)	0.0055 (14)			0.0055 (14)
$\gamma_{12,3}$(Po)	572.76 (7)	0.072 (8)	[E1]	0.00779 (11)	0.071 (8)
$\gamma_{15,5}$(Po)	595.23 (7)	0.0183 (17)	[M1,E2]	0.05 (3)	0.0174 (15)
$\gamma_{41,18}$(Po)	600.0 (5)	0.008 (4)			0.008 (4)
$\gamma_{1,0}$(Po)	609.312 (7)	46.42 (19)	E2	0.0204 (3)	45.49 (19)
$\gamma_{13,3}$(Po)	615.73 (10)	0.055 (7)	[E1]	0.00674 (10)	0.055 (7)
$\gamma_{14,4}$(Po)	617.0 (2)	0.027 (5)	[E1]	0.00672 (10)	0.027 (5)
$\gamma_{51,23}$(Po)	626.4 (6)	0.0041 (14)			0.0041 (14)
$\gamma_{-1,3}$(Po)	630.79 (7)	0.0166 (14)			0.0166 (14)
$\gamma_{15,4}$(Po)	633.14 (10)	0.057 (3)	[M1,E2]	0.044 (25)	0.055 (3)
$\gamma_{29,12}$(Po)	634.72 (21)	0.0067 (24)	[M1,E2]	0.043 (25)	0.0064 (23)
$\gamma_{16,4}$(Po)	639.67 (10)	0.035 (5)	[E2]	0.0183 (3)	0.034 (5)
$\gamma_{20,6}$(Po)	649.18 (7)	0.056 (7)	[M1,E2]	0.041 (24)	0.054 (7)
$\gamma_{27,11}$(Po)	658.7 (2)	0.017 (4)			0.017 (4)
$\gamma_{21,6}$(Po)	661.1 (2)	0.056 (4)	[M1,E2]	0.039 (22)	0.054 (4)
$\gamma_{3,1}$(Po)	665.453 (22)	1.539 (7)	E1	0.00579 (9)	1.530 (7)
$\gamma_{38,16}$(Po)	677.41 (15)	0.0055 (23)			0.0055 (23)
$\gamma_{28,11}$(Po)	683.22 (6)	0.084 (6)	[E1]	0.00551 (8)	0.084 (6)
$\gamma_{39,15}$(Po)	687.6 (3)	0.0066 (14)			0.0066 (14)
$\gamma_{27,9}$(Po)	693.3 (5)	0.0059 (15)			0.0059 (15)
$\gamma_{8,2}$(Po)	697.90 (25)	0.069 (4)	[M1,E2]	0.034 (19)	0.067 (4)
$\gamma_{38,14}$(Po)	699.82 (18)	0.016 (5)			0.016 (5)
$\gamma_{18,5}$(Po)	703.11 (4)	0.504 (12)	[M1]	0.0519 (8)	0.479 (11)
$\gamma_{28,10}$(Po)	704.9 (3)	0.051 (10)	[E1]	0.00519 (8)	0.051 (10)
$\gamma_{41,15}$(Po)	708.8 (3)	0.0119 (20)			0.0119 (20)
$\gamma_{17,4}$(Po)	710.67 (10)	0.076 (4)			0.076 (4)
$\gamma_{14,3}$(Po)	719.86 (3)	0.399 (10)	E2	0.01424 (20)	0.393 (10)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{23,6}$(Po)	722.98 (12)	0.037 (7)			0.037 (7)
$\gamma_{42,14}$(Po)	733.80 (15)	0.038 (3)			0.038 (3)
$\gamma_{18,4}$(Po)	740.73 (18)	0.0440 (23)	[M1,E2]	0.029 (16)	0.0428 (21)
$\gamma_{29,9}$(Po)	752.84 (3)	0.130 (8)	[M1,E2]	0.028 (16)	0.126 (8)
$\gamma_{4,1}$(Po)	768.356 (10)	4.969 (19)	M1+E2	0.0157 (21)	4.892 (16)
$\gamma_{28,7}$(Po)	786.1 (4)	0.31 (5)	[E1]	0.00422 (6)	0.31 (5)
$\gamma_{21,5}$(Po)	788.6 (5)	0.016 (5)	[M1]	0.0385 (6)	0.015 (5)
$\gamma_{5,1}$(Po)	806.174 (18)	1.276 (6)	E2	0.01127 (16)	1.262 (6)
$\gamma_{20,4}$(Po)	815.0 (1)	0.0399 (31)	[M1,E2]	0.023 (13)	0.039 (3)
$\gamma_{29,7}$(Po)	821.18 (3)	0.172 (10)	M1	0.0346 (5)	0.166 (10)
$\gamma_{21,4}$(Po)	826.3 (2)	0.133 (11)	M1	0.0341 (5)	0.129 (11)
$\gamma_{12,2}$(Po)	832.39 (11)	0.0354 (20)	[E2]	0.01057 (15)	0.035 (2)
$\gamma_{38,12}$(Po)	847.16 (11)	0.016 (6)			0.016 (6)
$\gamma_{19,3}$(Po)	873.07 (19)	0.019 (3)			0.019 (3)
$\gamma_{24,5}$(Po)	878.03 (12)	0.0120 (28)	[M1,E2]	0.019 (10)	0.0118 (27)
$\gamma_{28,6}$(Po)	904.29 (10)	0.066 (8)	[E1]	0.00326 (5)	0.066 (8)
$\gamma_{24,4}$(Po)	915.74 (15)	0.023 (5)	[M1,E2]	0.017 (9)	0.023 (5)
$\gamma_{20,3}$(Po)	917.8 (3)	0.005 (3)	[E1]	0.00317 (5)	0.005 (3)
$\gamma_{38,11}$(Po)	930.2 (2)	0.043 (8)			0.043 (8)
$\gamma_{6,1}$(Po)	934.061 (12)	3.173 (11)	M1+E2	0.0234 (10)	3.10 (1)
$\gamma_{29,6}$(Po)	939.6 (5)	0.016 (4)	[M1,E2]	0.016 (8)	0.016 (4)
$\gamma_{35,7}$(Po)	943.34 (12)	0.017 (3)			0.017 (3)
$\gamma_{37,8}$(Po)	949.8 (5)	0.0055 (23)			0.0055 (23)
$\gamma_{38,10}$(Po)	952.2 (8)	0.0059 (23)			0.0059 (23)
$\gamma_{30,6}$(Po)	961.61 (17)	0.0101 (14)			0.0101 (14)
$\gamma_{42,11}$(Po)	964.08 (3)	0.363 (12)			0.363 (12)
$\gamma_{41,10}$(Po)	976.18 (12)	0.0151 (21)			0.0151 (21)
$\gamma_{23,3}$(Po)	991.49 (19)	0.011 (3)	[M1,E2]	0.014 (7)	0.011 (3)
$\gamma_{48,12}$(Po)	1013.8 (2)	0.0087 (19)			0.0087 (19)
$\gamma_{44,11}$(Po)	1021.0 (5)	0.016 (3)			0.016 (3)
$\gamma_{28,5}$(Po)	1032.37 (8)	0.061 (4)	[E1]	0.00257 (4)	0.061 (4)
$\gamma_{39,7}$(Po)	1038.0 (3)	0.0086 (15)			0.0086 (15)
$\gamma_{27,4}$(Po)	1045.6 (2)	0.023 (3)			0.023 (3)
$\gamma_{7,1}$(Po)	1051.96 (3)	0.328 (8)	[M1,E2]	0.012 (6)	0.324 (8)
$\gamma_{42,7}$(Po)	1067.2 (3)	0.024 (7)			0.024 (7)
$\gamma_{28,4}$(Po)	1069.96 (8)	0.272 (10)	[E1]	0.00241 (4)	0.271 (10)
$\gamma_{8,1}$(Po)	1103.64 (19)	0.107 (15)	[M1,E2]	0.011 (5)	0.106 (15)
$\gamma_{29,4}$(Po)	1104.79 (19)	0.074 (14)	[M1,E2]	0.011 (5)	0.073 (14)
$\gamma_{37,6}$(Po)	1118.9 (5)	0.010 (4)			0.010 (4)
$\gamma_{9,1}$(Po)	1120.287 (10)	15.14 (3)	M1+E2	0.01522 (23)	14.91 (3)
$\gamma_{31,4}$(Po)	1130.29 (19)	0.036 (3)			0.036 (3)
$\gamma_{10,1}$(Po)	1133.66 (3)	0.255 (8)	[E2]	0.00578 (8)	0.254 (8)
$\gamma_{11,1}$(Po)	1155.19 (2)	1.657 (7)	M1+E2	0.0135 (4)	1.635 (7)
$\gamma_{32,4}$(Po)	1167.3 (2)	0.0123 (17)			0.0123 (17)
$\gamma_{28,3}$(Po)	1172.98 (10)	0.055 (7)	[E2]	0.00542 (8)	0.055 (7)
$\gamma_{29,3}$(Po)	1207.68 (3)	0.455 (12)	[E1]	0.00196 (3)	0.454 (12)
$\gamma_{-1,4}$(Po)	1226.7 (3)	0.018 (8)			0.018 (8)
$\gamma_{30,3}$(Po)	1230.6 (4)	0.007 (5)			0.007 (5)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{12,1}$(Po)	1238.111 (12)	5.901 (14)	M1+E2	0.01200 (17)	5.831 (14)
$\gamma_{13,1}$(Po)	1280.96 (2)	1.451 (6)	M1	0.01101 (16)	1.435 (6)
$\gamma_{37,4}$(Po)	1284 (1)	0.013 (6)			0.013 (6)
$\gamma_{41,5}$(Po)	1303.76 (8)	0.105 (5)			0.105 (5)
$\gamma_{38,4}$(Po)	1316.96 (15)	0.077 (7)			0.077 (7)
$\gamma_{35,3}$(Po)	1330.0 (2)	0.0120 (14)			0.0120 (14)
$\gamma_{41,4}$(Po)	1341.49 (16)	0.0214 (27)			0.0214 (27)
$\gamma_{42,4}$(Po)	1351 (1)	0.0042 (11)			0.0042 (11)
$\gamma_{65,7}$(Po)	1353.4 (8)	0.0036 (9)			0.0036 (9)
$\gamma_{4,0}$(Po)	1377.669 (12)	3.984 (11)	E2	0.00404 (6)	3.968 (11)
$\gamma_{14,1}$(Po)	1385.31 (3)	0.796 (5)	[E1]	0.001631 (23)	0.795 (5)
$\gamma_{43,4}$(Po)	1392.5 (4)	0.0087 (19)			0.0087 (19)
$\gamma_{15,1}$(Po)	1401.50 (4)	1.337 (7)	(M1+E2)	0.0053 (9)	1.330 (7)
$\gamma_{16,1}$(Po)	1407.98 (4)	2.398 (8)	(E2)	0.00389 (6)	2.389 (8)
$\gamma_{38,3}$(Po)	1419.7 (3)	0.0055 (10)			0.0055 (10)
$\gamma_{65,6}$(Po)	1470.9 (3)	0.0094 (13)			0.0094 (13)
$\gamma_{17,1}$(Po)	1479.15 (14)	0.051 (4)			0.051 (4)
$\gamma_{18,1}$(Po)	1509.228 (15)	2.144 (10)	M1+E2	0.00732 (11)	2.128 (10)
$\gamma_{51,4}$(Po)	1515.5 (3)	0.0072 (21)			0.0072 (21)
$\gamma_{19,1}$(Po)	1538.50 (6)	0.401 (22)			0.401 (22)
$\gamma_{6,0}$(Po)	1543.32 (6)	0.303 (13)	[E2]	0.00333 (5)	0.302 (13)
$\gamma_{20,1}$(Po)	1583.22 (4)	0.712 (5)	M1+E2	0.00642 (18)	0.707 (5)
$\gamma_{21,1}$(Po)	1594.73 (8)	0.276 (15)	[M1]	0.00644 (9)	0.274 (15)
$\gamma_{22,1}$(Po)	1599.31 (6)	0.322 (15)			0.322 (15)
$\gamma_{65,4}$(Po)	1636.3 (2)	0.0111 (16)			0.0111 (16)
$\gamma_{23,1}$(Po)	1657.00 (19)	0.047 (5)			0.047 (5)
$\gamma_{7,0}$(Po)	1661.28 (6)	1.051 (9)	E2	0.00296 (5)	1.048 (9)
$\gamma_{57,3}$(Po)	1665.8 (2)	0.015 (6)			0.015 (6)
$\gamma_{24,1}$(Po)	1683.99 (4)	0.217 (3)			0.217 (3)
$\gamma_{61,3}$(Po)	1711.0 (8)	0.023 (5)			0.023 (5)
$\gamma_{9,0}$(Po)	1729.595 (15)	2.852 (10)	E2	0.00278 (4)	2.844 (10)
$\gamma_{26,1}$(Po)	1751.4 (8)	0.0009 (5)			0.0009 (5)
$\gamma_{11,0}$(Po)	1764.494 (14)	15.39 (5)	M1	0.00511 (8)	15.31 (5)
$\gamma_{27,1}$(Po)	1813.73 (14)	0.0108 (9)			0.0108 (9)
$\gamma_{28,1}$(Po)	1838.36 (5)	0.343 (10)			0.343 (10)
$\gamma_{12,0}$(Po)	1847.420 (25)	2.025 (12)			2.025 (12)
$\gamma_{29,1}$(Po)	1873.16 (6)	0.212 (8)			0.212 (8)
$\gamma_{13,0}$(Po)	1890.30 (15)	0.078 (4)			0.078 (4)
$\gamma_{30,1}$(Po)	1895.92 (14)	0.146 (8)			0.146 (8)
$\gamma_{31,1}$(Po)	1898.7 (4)	0.049 (8)			0.049 (8)
$\gamma_{32,1}$(Po)	1935.5 (2)	0.032 (7)			0.032 (7)
$\gamma_{35,1}$(Po)	1994.6 (6)	0.0024 (5)			0.0024 (5)
$\gamma_{15,0}$(Po)	2010.78 (12)	0.0434 (17)			0.0434 (17)
$\gamma_{36,1}$(Po)	2021.6 (2)	0.0214 (21)			0.0214 (21)
$\gamma_{37,1}$(Po)	2052.94 (12)	0.069 (4)			0.069 (4)
$\gamma_{38,1}$(Po)	2085.1 (2)	0.0082 (5)			0.0082 (5)
$\gamma_{40,1}$(Po)	2089.7 (2)	0.0443 (22)			0.0443 (22)
$\gamma_{41,1}$(Po)	2109.92 (12)	0.084 (3)			0.084 (3)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{18,0}$(Po)	2118.55 (3)	1.162 (5)	M1	0.00356 (5)	1.158 (5)
$\gamma_{19,0}$(Po)	2147.9 (2)	0.0134 (13)			0.0134 (13)
$\gamma_{43,1}$(Po)	2160.4 (3)	0.007 (5)			0.007 (5)
$\gamma_{44,1}$(Po)	2176.5 (2)	0.0033 (6)			0.0033 (6)
$\gamma_{20,0}$(Po)	2192.58 (16)	0.038 (3)			0.038 (3)
$\gamma_{21,0}$(Po)	2204.21 (4)	4.929 (23)	M1	0.00333 (5)	4.913 (23)
$\gamma_{48,1}$(Po)	2251.6 (2)	0.0055 (5)			0.0055 (5)
$\gamma_{49,1}$(Po)	2260.3 (2)	0.0087 (4)			0.0087 (4)
$\gamma_{23,0}$(Po)	2266.51 (13)	0.0165 (8)			0.0165 (8)
$\gamma_{50,1}$(Po)	2270.9 (4)	0.0014 (3)			0.0014 (3)
$\gamma_{51,1}$(Po)	2284.3 (2)	0.0050 (4)			0.0050 (4)
$\gamma_{52,1}$(Po)	2287.65 (23)	0.0046 (5)			0.0046 (5)
$\gamma_{24,0}$(Po)	2293.40 (12)	0.306 (4)			0.306 (4)
$\gamma_{53,1}$(Po)	2310.2 (3)	0.0014 (9)			0.0014 (9)
$\gamma_{54,1}$(Po)	2312.4 (2)	0.0086 (8)			0.0086 (8)
$\gamma_{55,1}$(Po)	2319.3 (3)	0.0014 (9)			0.0014 (9)
$\gamma_{56,1}$(Po)	2325.0 (3)	0.0017 (3)			0.0017 (3)
$\gamma_{57,1}$(Po)	2331.3 (2)	0.026 (4)			0.026 (4)
$\gamma_{25,0}$(Po)	2348.0 (13)	0.0014 (9)			0.0014 (9)
$\gamma_{58,1}$(Po)	2353.5 (7)	0.00036 (14)			0.00036 (14)
$\gamma_{26,0}$(Po)	2361.00 (19)	0.0021 (6)			0.0021 (6)
$\gamma_{60,1}$(Po)	2369.0 (4)	0.0028 (4)			0.0028 (4)
$\gamma_{61,1}$(Po)	2376.9 (2)	0.0086 (8)			0.0086 (8)
$\gamma_{62,1}$(Po)	2390.8 (2)	0.00156 (14)			0.00156 (14)
$\gamma_{65,1}$(Po)	2405.1 (5)	0.0011 (7)			0.0011 (7)
$\gamma_{27,0}$(Po)	2423.27 (13)	0.0048 (6)			0.0048 (6)
$\gamma_{69,1}$(Po)	2444.7 (8)	0.008 (4)			0.008 (4)
$\gamma_{28,0}$(Po)	2447.86 (10)	1.550 (7)	E1	0.001424 (20)	1.548 (7)
$\gamma_{70,1}$(Po)	2459.0 (8)	0.00141 (23)			0.00141 (23)
$\gamma_{29,0}$(Po)	2482.8 (4)	0.00096 (18)			0.00096 (18)
$\gamma_{30,0}$(Po)	2505.4 (2)	0.0056 (6)			0.0056 (6)
$\gamma_{77,1}$(Po)	2550.7 (7)	0.00032 (9)			0.00032 (9)
$\gamma_{34,0}$(Po)	2562.0 (6)	0.00018 (9)			0.00018 (9)
$\gamma_{79,1}$(Po)	2564.0 (6)	0.00014 (9)			0.00014 (9)
$\gamma_{35,0}$(Po)	2604.5 (5)	0.00036 (9)			0.00036 (9)
$\gamma_{36,0}$(Po)	2630.9 (3)	0.00086 (23)			0.00086 (23)
$\gamma_{37,0}$(Po)	2662.4 (10)	0.000200 (41)			0.000200 (41)
$\gamma_{38,0}$(Po)	2694.7 (2)	0.033 (3)			0.033 (3)
$\gamma_{40,0}$(Po)	2699.4 (3)	0.00282 (23)			0.00282 (23)
$\gamma_{41,0}$(Po)	2719.3 (2)	0.00170 (17)			0.00170 (17)
$\gamma_{43,0}$(Po)	2769.9 (2)	0.0225 (8)			0.0225 (8)
$\gamma_{44,0}$(Po)	2785.9 (2)	0.0055 (5)			0.0055 (5)
$\gamma_{47,0}$(Po)	2826.98 (20)	0.00218 (17)			0.00218 (17)
$\gamma_{48,0}$(Po)	2861.08 (40)	0.00041 (13)			0.00041 (13)
$\gamma_{50,0}$(Po)	2880.3 (2)	0.0101 (16)			0.0101 (16)
$\gamma_{51,0}$(Po)	2893.5 (2)	0.0057 (5)			0.0057 (5)
$\gamma_{54,0}$(Po)	2921.9 (2)	0.0134 (5)			0.0134 (5)
$\gamma_{55,0}$(Po)	2928.6 (3)	0.00109 (9)			0.00109 (9)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{56,0}$(Po)	2934.6 (3)	0.00046 (12)			0.00046 (12)
$\gamma_{60,0}$(Po)	2978.9 (2)	0.0137 (4)			0.0137 (4)
$\gamma_{62,0}$(Po)	2999.98 (20)	0.0089 (7)			0.0089 (7)
$\gamma_{69,0}$(Po)	3053.88 (20)	0.022 (3)			0.022 (3)
$\gamma_{72,0}$(Po)	3081.7 (3)	0.0052 (7)			0.0052 (7)
$\gamma_{73,0}$(Po)	3093.98 (40)	0.00037 (4)			0.00037 (4)
$\gamma_{75,0}$(Po)	3142.58 (40)	0.00118 (9)			0.00118 (9)
$\gamma_{76,0}$(Po)	3149.0 (5)	0.00019			0.00019
$\gamma_{77,0}$(Po)	3160.6 (6)	0.00047 (8)			0.00047 (8)
$\gamma_{80,0}$(Po)	3183.57 (40)	0.0011 (5)			0.0011 (5)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	7.6	(2)	min
Q_{β^-}	:	2189	(15)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100		Nature	log ft
$\beta^-_{0,18}$	790 (15)	2.8	(1)	[1st forbidden non-unique]	6
$\beta^-_{0,17}$	895 (15)	2.0	(2)	[1st forbidden non-unique]	6.34
$\beta^-_{0,16}$	1013 (15)	0.2	(1)	[1st forbidden non-unique]	7.5
$\beta^-_{0,14}$	1111 (15)	0.7	(1)	[1st forbidden non-unique]	7.1
$\beta^-_{0,9}$	1354 (15)	1.5	(1)	[1st forbidden non-unique]	7.1
$\beta^-_{0,6}$	1512 (15)	0.5	(1)	[1st forbidden non-unique]	7.8
$\beta^-_{0,5}$	1581 (15)	0.7	(1)	(1st forbidden non-unique)	7.7
$\beta^-_{0,4}$	1671 (15)	0.3	(2)	(1st forbidden non-unique)	8.1
$\beta^-_{0,3}$	1787 (15)	0.5	(1)	(1st forbidden unique)	9
$\beta^-_{0,2}$	1895 (15)	30	(6)	(1st forbidden non-unique)	6.35
$\beta^-_{0,0}$	2189 (15)	61	(6)	(1st forbidden non-unique)	6.28

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Po)	5.434 - 10.934	4.0 (4)	
e_{AK}	(Po)		0.22 (5)	
	KLL	58.978 - 65.205	}	
	KLX	71.902 - 79.289	}	
	KXY	84.8 - 93.1	}	
$ec_{1,0\ K}$	(Po)	178.13 (1)	0.22 (1)	
$ec_{1,0\ L}$	(Po)	254.30 - 257.42	0.13 (1)	
$ec_{1,0\ M+}$	(Po)	267.08 - 271.23	0.04	
$ec_{2,0\ K}$	(Po)	200.46 (4)	6.0 (4)	
$ec_{2,0\ L}$	(Po)	276.63 - 279.75	1.5 (1)	
$ec_{2,0\ M+}$	(Po)	289.41 - 293.56	0.7 (1)	
$\beta^-_{0,18}$	max:	790 (15)	2.8 (1)	avg: 249 (6)
$\beta^-_{0,17}$	max:	895 (15)	2.0 (2)	avg: 287 (6)
$\beta^-_{0,16}$	max:	1013 (15)	0.2 (1)	avg: 332 (6)
$\beta^-_{0,14}$	max:	1111 (15)	0.7 (1)	avg: 370 (6)
$\beta^-_{0,9}$	max:	1354 (15)	1.5 (1)	avg: 465 (6)
$\beta^-_{0,6}$	max:	1512 (15)	0.5 (1)	avg: 528 (6)
$\beta^-_{0,5}$	max:	1581 (15)	0.7 (1)	avg: 556 (6)
$\beta^-_{0,4}$	max:	1671 (15)	0.3 (2)	avg: 593 (6)
$\beta^-_{0,3}$	max:	1787 (15)	0.5 (1)	avg: 619 (6)

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		Energy keV		Electrons per 100 disint.	Energy keV	
$\beta^-_{0,2}$	max:	1895	(15)	30 (6)	avg:	685 (6)
$\beta^-_{0,0}$	max:	2189	(15)	61 (6)	avg:	808 (6)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9.658 — 16.213		2.7 (3)	
$XK\alpha_2$	(Po)	76.864		1.8 (3)	} $K\alpha$
$XK\alpha_1$	(Po)	79.293		3.0 (5)	}
$XK\beta_3$	(Po)	89.256	}		
$XK\beta_1$	(Po)	89.807	}	1.02 (16)	$K\beta_1'$
$XK\beta_5''$	(Po)	90.363	}		
$XK\beta_2$	(Po)	92.263	}		
$XK\beta_4$	(Po)	92.618	}	0.32 (5)	$K\beta_2'$
$XKO_{2,3}$	(Po)	92.983	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{3,1}$(Po)	130.58 (1)	0.0505 (12)	M1+26.5%E2	4.44 (13)	0.0093 (10)
$\gamma_{4,2}$(Po)	224.04 (7)	0.044 (7)	E2	0.319 (5)	0.033 (5)
$\gamma_{1,0}$(Po)	271.228 (10)	2.34 (10)	M1+94%E2	0.201 (7)	1.95 (7)
$\gamma_{2,0}$(Po)	293.56 (4)	32 (2)	M1+50%E2	0.34 (5)	23.8 (9)
$\gamma_{6,2}$(Po)	383.10 (8)	0.14 (7)			0.14 (7)
$\gamma_{3,0}$(Po)	401.81 (1)	0.50 (8)	E2	0.0555 (8)	0.48 (7)
$\gamma_{6,1}$(Po)	405.43 (7)	0.006 (1)			0.006 (1)
$\gamma_{4,0}$(Po)	517.60 (6)	1.10 (8)	M1+50%E2	0.073 (10)	1.02 (8)
$\gamma_{9,2}$(Po)	541.76 (22)	0.21 (7)			0.21 (7)
$\gamma_{9,1}$(Po)	564.09 (22)	0.67 (7)			0.67 (7)
$\gamma_{5,0}$(Po)	608.30 (7)	0.67 (7)	(M1+E2)		0.67 (7)
$\gamma_{6,0}$(Po)	676.66 (7)	0.40 (7)			0.40 (7)
$\gamma_{17,4}$(Po)	776.9 (1)	0.81 (14)			0.81 (14)
$\gamma_{14,2}$(Po)	784 (2)	0.33 (7)			0.33 (7)
$\gamma_{14,1}$(Po)	806.4 (20)	0.40 (7)			0.40 (7)
$\gamma_{9,0}$(Po)	835.32 (22)	0.62 (7)			0.62 (7)
$\gamma_{16,1}$(Po)	905 (2)	0.21 (7)			0.21 (7)
$\gamma_{17,1}$(Po)	1023.3 (1)	0.62 (7)			0.62 (7)
$\gamma_{18,2}$(Po)	1105.2 (4)	1.50 (7)			1.50 (7)
$\gamma_{18,1}$(Po)	1127.6 (4)	0.48 (7)			0.48 (7)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{17,0}$(Po)	1294.5 (1)	0.62 (7)			0.62 (7)
$\gamma_{18,0}$(Po)	1398.8 (4)	0.81 (7)			0.81 (7)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	138.3763	(17)	d
Q_α	:	5407.46	(7)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,1}$	4516.66 (9)	0.00124 (4)
$\alpha_{0,0}$	5304.33 (7)	99.99876 (4)

3 Photon Emissions

3.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9.186 — 15.217		0.00000384 (10)	
XKα_2	(Pb)	72.805		0.00000277 (10)	} Kα
XKα_1	(Pb)	74.97		0.00000466 (17)	}
XKβ_3	(Pb)	84.451	}		
XKβ_1	(Pb)	84.937	}	0.00000159 (6)	K$\beta_1^{'}$
XK$\beta_5^{''}$	(Pb)	85.47	}		
XKβ_2	(Pb)	87.238	}		
XKβ_4	(Pb)	87.58	}	0.000000481 (20)	K$\beta_2^{'}$
XKO$_{2,3}$	(Pb)	87.911	}		

3.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pb)	803.10 (5)	0.00124 (4)	E2	0.01033 (15)	0.00123 (4)

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G.Audi, A.H.Wapstra, V.Thibault, Nucl. Phys. A729 (2003) 129
(Q)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	0.516	(3)	s
Q_α	:	7594.48	(51)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,2}$	6568.4 (10)	0.523 (9)
$\alpha_{0,1}$	6891.2 (10)	0.541 (17)
$\alpha_{0,0}$	7450.2 (3)	98.936 (19)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pb)	5.33 - 15.82		0.01216 (17)
e_{AK}	(Pb)			0.00071 (8)
	KLL	56.028 - 61.669	}	
	KLX	68.181 - 74.969	}	
	KXY	80.3 - 88.0	}	

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9.186 — 15.2169		0.00740 (16)	
XKα_2	(Pb)	72.8049		0.00535 (14)	} Kα
XKα_1	(Pb)	74.97		0.00900 (24)	}
XKβ_3	(Pb)	84.451	}		
XKβ_1	(Pb)	84.937	}	0.00308 (10)	Kβ_1'
XKβ_5''	(Pb)	85.47	}		
XKβ_2	(Pb)	87.238	}		
XKβ_4	(Pb)	87.58	}	0.00093 (4)	Kβ_2'
XKO$_{2,3}$	(Pb)	87.911	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{2,1}$(Pb)	328.2 (2)	0.0043 (15)	M1	0.334 (5)	0.0032 (11)
$\gamma_{1,0}$(Pb)	569.65 (15)	0.546 (17)	E2	0.0216 (3)	0.534 (17)
$\gamma_{2,0}$(Pb)	897.8 (2)	0.519 (9)	M1+E2	0.0233 (4)	0.507 (9)

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(Theoretical ICC)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	300	(2)	$\times 10^{-9}$ s
Q_α	:	8954.12	(11)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,0}$	8785.17 (11)	100

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Surrey Univ. /A.L. Nichols

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	3.70	(5)	$\times 10^{-6}$ s
Q_α	:	8536.1	(26)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,1}$	7614 (10)	0.0050 (5)
$\alpha_{0,0}$	8375.9 (25)	99.9950 (5)

3 Photon Emissions

3.1 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pb)	778.8 (3)	0.0050 (5)	M1	0.0339 (5)	0.0048 (5)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	162.3	(12)	$\times 10^{-6}$ s
Q_{α}	:	7833.46	(6)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,2}$	6610.1 (10)	0.000058 (2)
$\alpha_{0,1}$	6902.6 (3)	0.0105 (7)
$\alpha_{0,0}$	7686.82 (6)	99.9895 (7)

3 Photon Emissions

3.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9.19 — 15.22		0.0000347 (13)	
$XK\alpha_2$	(Pb)	72.8049		0.0000246 (15)	} $K\alpha$
$XK\alpha_1$	(Pb)	74.97		0.0000414 (25)	}
$XK\beta_3$	(Pb)	84.451	}		
$XK\beta_1$	(Pb)	84.937	}	0.0000141 (9)	$K\beta_1'$
$XK\beta_5''$	(Pb)	85.47	}		
$XK\beta_2$	(Pb)	87.238	}		
$XK\beta_4$	(Pb)	87.58	}	0.00000427 (27)	$K\beta_2'$
$XKO_{2,3}$	(Pb)	87.911	}		

3.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_{γ} × 100
$\gamma_{2,1}$(Pb)	298 (1)	0.000058 (20)	E2	0.1180 (21)	0.000052 (18)
$\gamma_{1,0}$(Pb)	799.7 (1)	0.0105 (7)	E2	0.01042 (15)	0.0104 (6)

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(Q)
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(Energy level, spin, parity)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	1.781	(4)	$\times 10^{-3}$ s
Q_{α}	:	7526.3	(8)	keV
Q_{β^-}	:	715	(7)	keV
α	:	99.99977	(2)	%
β^-	:	2.3	(2)	$\times 10^{-4}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,7}$	6509 (3)	0.0003
$\alpha_{0,6}$	6586 (3)	0.0020 (6)
$\alpha_{0,5}$	6667 (3)	0.0008 (3)
$\alpha_{0,4}$	6755 (3)	0.0008 (3)
$\alpha_{0,3}$	6799 (3)	0.0016 (5)
$\alpha_{0,2}$	6813 (3)	0.0004 (2)
$\alpha_{0,1}$	6955.4 (8)	0.06 (2)
$\alpha_{0,0}$	7386.1 (8)	99.934 (20)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pb)	5.33 - 15.82		0.00115 (14)
e_{AK}	(Pb)			0.000059 (21)
	KLL	56.028 - 61.669	}	
	KLX	68.181 - 74.969	}	
	KXY	80.3 - 88.0	}	

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9.186 — 15.2169		0.00071 (12)	
XKα_2	(Pb)	72.8049		0.00045 (15)	} Kα
XKα_1	(Pb)	74.97		0.00075 (25)	}
XKβ_3	(Pb)	84.451	}		
XKβ_1	(Pb)	84.937	}	0.00026 (9)	Kβ_1'
XKβ_5''	(Pb)	85.47	}		

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		Energy keV		Photons per 100 disint.	
$XK\beta_2$	(Pb)	87.238	}		
$XK\beta_4$	(Pb)	87.58	}	0.000078 (26)	$K\beta_2'$
$XKO_{2,3}$	(Pb)	87.911	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pb)	438.9 (2)	0.06 (2)	E2	0.0405 (6)	0.058 (19)

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(Band-Raman ICC for gamma-ray transitions)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	0.148	(4)	s
Q_α	:	6906.3	(5)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,1}$	5988.4 (7)	0.0019 (3)
$\alpha_{0,0}$	6778.4 (5)	99.9981 (3)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pb)	5.26 - 10.40		0.0000097 (10)
e_{AK}	(Pb)			0.00000056 (11)
	KLL	56.03 - 61.67	}	
	KLX	68.18 - 74.97	}	
	KXY	80.3 - 88.0	}	

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9.184 — 15.216		0.0000059 (6)	
XKα_2	(Pb)	72.8049		0.0000043 (7)	} Kα
XKα_1	(Pb)	74.97		0.0000072 (12)	}
XKβ_3	(Pb)	84.451	}		
XKβ_1	(Pb)	84.937	}	0.0000024 (4)	Kβ_1'
XKβ_5''	(Pb)	85.47	}		
XKβ_2	(Pb)	87.238	}		
XKβ_4	(Pb)	87.58	}	0.00000074 (12)	Kβ_2'
XKO$_{2,3}$	(Pb)	87.911	}		

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4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pb)	804.9 (5)	0.0019 (3)	[E2]	0.01027 (15)	0.0019 (3)

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(Theoretical ICC)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	3.071	(22)	min
Q_{β^-}	:	260	(12)	keV
Q_{α}	:	6114.68	(9)	keV
α	:	99.978	(3)	%
β^-	:	0.022	(3)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,0}$	260 (12)	0.022 (3)		

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,1}$	5181 (2)	0.0011 (11)
$\alpha_{0,0}$	6002.35 (9)	99.9769 (32)

4 Electron Emissions

		Energy keV	Electrons per 100 disint.		Energy keV
$\beta^-_{0,0}$	max:	260 (12)	0.022 (3)	avg:	73 (4)

5 Photon Emissions

5.1 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pb)	836 (2)	0.0011 (11)	(E2)		0.0011 (11)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	7.216	(7)	h
Q_{α}	:	5982.4	(13)	keV
Q_{EC}	:	785.4	(25)	keV
EC	:	58.22	(8)	%
α	:	41.78	(8)	%

2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	log ft	P_K	P_L	P_{M+}
$\epsilon_{0,1}$	98.2 (26)	0.258 (13)	1st forbidden non-unique	5.77	0.015 (17)	0.684 (10)	0.301 (7)
$\epsilon_{0,0}$	785.4 (25)	57.96 (8)	1st forbidden non-unique	5.97	0.7731 (2)	0.1693 (1)	0.05758 (4)

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,5}$	4895.4 (13)	<0.00004
$\alpha_{0,3}$	4993.4 (13)	~0.0004
$\alpha_{0,2}$	5140.3 (13)	0.0011 (2)
$\alpha_{0,1}$	5211.9 (13)	0.0039 (3)
$\alpha_{0,0}$	5869.0 (13)	41.78 (8)

4 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Po)	5.434 - 10.934	27.6 (8)
e_{AK}	(Po)		1.57 (18)
	KLL	58.978 - 65.205	}
	KLX	71.902 - 79.289	}
	KXY	84.8 - 93.1	}
e_{AL}	(Bi)	5.35 - 10.66	0.000211 (20)
e_{AK}	(Bi)		0.0000126 (24)
	KLL	57.491 - 63.419	}
	KLX	70.025 - 77.105	}
	KXY	82.53 - 90.52	}

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5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9.658 — 16.213		18.6 (8)	
XKα_2	(Po)	76.864		12.66 (9)	} Kα
XKα_1	(Po)	79.293		21.08 (12)	}
XKβ_3	(Po)	89.256	}		
XKβ_1	(Po)	89.807	}	7.26 (12)	Kβ_1'
XKβ_5''	(Po)	90.363	}		
XKβ_2	(Po)	92.263	}		
XKβ_4	(Po)	92.618	}	2.26 (5)	Kβ_2'
XKO$_{2,3}$	(Po)	92.983	}		
XL	(Bi)	9.42 — 15.709		0.000136 (14)	
XKα_2	(Bi)	74.8157		0.000098 (15)	} Kα
XKα_1	(Bi)	77.1088		0.000164 (25)	}
XKβ_3	(Bi)	86.835	}		
XKβ_1	(Bi)	87.344	}	0.000056 (9)	Kβ_1'
XKβ_5''	(Bi)	87.862	}		
XKβ_2	(Bi)	89.732	}		
XKβ_4	(Bi)	90.074	}	0.000017 (3)	Kβ_2'
XKO$_{2,3}$	(Bi)	90.421	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{3,2}$(Bi)	149.72 (10)	~0.0002	M1+13.8%E2	3.0 (3)	~0.00005
$\gamma_{3,1}$(Bi)	222.69 (10)	~0.00008	M1+13.8%E2	0.95 (5)	~0.00004
$\gamma_{1,0}$(Bi)	669.77 (7)	0.0040 (3)	[M1+5.9%E2]	0.0520 (9)	0.0038 (3)
$\gamma_{1,0}$(Po)	687.2 (7)	0.258 (13)	(M1+3.85%E2]	0.0536 (9)	0.245 (12)
$\gamma_{2,0}$(Bi)	742.74 (7)	0.0013 (2)	[M1+8.3%E2]	0.0391 (7)	0.00125 (19)
$\gamma_{3,0}$(Bi)	892.46 (7)	~0.00014	[M1+66.2%E2]	0.0145 (13)	~0.00014

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	0.10	(2)	$\times 10^{-3}$ s
Q_α	:	8178	(4)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,1}$	7628 (4)	0.05 (2)
$\alpha_{0,0}$	8026 (4)	99.95 (2)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Bi)	5.42 - 16.34		0.0027 (5)
e_{AK}	(Bi)			0.00015 (7)
	KLL	57.491 - 63.419	}	
	KLX	70.025 - 77.105	}	
	KXY	82.53 - 90.52	}	

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Bi)	9.4207 — 15.7084		0.0017 (4)	
XKα_2	(Bi)	74.8157		0.0012 (5)	} Kα
XKα_1	(Bi)	77.1088		0.0020 (9)	}
XKβ_3	(Bi)	86.835	}		
XKβ_1	(Bi)	87.344	}	0.00069 (28)	Kβ_1'
XKβ_5''	(Bi)	87.862	}		
XKβ_2	(Bi)	89.732	}		
XKβ_4	(Bi)	90.074	}	0.00021 (9)	Kβ_2'
XKO$_{2,3}$	(Bi)	90.421	}		

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4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Bi)	404.853 (9)	0.05 (2)	M1+E2	0.122 (8)	0.045 (18)

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(Band-Raman ICC for gamma-ray transitions)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	32.3	(4)	$\times 10^{-3}$ s
Q_{β^-}	:	737	(6)	keV
Q_α	:	7201.3	(12)	keV
α	:	99.9933	(24)	%
β^-	:	0.0067	(24)	%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,4}$	6037 (3)	0.002
$\alpha_{0,3}$	6322.0 (16)	0.0049 (4)
$\alpha_{0,2}$	6484.7 (16)	0.0167 (8)
$\alpha_{0,1}$	6813.8 (16)	0.0384 (15)
$\alpha_{0,0}$	7066.9 (16)	99.932 (3)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Bi)	5.3 - 16.4		0.0077 (4)
e_{AK}	(Bi)			0.00044 (3)
	KLL	57.491 - 63.419	}	
	KLX	70.025 - 77.105	}	
	KXY	82.53 - 90.52	}	
$ec_{1,0\ K}$	(Bi)	167.35 (4)		0.0125 (6)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Bi)	9.421 — 15.708		0.00497 (23)	
$XK\alpha_2$	(Bi)	74.8157		0.00351 (20)	} $K\alpha$
$XK\alpha_1$	(Bi)	77.1088		0.0059 (4)	}
$XK\beta_3$	(Bi)	86.835	}		
$XK\beta_1$	(Bi)	87.344	}	0.00201 (11)	$K\beta_1'$
$XK\beta_5''$	(Bi)	87.862	}		
$XK\beta_2$	(Bi)	89.732	}		
$XK\beta_4$	(Bi)	90.074	}	0.00062 (4)	$K\beta_2'$
$XKO_{2,3}$	(Bi)	90.421	}		

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4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Bi)	257.88 (4)	0.0446 (13)	M1+29%E2	0.555 (26)	0.0287 (7)
$\gamma_{2,1}$(Bi)	335.33 (10)	0.0062 (3)			0.0062 (3)
$\gamma_{4,2}$(Bi)	455	0.002			0.002
$\gamma_{2,0}$(Bi)	593.1 (1)	0.0115 (5)			0.0115 (5)
$\gamma_{3,0}$(Bi)	758.9 (1)	0.0049 (4)			0.0049 (4)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	1.4	(2)	s
Q_{β^-}	:	2881	(12)	keV
Q_α	:	6874	(3)	keV
α	:	99.9	(1)	%
β^-	:	0.1	(1)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,0}$	2881 (12)	0.1 (1)		

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,2}$	6653 (5)	6.4 (1)
$\alpha_{0,1}$	6694 (3)	90.0 (1)
$\alpha_{0,0}$	6756 (5)	3.6 (1)

4 Electron Emissions

	Energy keV	Electrons per 100 disint.	Energy keV
$\beta^-_{0,0}$	max: 2881 (12)	0.1 (1)	avg: 1095 (12)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	56	(4)	s
Q_{β^-}	:	1566	(3)	keV
Q_α	:	6324	(15)	keV
α	:	~97		%
β^-	:	~3		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,0}$	1566 (3)	~3	1st forbidden non-unique	6.2

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,0}$	6208 (15)	~97

4 Electron Emissions

		Energy keV	Electrons per 100 disint.		Energy keV
$\beta^-_{0,0}$	max:	1566 (3)	~3	avg:	547 (2)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	0.54	(5)	$\times 10^{-3}$ s
Q_α	:	7887	(3)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,0}$	7742 (3)	100

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(Decay scheme and levels)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	36.0	(19)	$\times 10^{-3}$ s
Q_α	:	7262.5	(19)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,1}$	6531.1 (19)	0.127 (7)
$\alpha_{0,0}$	7129.2 (19)	99.873 (7)

3 Photon Emissions

3.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9.66 — 16.21		0.00080 (3)	
XKα_2	(Po)	76.864		0.00052 (4)	} Kα
XKα_1	(Po)	79.293		0.00086 (6)	}
XKβ_3	(Po)	89.256	}		
XKβ_1	(Po)	89.807	}	0.000296 (21)	Kβ_1'
XKβ_5''	(Po)	90.363	}		
XKβ_2	(Po)	92.263	}		
XKβ_4	(Po)	92.618	}	0.000092 (7)	Kβ_2'
XKO$_{2,3}$	(Po)	92.983	}		

3.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Po)	609.31 (6)	0.127 (7)	E2	0.0204 (3)	0.124 (7)

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(Q)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	3.98	(3)	s
Q_α	:	6946.1	(3)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,14}$	5745 (1)	0.00009 (5)
$\alpha_{0,13}$	5765.1 (5)	0.00094 (19)
$\alpha_{0,12}$	5906.2 (10)	0.00009 (5)
$\alpha_{0,11}$	5944.4 (4)	0.0021 (3)
$\alpha_{0,10}$	5958.1 (7)	0.0003 (1)
$\alpha_{0,9}$	5999.2 (4)	0.0032 (5)
$\alpha_{0,8}$	6099.9 (5)	0.00123 (12)
$\alpha_{0,7}$	6124.1 (6)	0.00064 (12)
$\alpha_{0,6}$	6154.9 (3)	0.0184 (22)
$\alpha_{0,5}$	6222.0 (3)	0.0043 (10)
$\alpha_{0,4}$	6311.1 (3)	0.048 (3)
$\alpha_{0,3}$	6424.8 (3)	7.85 (24)
$\alpha_{0,2}$	6531.0 (3)	0.098 (5)
$\alpha_{0,1}$	6553.0 (3)	12.6 (3)
$\alpha_{0,0}$	6819.2 (3)	79.4 (10)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Po)	5.434 - 10.934	1.50 (5)
e_{AK}	(Po)		0.067 (9)
	KLL	58.978 - 65.205	}
	KLX	71.902 - 79.289	}
	KXY	84.8 - 93.1	}
$ec_{1,0\ K}$	(Po)	178.13 (1)	1.23 (2)
$ec_{1,0\ L}$	(Po)	254.30 - 257.43	0.74 (2)
$ec_{1,0\ M}$	(Po)	267.08 - 268.55	0.19 (1)
$ec_{3,0\ K}$	(Po)	308.71 (1)	0.234 (8)
$ec_{3,0\ L}$	(Po)	384.88 - 388.00	0.102 (3)
$ec_{3,0\ M}$	(Po)	397.66 - 399.13	0.026 (1)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9.658 — 16.213		1.01 (5)	
$XK\alpha_2$	(Po)	76.864		0.540 (24)	} $K\alpha$
$XK\alpha_1$	(Po)	79.293		0.90 (4)	}
$XK\beta_3$	(Po)	89.256	}		
$XK\beta_1$	(Po)	89.807	}	0.309 (15)	$K\beta_1'$
$XK\beta_5''$	(Po)	90.363	}		
$XK\beta_2$	(Po)	92.263	}		
$XK\beta_4$	(Po)	92.618	}	0.096 (5)	$K\beta_2'$
$XKO_{2,3}$	(Po)	92.983	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{3,1}$(Po)	130.58 (1)	0.72 (6)	M1+26.5%E2	4.44 (13)	0.133 (11)
$\gamma_{4,2}$(Po)	224.04 (7)	0.0019 (3)	(E2)	0.319 (5)	0.0014 (2)
$\gamma_{1,0}$(Po)	271.228 (10)	13.30 (26)	M1+94%E2	0.201 (7)	11.07 (22)
$\gamma_{2,0}$(Po)	293.56 (4)	0.101 (4)	M1+50%E2	0.34 (5)	0.075 (3)
$\gamma_{12,5}$(Po)	322 (1)	0.00009 (5)			0.00009 (5)
$\gamma_{8,3}$(Po)	330.9 (4)	0.00100 (11)			0.00100 (11)
$\gamma_{11,4}$(Po)	373.5 (3)	0.00025 (3)			0.00025 (3)
$\gamma_{6,2}$(Po)	383.1 (1)	0.00044 (7)			0.00044 (7)
$\gamma_{3,0}$(Po)	401.81 (1)	7.12 (23)	E2	0.0555 (8)	6.75 (22)
$\gamma_{6,1}$(Po)	405.4 (1)	0.00025 (4)			0.00025 (4)
$\gamma_{7,1}$(Po)	436.9 (5)	0.00031 (6)			0.00031 (6)
$\gamma_{8,1}$(Po)	461.5 (4)	0.00017 (3)			0.00017 (3)
$\gamma_{11,3}$(Po)	489.3 (3)	0.00064 (9)			0.00064 (9)
$\gamma_{4,0}$(Po)	517.60 (6)	0.046 (4)	M1+50%E2	0.073 (10)	0.043 (3)
$\gamma_{13,4}$(Po)	556.1 (4)	0.00006 (4)	M1+50%E2	0.061 (8)	0.00006 (4)
$\gamma_{9,1}$(Po)	564.1 (2)	0.0015 (3)			0.0015 (3)
$\gamma_{14,4}$(Po)	576.6 (10)	0.00009 (5)			0.00009 (5)
$\gamma_{5,0}$(Po)	608.30 (7)	0.0044 (10)	(M1+E2)		0.0044 (10)
$\gamma_{11,1}$(Po)	619.9 (3)	0.00033 (11)			0.00033 (11)
$\gamma_{-1,1}$(Po)	665.5 (10)	0.00009 (5)			0.00009 (5)
$\gamma_{13,3}$(Po)	671.9 (4)	0.00022 (11)	M1+E2		0.00022 (11)
$\gamma_{6,0}$(Po)	676.66 (7)	0.018 (2)			0.018 (2)
$\gamma_{7,0}$(Po)	708.1 (5)	0.00033 (11)			0.00033 (11)
$\gamma_{8,0}$(Po)	732.7 (4)	0.00007 (4)			0.00007 (4)
$\gamma_{13,1}$(Po)	802.5 (4)	0.00033 (11)	M1+E2		0.00033 (11)
$\gamma_{9,0}$(Po)	835.32 (22)	0.0017 (3)			0.0017 (3)
$\gamma_{10,0}$(Po)	877.2 (6)	0.00033 (11)			0.00033 (11)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{11,0}$(Po)	891.1 (3)	0.0009 (2)			0.0009 (2)
$\gamma_{13,0}$(Po)	1073.7 (4)	0.00033 (11)	E2	0.00641 (9)	0.00033 (11)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	55.8	(3)	s
Q_α	:	6404.67	(10)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,1}$	5748.46 (11)	0.118 (15)
$\alpha_{0,0}$	6288.22 (10)	99.882 (15)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Po)	5.434 - 10.934		0.00140 (11)
e_{AK}	(Po)			0.000074 (13)
	KLL	58.978 - 65.205	}	
	KLX	71.902 - 79.289	}	
	KXY	84.8 - 93.1	}	

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9.658 — 16.213		0.00094 (8)	
XKα_2	(Po)	76.864		0.00059 (8)	} Kα
XKα_1	(Po)	79.293		0.00099 (13)	}
XKβ_3	(Po)	89.256	}		
XKβ_1	(Po)	89.807	}	0.00034 (5)	Kβ_1'
XKβ_5''	(Po)	90.363	}		
XKβ_2	(Po)	92.263	}		
XKβ_4	(Po)	92.618	}	0.000106 (15)	Kβ_2'
XKO$_{2,3}$	(Po)	92.983	}		

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4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Po)	549.76 (4)	0.118 (15)	E2	0.0257 (4)	0.115 (15)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	3.8232	(8)	d
Q_α	:	5590.3	(3)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,2}$	4827 (4)	≈0.0005
$\alpha_{0,1}$	4987 (1)	0.078
$\alpha_{0,0}$	5489.48 (30)	99.92 (1)

3 Photon Emissions

3.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9.66 — 16.21		0.000766 (15)	
XKα_2	(Po)	76.864		0.000469 (10)	} Kα
XKα_1	(Po)	79.293		0.000781 (16)	}
XKβ_3	(Po)	89.256	}		
XKβ_1	(Po)	89.807	}	0.000269 (7)	Kβ_1'
XKβ_5''	(Po)	90.363	}		
XKβ_2	(Po)	92.263	}		
XKβ_4	(Po)	92.618	}	0.0000837 (25)	Kβ_2'
XKO$_{2,3}$	(Po)	92.983	}		

3.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Po)	510 (2)	0.078	[E2]	0.0306 (6)	0.076

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	4.79	(2)	min
Q_{β^-}	:	314	(6)	keV
Q_α	:	6457.8	(14)	keV
α	:	99.9952	(15)	%
β^-	:	0.0048	(15)	%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,14}$	5500 (40)	0.000038 (10)
$\alpha_{0,13}$	5530 (25)	0.00010 (2)
$\alpha_{0,12}$	5689 (3)	0.0025 (5)
$\alpha_{0,11}$	5697 (4)	0.0003
$\alpha_{0,10}$	5776 (3)	0.064 (4)
$\alpha_{0,9}$	5783 (4)	0.0031 (6)
$\alpha_{0,8}$	5813 (3)	0.006 (1)
$\alpha_{0,7}$	5925 (3)	0.0285 (24)
$\alpha_{0,6}$	5938.9 (20)	0.128 (3)
$\alpha_{0,5}$	5965.9 (25)	0.064 (16)
$\alpha_{0,4}$	5979.9 (20)	0.39 (7)
$\alpha_{0,3}$	6075.9 (20)	0.15 (3)
$\alpha_{0,2}$	6126.3 (15)	15.1 (2)
$\alpha_{0,1}$	6243 (2)	1.34 (7)
$\alpha_{0,0}$	6341.0 (13)	82.8 (2)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(At)	5.6 - 17.4		3.05 (10)
e_{AK}	(At)			0.114 (6)
	KLL	60.489 - 67.031	}	
	KLX	73.811 - 81.516	}	
	KXY	87.10 - 95.72	}	
$ec_{1,0\ K}$	(At)	4.53 (2)		1.51 (13)
$ec_{2,1\ K}$	(At)	22.10 (3)		0.13 (10)
$ec_{3,2\ L}$	(At)	36.33 - 39.60		0.156 (27)
$ec_{3,2\ M}$	(At)	49.50 - 51.03		0.037 (6)
$ec_{4,2\ K}$	(At)	54.49 (3)		0.138 (8)
$ec_{3,1\ K}$	(At)	76.11 (3)		0.0156 (21)
$ec_{4,3\ L}$	(At)	78.8 - 82.1		0.029 (18)
$ec_{1,0\ L}$	(At)	82.77 - 86.04		0.274 (23)
$ec_{1,0\ M}$	(At)	95.94 - 97.47		0.065 (5)
$ec_{2,1\ L}$	(At)	100.34 - 103.61		0.024 (18)

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		Energy keV	Electrons per 100 disint.
$ec_{2,0\ K}$	(At)	122.40 (2)	1.570 (31)
$ec_{4,2\ L}$	(At)	132.73 - 136.00	0.0247 (14)
$ec_{3,1\ L}$	(At)	154.35 - 157.62	0.0325 (43)
$ec_{2,0\ L}$	(At)	200.64 - 203.91	1.943 (37)
$ec_{2,0\ M}$	(At)	213.81 - 215.34	0.515 (10)
$ec_{10,2\ K}$	(At)	264.14 (4)	0.01047 (44)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(At)	9.8964 — 16.7291		2.18 (7)	
$XK\alpha_2$	(At)	78.94		0.96 (5)	} $K\alpha$
$XK\alpha_1$	(At)	81.51		1.59 (9)	}
$XK\beta_3$	(At)	91.73	}		
$XK\beta_1$	(At)	92.315	}	0.55 (6)	$K\beta_1'$
$XK\beta_5''$	(At)	92.883	}		
$XK\beta_2$	(At)	94.846	}		
$XK\beta_4$	(At)	95.211	}	0.18 (2)	$K\beta_2'$
$XKO_{2,3}$	(At)	95.595	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{3,2}$(At)	53.81 (3)	0.220 (38)	M1	14.17 (20)	0.0145 (25)
$\gamma_{4,3}$(At)	96.3 (3)	0.046 (26)	M1+E2	5.6 (24)	0.007 (3)
$\gamma_{1,0}$(At)	100.25 (2)	2.02 (17)	M1	11.97 (17)	0.156 (13)
$\gamma_{2,1}$(At)	117.82 (3)	0.19 (14)	M1	7.58 (11)	0.022 (16)
$\gamma_{4,2}$(At)	150.21 (3)	0.216 (12)	M1	3.80 (5)	0.0449 (25)
$\gamma_{3,1}$(At)	171.83 (3)	0.129 (17)	E2	0.863 (12)	0.069 (9)
$\gamma_{10,4}$(At)	208.3 (6)	0.0073 (14)	[E2]	0.430 (8)	0.0051 (10)
$\gamma_{2,0}$(At)	218.12 (2)	15.61 (21)	E2	0.367 (5)	11.42 (15)
$\gamma_{5,1}$(At)	282.12 (9)	0.0097 (20)	[M1,E2]	0.41 (25)	0.0069 (7)
$\gamma_{7,1}$(At)	324.10 (6)	0.0252 (17)	M1	0.446 (6)	0.0174 (12)
$\gamma_{10,2}$(At)	359.86 (4)	0.0514 (20)	M1	0.335 (5)	0.0385 (15)
$\gamma_{5,0}$(At)	382.34 (4)	0.0437 (18)	M1	0.284 (4)	0.0340 (14)
$\gamma_{6,0}$(At)	410.64 (5)	0.1270 (26)	E2	0.0548 (8)	0.1204 (25)
$\gamma_{8,1}$(At)	437.00 (5)	0.0010 (1)			0.0010 (1)
$\gamma_{12,2}$(At)	446.30 (8)	0.0017 (4)	E1+M2		0.0017 (4)
$\gamma_{9,1}$(At)	468.3 (7)	0.0018 (3)			0.0018 (3)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{8,0}$(At)	537.8 (8)	0.0045 (8)			0.0045 (8)
$\gamma_{12,1}$(At)	562.3 (12)	0.005 (5)			0.005 (5)
$\gamma_{9,0}$(At)	568.5 (3)	0.0012 (4)			0.0012 (4)
$\gamma_{10,0}$(At)	576.9 (4)	0.0033 (7)	[M1]	0.0948 (13)	0.0030 (6)
$\gamma_{11,0}$(At)	652 (2)	0.0004 (4)			0.0004 (4)
$\gamma_{12,0}$(At)	665 (2)	0.0009 (9)			0.0009 (9)
$\gamma_{13,0}$(At)	809.3 (2)	0.00010 (2)			0.00010 (2)
$\gamma_{14,0}$(At)	891.9 (3)	0.000038 (10)			0.000038 (10)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	22.00	(7)	min
Q_α	:	5562	(3)	keV
Q_{β^-}	:	1149.2	(9)	keV
β^-	:	99.980	(4)	%
α	:	0.020	(4)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,32}$	120.3 (10)	0.0012 (3)	Super-allowed or allowed	7.3
$\beta^-_{0,31}$	124.6 (10)	0.0004 (1)	1st forbidden	7.82
$\beta^-_{0,30}$	129.9 (10)	0.00046 (12)	1st forbidden	7.82
$\beta^-_{0,29}$	191.5 (9)	0.020 (4)	nth forbidden unique	6.7
$\beta^-_{0,28}$	205.9 (9)	0.0082 (18)	nth forbidden unique	7.19
$\beta^-_{0,27}$	208.4 (9)	0.0051 (12)		7.41
$\beta^-_{0,26}$	222.6 (9)	0.106 (22)	nth forbidden unique	6.18
$\beta^-_{0,25}$	243.3 (10)	0.0011 (4)	1st forbidden	8.29
$\beta^-_{0,24}$	281.9 (9)	0.025 (5)	nth forbidden unique	7.14
$\beta^-_{0,23}$	302.8 (9)	0.088 (18)	1st forbidden	6.69
$\beta^-_{0,22}$	306.9 (9)	0.035 (7)	nth forbidden unique	7.11
$\beta^-_{0,21}$	323.3 (9)	0.54 (10)		5.99
$\beta^-_{0,20}$	326.0 (9)	0.014 (3)	nth forbidden unique	7.59
$\beta^-_{0,19}$	343.8 (9)	0.0040 (8)	nth forbidden unique	8.21
$\beta^-_{0,18}$	345.4 (9)	0.14 (3)	nth forbidden unique	6.67
$\beta^-_{0,17}$	362.1 (9)	0.019 (4)	1st forbidden	7.6
$\beta^-_{0,16}$	366.7 (10)	0.00111 (22)	nth forbidden unique	8.85
$\beta^-_{0,15}$	555.3 (9)	0.013 (3)	1st forbidden	8.38
$\beta^-_{0,14}$	773.1 (10)	0.0046 (12)		9.31
$\beta^-_{0,13}$	779.9 (9)	1.8 (4)		6.73
$\beta^-_{0,11}$	806.7 (9)	0.037 (8)	1st forbidden	8.47
$\beta^-_{0,10}$	814.9 (9)	0.042 (9)	1st forbidden	8.43
$\beta^-_{0,9}$	819.4 (9)	0.049 (10)	Super-allowed or allowed	8.37
$\beta^-_{0,8}$	863.1 (9)	0.032 (9)	1st forbidden	8.64
$\beta^-_{0,7}$	869.0 (9)	0.004 (4)		9.5
$\beta^-_{0,6}$	914.5 (9)	9.1 (17)		6.27
$\beta^-_{0,5}$	1025.5 (9)	0.24 (6)		8.02
$\beta^-_{0,4}$	1069.6 (9)	15 (3)		6.29
$\beta^-_{0,3}$	1087.8 (9)	0.27 (19)		8.1
$\beta^-_{0,2}$	1099.1 (9)	67 (13)	Super-allowed or allowed	5.68
$\beta^-_{0,1}$	1119.3 (9)	6 (6)		6.8
$\beta^-_{0,0}$	1149.2 (9)	1	1st forbidden	7.6

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,4}$	5172 (5)	0.0009 (5)
$\alpha_{0,3}$	5291 (4)	0.0060 (26)
$\alpha_{0,2}$	5314 (4)	0.0053 (23)
$\alpha_{0,1}$	5403 (3)	0.0044 (20)
$\alpha_{0,0}$	5462 (3)	0.0033 (15)

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Ra)	5.71 - 12.04	29 (4)	
e_{AK}	(Ra)		0.159 (21)	
	KLL	65.149 - 72.729	}	
	KLX	79.721 - 88.466	}	
	KXY	94.27 - 103.91	}	
e_{AL}	(At)	5.6 - 17.4	0.0076 (18)	
e_{AK}	(At)		0.000065 (20)	
	KLL	60.489 - 67.031	}	
	KLX	73.811 - 81.516	}	
	KXY	87.10 - 95.72	}	
$ec_{2,1\ L}$	(Ra)	1.04 - 4.83	8.1 (17)	
$ec_{1,0\ L}$	(Ra)	10.55 - 14.34	20 (6)	
$ec_{3,1\ L}$	(Ra)	12.46 - 16.25	0.26 (8)	
$ec_{2,1\ M}$	(Ra)	15.45 - 17.16	2.10 (45)	
$ec_{5,4\ L}$	(Ra)	24.768 - 28.556	0.131 (12)	
$ec_{1,0\ M}$	(Ra)	24.96 - 26.68	5.0 (14)	
$ec_{3,1\ M}$	(Ra)	26.87 - 28.58	0.068 (20)	
$ec_{4,1\ L}$	(Ra)	30.6 - 34.4	1.34 (32)	
$ec_{13,6\ K}$	(Ra)	30.68 (2)	0.092 (18)	
$ec_{2,0\ L}$	(Ra)	30.9 - 34.7	17.4 (37)	
$ec_{5,4\ M}$	(Ra)	39.178 - 40.895	0.0344 (32)	
$ec_{3,0\ L}$	(Ra)	42.20 - 45.99	0.25 (5)	
$ec_{4,1\ M}$	(Ra)	45.0 - 46.7	0.33 (8)	
$ec_{2,0\ M}$	(Ra)	45.3 - 47.0	4.3 (9)	
$ec_{5,2\ L}$	(Ra)	54.3 - 58.1	0.039 (27)	
$ec_{3,0\ M}$	(Ra)	56.61 - 58.32	0.068 (14)	
$ec_{4,0\ L}$	(Ra)	60.42 - 64.21	1.38 (28)	
$ec_{5,2\ M}$	(Ra)	68.7 - 70.4	0.011 (7)	
$ec_{6,3\ K}$	(Ra)	69.43 (5)	0.16 (14)	
$ec_{4,0\ M}$	(Ra)	74.83 - 76.54	0.33 (7)	
$ec_{6,2\ K}$	(Ra)	80.74 (5)	0.0191 (43)	
$ec_{6,1\ K}$	(Ra)	100.93 (5)	1.47 (28)	

		Energy keV		Electrons per 100 disint.		Energy keV
$ec_{7,3\ K}$	(Ra)	114.88	(5)	0.0118 (23)		
$ec_{13,6\ L}$	(Ra)	115.4 - 119.2		0.0192 (38)		
$ec_{6,0\ K}$	(Ra)	130.78	(5)	3.0 (6)		
$ec_{7,1\ K}$	(Ra)	146.33	(5)	0.01506 (22)		
$ec_{6,3\ L}$	(Ra)	154.12 - 157.91		0.061 (13)		
$ec_{6,3\ M}$	(Ra)	168.53 - 170.24		0.0156 (38)		
$ec_{6,1\ L}$	(Ra)	185.62 - 189.41		0.28 (5)		
$ec_{6,1\ M}$	(Ra)	200.03 - 201.74		0.066 (12)		
$ec_{13,2\ K}$	(Ra)	215.33	(5)	0.215 (42)		
$ec_{6,0\ L}$	(Ra)	215.5 - 219.3		0.56 (10)		
$ec_{6,0\ M}$	(Ra)	229.9 - 231.6		0.134 (25)		
$ec_{13,2\ L}$	(Ra)	300.02 - 303.81		0.040 (8)		
$\beta^-_{0,32}$	max:	120.3	(10)	0.0012 (3)	avg:	31.5 (3)
$\beta^-_{0,31}$	max:	124.6	(10)	0.0004 (1)	avg:	32.7 (3)
$\beta^-_{0,30}$	max:	129.9	(10)	0.00046 (12)	avg:	34.1 (3)
$\beta^-_{0,29}$	max:	191.5	(9)	0.020 (4)	avg:	51.5 (3)
$\beta^-_{0,28}$	max:	205.9	(9)	0.0082 (18)	avg:	55.6 (3)
$\beta^-_{0,27}$	max:	208.4	(9)	0.0051 (12)	avg:	56.3 (3)
$\beta^-_{0,26}$	max:	222.6	(9)	0.106 (22)	avg:	60.5 (3)
$\beta^-_{0,25}$	max:	243.3	(10)	0.0011 (4)	avg:	66.6 (3)
$\beta^-_{0,24}$	max:	281.9	(9)	0.025 (5)	avg:	78.1 (3)
$\beta^-_{0,23}$	max:	302.8	(9)	0.088 (18)	avg:	84.4 (3)
$\beta^-_{0,22}$	max:	306.9	(9)	0.035 (7)	avg:	85.7 (3)
$\beta^-_{0,21}$	max:	323.3	(9)	0.54 (10)	avg:	90.7 (3)
$\beta^-_{0,20}$	max:	326.0	(9)	0.014 (3)	avg:	91.5 (3)
$\beta^-_{0,19}$	max:	343.8	(9)	0.0040 (8)	avg:	97.0 (3)
$\beta^-_{0,18}$	max:	345.4	(9)	0.14 (3)	avg:	97.5 (3)
$\beta^-_{0,17}$	max:	362.1	(9)	0.019 (4)	avg:	102.7 (3)
$\beta^-_{0,16}$	max:	366.7	(10)	0.00111 (22)	avg:	104.1 (3)
$\beta^-_{0,15}$	max:	555.3	(9)	0.013 (3)	avg:	165.6 (4)
$\beta^-_{0,14}$	max:	773.1	(10)	0.0046 (12)	avg:	241.3 (4)
$\beta^-_{0,13}$	max:	779.9	(9)	1.8 (4)	avg:	243.7 (4)
$\beta^-_{0,11}$	max:	806.7	(9)	0.037 (8)	avg:	253.3 (4)
$\beta^-_{0,10}$	max:	814.9	(9)	0.042 (9)	avg:	256.3 (4)
$\beta^-_{0,9}$	max:	819.4	(9)	0.049 (10)	avg:	257.9 (4)
$\beta^-_{0,8}$	max:	863.1	(9)	0.032 (9)	avg:	273.8 (4)
$\beta^-_{0,7}$	max:	869.0	(9)	0.004 (4)	avg:	275.9 (4)
$\beta^-_{0,6}$	max:	914.5	(9)	9.1 (17)	avg:	292.6 (4)
$\beta^-_{0,5}$	max:	1025.5	(9)	0.24 (6)	avg:	333.9 (4)
$\beta^-_{0,4}$	max:	1069.6	(9)	15 (3)	avg:	350.5 (4)
$\beta^-_{0,3}$	max:	1087.8	(9)	0.27 (19)	avg:	357.4 (4)
$\beta^-_{0,2}$	max:	1099.1	(9)	67 (13)	avg:	361.7 (4)
$\beta^-_{0,1}$	max:	1119.3	(9)	6 (6)	avg:	369.4 (4)
$\beta^-_{0,0}$	max:	1149.2	(9)	1	avg:	380.8 (4)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Ra)	10.6241 — 18.3539		24 (3)	
XKα_2	(Ra)	85.43		1.44 (19)	} Kα
XKα_1	(Ra)	88.47		2.3 (3)	}
XKβ_3	(Ra)	99.432	}		
XKβ_1	(Ra)	100.13	}	0.83 (11)	Kβ_1'
XKβ_5''	(Ra)	100.738	}		
XKβ_2	(Ra)	102.89	}		
XKβ_4	(Ra)	103.295	}	0.27 (4)	Kβ_2'
XKO$_{2,3}$	(Ra)	103.74	}		
XL	(At)	9.8964 — 16.7291		0.0054 (13)	
XKα_2	(At)	78.94		0.00056 (15)	} Kα
XKα_1	(At)	81.51		0.00092 (25)	}
XKβ_3	(At)	91.73	}		
XKβ_1	(At)	92.315	}	0.00031 (11)	Kβ_1'
XKβ_5''	(At)	92.883	}		
XKβ_2	(At)	94.846	}		
XKβ_4	(At)	95.211	}	0.00011 (6)	Kβ_2'
XKO$_{2,3}$	(At)	95.595	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{2,1}$(Ra)	20.27 (5)	12.3 (26)	[E1]	7.76 (22)	1.4 (3)
$\gamma_{1,0}$(Ra)	29.78 (4)	26 (7)	M1+8.26%E2	370 (50)	0.070 (17)
$\gamma_{3,1}$(Ra)	31.69 (5)	0.35	M1+7.27%E2	260 (80)	0.00135
$\gamma_{9,8}$(Ra)	43.5 (2)	0.0044	E1	1.015 (19)	0.0022
$\gamma_{5,4}$(Ra)	44.0 (1)	0.178	M1+21.3%E2	131 (12)	0.00135
$\gamma_{4,1}$(Ra)	49.80 (5)	4.3 (10)	E1	0.708 (10)	2.5 (6)
$\gamma_{2,0}$(Ra)	50.10 (2)	56 (12)	E1	0.696 (10)	33 (7)
$\gamma_{1,0}$(At)	58.9 (2)	0.0095 (36)	M1	10.87 (19)	0.0008 (3)
$\gamma_{3,0}$(Ra)	61.43 (5)	0.34 (7)	E2	96.5 (14)	0.0035 (7)
$\gamma_{5,3}$(Ra)	62.31 (6)	0.022 (10)	E1	0.389 (6)	0.016 (7)
$\gamma_{5,2}$(Ra)	73.5 (1)	0.054 (38)	E2	40.8 (6)	0.0013 (9)
$\gamma_{4,0}$(Ra)	79.65 (2)	10.8 (22)	E1	0.202 (3)	9.0 (18)
$\gamma_{13,7}$(Ra)	89.08 (10)	0.054 (11)			0.054 (11)
$\gamma_{5,1}$(Ra)	93.88 (5)	0.067 (16)	E1	0.1305 (18)	0.059 (14)
$\gamma_{6,5}$(Ra)	111.05 (3)	0.0049 (14)			0.0049 (14)
$\gamma_{13,6}$(Ra)	134.60 (2)	0.62 (12)	[E1]	0.234 (3)	0.5 (1)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{4,2}$(At)	145.3 (3)	0.00078 (47)	M1+(E2)	2.9 (13)	0.0002 (1)
$\gamma_{2,0}$(At)	150.9 (2)	0.0135 (12)	E2	1.417 (21)	0.0056 (5)
$\gamma_{6,4}$(Ra)	155.5 (5)	0.0027			0.0027
$\gamma_{6,3}$(Ra)	173.35 (5)	0.36 (15)	M1,E2	2.1 (12)	0.115 (22)
$\gamma_{6,2}$(Ra)	184.65 (5)	0.24 (6)	E1	0.1092 (15)	0.22 (5)
$\gamma_{7,4}$(Ra)	200.7 (2)	0.0027 (10)			0.0027 (10)
$\gamma_{6,1}$(Ra)	204.85 (5)	2.8 (5)	M1+1.42%E2	2.02 (5)	0.92 (18)
$\gamma_{9,5}$(Ra)	205.6 (2)	0.0090 (17)	E2	0.530 (8)	0.0059 (11)
$\gamma_{10,5}$(Ra)	210.60 (5)	0.0105 (21)	E1	0.0798 (11)	0.0097 (19)
$\gamma_{7,3}$(Ra)	218.80 (5)	0.0232 (46)	M1	1.701 (24)	0.0086 (17)
$\gamma_{6,0}$(Ra)	234.70 (5)	6.5 (12)	M1(+0.5%E2)	1.393 (16)	2.7 (5)
$\gamma_{8,2}$(Ra)	236.05 (5)	0.029 (8)	E1	0.0610 (9)	0.027 (8)
$\gamma_{13,5}$(Ra)	245.60 (5)	0.019 (4)			0.019 (4)
$\gamma_{9,4}$(Ra)	250.25 (5)	0.0043	M1+81.5%E2	0.44 (7)	0.003
$\gamma_{7,1}$(Ra)	250.25 (5)	0.035	M1	1.170 (16)	0.016
$\gamma_{10,4}$(Ra)	254.6 (2)	0.0060 (13)	E1	0.0512 (7)	0.0057 (12)
$\gamma_{8,1}$(Ra)	256.18 (5)	0.025 (5)	E2	0.250 (4)	0.020 (4)
$\gamma_{11,4}$(Ra)	262.9 (2)	0.0037 (12)	E1	0.0475 (7)	0.0035 (11)
$\gamma_{10,3}$(Ra)	272.8 (2)	0.0064 (23)	M1+E2	0.6 (4)	0.004 (1)
$\gamma_{7,0}$(Ra)	280.7 (5)	0.0003			0.0003
$\gamma_{11,3}$(Ra)	280.7 (5)	0.0003			0.0003
$\gamma_{8,0}$(Ra)	286.0 (2)	0.0069 (24)	M1+E2	0.5 (4)	0.0046 (10)
$\gamma_{13,4}$(Ra)	289.67 (5)	0.21			0.21
$\gamma_{14,4}$(Ra)	296.5 (2)	0.0022 (7)	M1+1.66%E2	0.723 (9)	0.0013 (4)
$\gamma_{9,1}$(Ra)	299.95 (5)	0.0207 (41)	E1	0.0352 (5)	0.020 (4)
$\gamma_{10,1}$(Ra)	304.40 (5)	0.0142 (28)	M1+6.3%E2(+E0)	0.647 (14)	0.0086 (17)
$\gamma_{15,8}$(Ra)	307.93 (5)	0.012 (3)			0.012 (3)
$\gamma_{13,3}$(Ra)	307.93 (5)	0.0013 (13)			0.0013 (13)
$\gamma_{11,1}$(Ra)	312.65 (5)	0.026 (6)	M1+2.5%E2	0.621 (10)	0.016 (4)
$\gamma_{14,3}$(Ra)	314.6 (2)	0.0023 (7)	E1	0.0316 (5)	0.0022 (7)
$\gamma_{13,2}$(Ra)	319.25 (5)	0.73 (14)	M1+3.14%E2	0.583 (10)	0.46 (9)
$\gamma_{9,0}$(Ra)	329.80 (5)	0.025 (5)	(E1)	0.0285 (4)	0.024 (5)
$\gamma_{10,0}$(Ra)	334.30 (6)	0.0119 (24)	M1+27.12%E2	0.414 (13)	0.0084 (17)
$\gamma_{13,1}$(Ra)	339.50 (5)	0.062 (13)			0.062 (13)
$\gamma_{11,0}$(Ra)	342.50 (7)	0.0145 (30)	M1+62.5%E2	0.250 (5)	0.0116 (24)
$\gamma_{12,0}$(Ra)	350.5 (2)	0.0028 (15)	E1	0.0249 (4)	0.0027 (15)
$\gamma_{13,0}$(Ra)	369.32 (5)	0.089 (18)			0.089 (18)
$\gamma_{18,13}$(Ra)	434.4 (1)	0.0022 (7)			0.0022 (7)
$\gamma_{16,11}$(Ra)	439.6 (3)	0.00030 (8)			0.00030 (8)
$\gamma_{17,11}$(Ra)	444.5 (3)	0.0011 (4)			0.0011 (4)
$\gamma_{16,9}$(Ra)	452.9 (2)	0.0008			0.0008
$\gamma_{17,10}$(Ra)	452.9 (2)	0.0008			0.0008
$\gamma_{17,9}$(Ra)	457.5 (2)	0.0008			0.0008
$\gamma_{18,10}$(Ra)	469.3 (2)	0.001			0.001
$\gamma_{15,5}$(Ra)	469.3 (2)	0.001			0.001
$\gamma_{19,9}$(Ra)	475.4 (1)	0.0027			0.0027
$\gamma_{21,12}$(Ra)	475.4 (1)	0.003			0.003
$\gamma_{20,11}$(Ra)	480.9 (3)	0.0013 (4)			0.0013 (4)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{20,9}$(Ra)	493.4 (2)	0.0024 (7)			0.0024 (7)
$\gamma_{17,7}$(Ra)	506.9 (2)	0.0022 (7)			0.0022 (7)
$\gamma_{23,9}$(Ra)	516.7 (2)	0.0032 (8)			0.0032 (8)
$\gamma_{24,11}$(Ra)	524.8 (2)	0.0043 (12)			0.0043 (12)
$\gamma_{24,10}$(Ra)	533.1 (3)	0.0019 (7)			0.0019 (7)
$\gamma_{20,8}$(Ra)	537.2 (2)	0.0032			0.0032
$\gamma_{24,9}$(Ra)	537.2 (2)	0.0019			0.0019
$\gamma_{21,8}$(Ra)	539.8 (2)	0.0059 (18)			0.0059 (18)
$\gamma_{21,7}$(Ra)	545.4 (4)	0.00030 (8)			0.00030 (8)
$\gamma_{17,6}$(Ra)	552.3 (2)	0.0027 (8)			0.0027 (8)
$\gamma_{22,8}$(Ra)	556.3 (3)	0.0011 (4)			0.0011 (4)
$\gamma_{18,6}$(Ra)	569.03 (8)	0.049 (11)			0.049 (11)
$\gamma_{25,9}$(Ra)	576.1 (4)	0.0011 (4)			0.0011 (4)
$\gamma_{24,8}$(Ra)	581.3 (4)	0.0013 (4)			0.0013 (4)
$\gamma_{26,10}$(Ra)	592.3 (2)	0.0032 (10)			0.0032 (10)
$\gamma_{26,9}$(Ra)	596.9 (4)	0.0008 (3)			0.0008 (3)
$\gamma_{28,11}$(Ra)	600.7 (4)	0.00054 (14)			0.00054 (14)
$\gamma_{22,6}$(Ra)	607.6 (3)	0.0022 (7)			0.0022 (7)
$\gamma_{28,9}$(Ra)	613.6 (4)	0.0011 (4)			0.0011 (4)
$\gamma_{24,6}$(Ra)	632.7 (3)	0.0022 (7)			0.0022 (7)
$\gamma_{17,5}$(Ra)	663.7 (3)	0.0011 (4)			0.0011 (4)
$\gamma_{29,8}$(Ra)	671.9 (4)	0.00054 (14)			0.00054 (14)
$\gamma_{17,4}$(Ra)	708.3 (3)	0.0013 (4)			0.0013 (4)
$\gamma_{23,5}$(Ra)	722.65 (5)	0.038 (9)			0.038 (9)
$\gamma_{18,4}$(Ra)	724.15 (5)	0.014 (4)			0.014 (4)
$\gamma_{17,2}$(Ra)	737.4 (3)	0.0009 (3)			0.0009 (3)
$\gamma_{18,3}$(Ra)	742.4 (3)	0.0011 (4)			0.0011 (4)
$\gamma_{21,4}$(Ra)	746.30 (5)	0.020 (5)			0.020 (5)
$\gamma_{18,2}$(Ra)	753.65 (5)	0.0094 (22)			0.0094 (22)
$\gamma_{17,1}$(Ra)	757.20 (5)	0.0076 (20)			0.0076 (20)
$\gamma_{22,4}$(Ra)	762.6 (2)	0.0024 (7)			0.0024 (7)
$\gamma_{23,4}$(Ra)	766.64 (5)	0.022 (5)			0.022 (5)
$\gamma_{21,2}$(Ra)	775.83 (5)	0.45 (9)			0.45 (9)
$\gamma_{22,3}$(Ra)	780.8 (1)	0.003 (1)			0.003 (1)
$\gamma_{23,3}$(Ra)	784.93 (5)	0.0086 (21)			0.0086 (21)
$\gamma_{24,4}$(Ra)	787.6 (2)	0.0024 (7)			0.0024 (7)
$\gamma_{17,0}$(Ra)	787.6 (2)	0.0003 (3)			0.0003 (3)
$\gamma_{22,2}$(Ra)	792.2 (3)	0.00054 (14)			0.00054 (14)
$\gamma_{23,2}$(Ra)	796.22 (5)	0.0108 (25)			0.0108 (25)
$\gamma_{18,0}$(Ra)	803.77 (5)	0.059 (14)			0.059 (14)
$\gamma_{19,0}$(Ra)	806.0 (2)	0.0013 (4)			0.0013 (4)
$\gamma_{22,1}$(Ra)	812.40 (6)	0.021 (5)			0.021 (5)
$\gamma_{27,5}$(Ra)	816.5 (2)	0.0013 (4)			0.0013 (4)
$\gamma_{20,0}$(Ra)	823.20 (7)	0.0070 (16)			0.0070 (16)
$\gamma_{21,0}$(Ra)	825.95 (7)	0.054 (13)			0.054 (13)
$\gamma_{29,5}$(Ra)	833.9 (2)	0.0013 (4)			0.0013 (4)
$\gamma_{24,1}$(Ra)	837.5 (1)	0.0097 (21)			0.0097 (21)
$\gamma_{22,0}$(Ra)	842.2 (1)	0.0049 (11)			0.0049 (11)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{26,4}$(Ra)	846.85 (10)	0.049 (13)			0.049 (13)
$\gamma_{23,0}$(Ra)	846.85 (10)	0.005 (3)			0.005 (3)
$\gamma_{28,4}$(Ra)	863.6 (1)	0.0038 (9)			0.0038 (9)
$\gamma_{24,0}$(Ra)	867.4 (1)	0.0016 (4)			0.0016 (4)
$\gamma_{26,2}$(Ra)	876.5 (1)	0.038 (9)			0.038 (9)
$\gamma_{29,4}$(Ra)	878.1 (2)	0.0032 (8)			0.0032 (8)
$\gamma_{28,2}$(Ra)	893.1 (2)	0.0024 (7)			0.0024 (7)
$\gamma_{26,1}$(Ra)	896.7 (2)	0.013 (3)			0.013 (3)
$\gamma_{29,2}$(Ra)	907.6 (2)	0.014 (3)			0.014 (3)
$\gamma_{27,1}$(Ra)	911.3 (3)	0.0008 (3)			0.0008 (3)
$\gamma_{28,1}$(Ra)	913.6 (3)	0.00041 (14)			0.00041 (14)
$\gamma_{26,0}$(Ra)	926.5 (3)	0.0016 (4)			0.0016 (4)
$\gamma_{27,0}$(Ra)	941.2 (3)	0.0030 (8)			0.0030 (8)
$\gamma_{32,4}$(Ra)	949.3 (4)	0.00032 (8)			0.00032 (8)
$\gamma_{29,0}$(Ra)	958.0 (7)	0.00035 (8)			0.00035 (8)
$\gamma_{30,2}$(Ra)	969.2 (4)	0.00032 (8)			0.00032 (8)
$\gamma_{31,2}$(Ra)	975.2 (5)	0.00016 (5)			0.00016 (5)
$\gamma_{32,2}$(Ra)	978.7 (4)	0.00067 (12)			0.00067 (12)
$\gamma_{30,1}$(Ra)	989.4 (5)	0.00014 (3)			0.00014 (3)
$\gamma_{31,1}$(Ra)	994.3 (3)	0.00011 (3)			0.00011 (3)
$\gamma_{32,1}$(Ra)	999.3 (5)	0.00019 (4)			0.00019 (4)
$\gamma_{31,0}$(Ra)	1025.1 (5)	0.00014 (3)			0.00014 (3)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	11.43	(3)	d
Q_α	:	5978.99	(21)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,30}$	5014.3	~0.00044
$\alpha_{0,29}$	5026.1	~0.00063
$\alpha_{0,28}$	5035.9	~0.0004
$\alpha_{0,27}$	5056.5	~0.0002
$\alpha_{0,26}$	5086	~0.0003
$\alpha_{0,25}$	5112.5	~0.0006
$\alpha_{0,24}$	5137.1	~0.0017
$\alpha_{0,23}$	5151.98 (23)	0.021
$\alpha_{0,22}$	5173.10 (23)	0.026
$\alpha_{0,21}$	5211.1 (5)	0.0053
$\alpha_{0,20}$	5237.12 (23)	0.041
$\alpha_{0,19}$	5259.14 (21)	0.042
$\alpha_{0,18}$	5283.65 (21)	0.093
$\alpha_{0,17}$	5288.19 (23)	0.16 (4)
$\alpha_{0,16}$	5339.37 (21)	0.13
$\alpha_{0,14}$	5366.37 (23)	0.13
$\alpha_{0,12}$	5432.83 (21)	0.50 (8)
$\alpha_{0,11}$	5434.60 (21)	1.60 (24)
$\alpha_{0,10}$	5481.7 (5)	0.008
$\alpha_{0,8}$	5502.12 (21)	0.74 (25)
$\alpha_{0,6}$	5539.43 (21)	10.6 (10)
$\alpha_{0,5}$	5606.99 (21)	25.8 (11)
$\alpha_{0,4}$	5715.84 (21)	49.6 (12)
$\alpha_{0,3}$	5747.14 (21)	10.0 (3)
$\alpha_{0,2}$	5857.52 (21)	0.32 (4)
$\alpha_{0,0}$	5871.63 (21)	1.0 (2)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Rn)	5.66 - 17.95	30.1 (4)
e_{AK}	(Rn)		1.73 (21)
	KLL	62.017 - 68.885	}
	KLX	75.744 - 83.785	}
	KXY	89.45 - 98.39	}
$ec_{17,13\ K}$	(Rn)	4.8 (2)	0.03 (3)

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		Energy keV	Electrons per 100 disint.
$ec_{2,1\ M}$	(Rn)	5.4 - 7.0	11.8 (16)
$ec_{12,7\ K}$	(Rn)	5.64 (4)	0.1 (1)
$ec_{11,6\ K}$	(Rn)	8.38 (3)	0.204 (13)
$ec_{2,1\ N}$	(Rn)	8.8 - 9.7	3.05 (41)
$ec_{2,0\ M}$	(Rn)	9.90 - 11.49	7.6 (6)
$ec_{5,4\ K}$	(Rn)	12.46 (1)	0.0211 (15)
$ec_{2,0\ N}$	(Rn)	13.28 - 14.15	1.96 (15)
$ec_{4,3\ L}$	(Rn)	13.82 - 17.26	0.156 (31)
$ec_{3,1\ K}$	(Rn)	23.92 (1)	7.28 (16)
$ec_{4,3\ M}$	(Rn)	27.40 - 28.99	0.042 (8)
$ec_{4,3\ N}$	(Rn)	30.78 - 31.65	0.0108 (22)
$ec_{4,2\ K}$	(Rn)	45.87 (2)	12.40 (36)
$ec_{12,9\ L}$	(Rn)	51.5 - 54.9	0.039 (17)
$ec_{4,1\ K}$	(Rn)	55.81 (1)	18.0 (5)
$ec_{4,0\ K}$	(Rn)	60.24 (1)	1.98 (10)
$ec_{6,4\ K}$	(Rn)	81.14 (6)	0.249 (25)
$ec_{17,13\ L}$	(Rn)	85.2 - 88.6	0.021 (15)
$ec_{12,7\ L}$	(Rn)	85.99 - 89.43	0.064 (32)
$ec_{11,6\ L}$	(Rn)	88.73 - 92.17	0.0375 (23)
$ec_{5,4\ L}$	(Rn)	92.808 - 96.250	0.214 (15)
$ec_{12,7\ M}$	(Rn)	99.57 - 101.16	0.017 (10)
$ec_{3,1\ L}$	(Rn)	104.271 - 107.710	1.373 (30)
$ec_{5,4\ M}$	(Rn)	106.383 - 107.972	0.0577 (41)
$ec_{5,4\ N}$	(Rn)	109.770 - 110.634	0.0150 (11)
$ec_{3,1\ M}$	(Rn)	117.846 - 119.435	0.328 (7)
$ec_{3,1\ N}$	(Rn)	121.230 - 122.097	0.0854 (19)
$ec_{4,2\ L}$	(Rn)	126.22 - 129.66	2.30 (6)
$ec_{4,1\ L}$	(Rn)	136.16 - 139.60	3.27 (9)
$ec_{4,2\ M}$	(Rn)	139.80 - 141.39	0.547 (15)
$ec_{4,0\ L}$	(Rn)	140.587 - 144.020	0.373 (12)
$ec_{4,2\ N}$	(Rn)	143.18 - 144.05	0.143 (4)
$ec_{4,1\ M}$	(Rn)	149.735 - 151.324	0.777 (21)
$ec_{8,3\ K}$	(Rn)	151.09 (3)	0.019 (16)
$ec_{4,1\ N}$	(Rn)	153.120 - 153.986	0.203 (5)
$ec_{17,7\ K}$	(Rn)	153.2 (3)	0.022 (22)
$ec_{4,0\ M}$	(Rn)	154.162 - 155.751	0.0891 (35)
$ec_{4,0\ N}$	(Rn)	157.540 - 158.413	0.0232 (9)
$ec_{6,4\ L}$	(Rn)	161.49 - 164.93	0.058 (5)
$ec_{5,0\ K}$	(Rn)	171.07 (1)	9.06 (27)
$ec_{6,4\ M}$	(Rn)	175.07 - 176.66	0.0142 (13)
$ec_{6,2\ K}$	(Rn)	225.47 (1)	1.55 (7)
$ec_{6,0\ K}$	(Rn)	239.88 (1)	0.992 (25)
$ec_{5,0\ L}$	(Rn)	251.415 - 254.850	1.65 (4)
$ec_{5,0\ M}$	(Rn)	264.990 - 266.579	0.391 (10)
$ec_{5,0\ N}$	(Rn)	268.370 - 269.241	0.1019 (28)
$ec_{8,1\ K}$	(Rn)	273.279 (15)	0.135 (4)
$ec_{6,2\ L}$	(Rn)	305.823 - 309.260	0.281 (9)
$ec_{6,2\ M}$	(Rn)	319.398 - 320.987	0.0666 (21)

		Energy keV	Electrons per 100 disint.
$ec_{6,0\ L}$	(Rn)	320.234 - 323.670	0.177 (5)
$ec_{6,2\ N}$	(Rn)	322.780 - 323.649	0.0174 (5)
$ec_{6,0\ M}$	(Rn)	333.809 - 335.398	0.0420 (11)
$ec_{6,0\ N}$	(Rn)	337.19 - 338.06	0.0109 (3)
$ec_{11,0\ K}$	(Rn)	346.636 (12)	0.213 (7)
$ec_{8,1\ L}$	(Rn)	353.628 - 357.070	0.0240 (6)
$ec_{11,0\ L}$	(Rn)	426.985 - 430.420	0.0378 (13)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Rn)	10.1372 — 17.2578		22.1 (4)	
XKα_2	(Rn)	81.07		14.86 (23)	} Kα
XKα_1	(Rn)	83.78		24.5 (4)	}
XKβ_3	(Rn)	94.247	}		
XKβ_1	(Rn)	94.868	}	8.50 (18)	Kβ_1'
XKβ_5''	(Rn)	95.449	}		
XKβ_2	(Rn)	97.48	}		
XKβ_4	(Rn)	97.853	}	2.72 (7)	Kβ_2'
XKO$_{2,3}$	(Rn)	98.357	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Rn)	4.47 (1)	54.9 (23)	E2	860000	0.0000064
$\gamma_{2,1}$(Rn)	9.90 (2)	15.7 (21)	M1+E2	990 (40)	0.0158 (20)
$\gamma_{2,0}$(Rn)	14.37 (1)	10.0 (8)	M1+E2	539 (15)	0.0185 (13)
$\gamma_{4,3}$(Rn)	31.87 (2)	0.21 (4)	(E2)	2010 (30)	0.000105 (21)
$\gamma_{12,9}$(Rn)	69.5 (1)	0.059 (25)	M1	7.36 (11)	0.007 (3)
$\gamma_{15,12}$(Rn)	70.9 (2)	0.0036 (11)			0.0036 (11)
$\gamma_{11,7}$(Rn)	102.2 (2)	0.0008 (4)			0.0008 (4)
$\gamma_{17,13}$(Rn)	103.2 (2)	0.064 (35)	M1+E2	9.6 (24)	0.006 (3)
$\gamma_{12,7}$(Rn)	104.04 (4)	0.20 (5)	M1+E2	9.4 (24)	0.0194 (21)
$\gamma_{11,6}$(Rn)	106.78 (3)	0.277 (17)	(M1)	10.89 (16)	0.0233 (14)
$\gamma_{12,6}$(Rn)	108.5 (2)	0.006 (3)			0.006 (3)
$\gamma_{5,4}$(Rn)	110.856 (10)	0.369 (26)	E2	5.36 (8)	0.058 (4)
$\gamma_{13,8}$(Rn)	114.7 (2)	0.010 (4)			0.010 (4)
$\gamma_{3,1}$(Rn)	122.319 (10)	10.32 (21)	M1+E2	7.34 (11)	1.238 (19)
$\gamma_{20,14}$(Rn)	131.6 (2)	0.006 (3)			0.006 (3)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{14,8}$(Rn)	138.3 (3)	0.0017 (7)			0.0017 (7)
$\gamma_{4,2}$(Rn)	144.27 (2)	18.8 (5)	M1+E2	4.59 (7)	3.36 (8)
$\gamma_{17,12}$(Rn)	147.2 (3)	0.006 (3)			0.006 (3)
$\gamma_{4,1}$(Rn)	154.208 (10)	28.2 (7)	M1	3.83 (6)	5.84 (13)
$\gamma_{4,0}$(Rn)	158.635 (10)	3.18 (11)	M1+E2	3.46 (12)	0.713 (16)
$\gamma_{16,8}$(Rn)	165.8 (2)	0.0054 (28)			0.0054 (28)
$\gamma_{11,5}$(Rn)	175.65 (15)	0.017 (4)			0.017 (4)
$\gamma_{12,5}$(Rn)	177.3 (1)	0.047 (4)			0.047 (4)
$\gamma_{6,4}$(Rn)	179.54 (6)	0.480 (45)	M1+E2	2.12 (7)	0.154 (14)
$\gamma_{20,12}$(Rn)	199.3 (3)	0.0030 (14)			0.0030 (14)
$\gamma_{18,9}$(Rn)	221.32 (24)	0.038 (6)	E1	0.0675 (10)	0.036 (6)
$\gamma_{19,8}$(Rn)	247.2 (5)	0.0097 (28)			0.0097 (28)
$\gamma_{8,3}$(Rn)	249.49 (3)	0.061 (22)	M1+E2	0.6 (4)	0.038 (10)
$\gamma_{17,7}$(Rn)	251.6 (3)	0.088 (27)	M1+E2	0.6 (4)	0.055 (10)
$\gamma_{5,2}$(Rn)	255.2 (2)	0.048 (7)			0.048 (7)
$\gamma_{17,6}$(Rn)	255.7 (3)	0.0055 (28)			0.0055 (28)
$\gamma_{18,6}$(Rn)	260.4 (3)	0.0067 (28)			0.0067 (28)
$\gamma_{5,0}$(Rn)	269.463 (10)	25.5 (6)	M1+E2	0.789 (14)	14.23 (32)
$\gamma_{10,3}$(Rn)	270.3 (4)	0.0007 (4)			0.0007 (4)
$\gamma_{23,12}$(Rn)	286.0 (4)	0.0011 (6)			0.0011 (6)
$\gamma_{12,4}$(Rn)	288.18 (3)	0.167 (5)	E1	0.0364 (6)	0.161 (5)
$\gamma_{6,2}$(Rn)	323.871 (10)	5.98 (14)	M1+E2	0.473 (17)	4.06 (8)
$\gamma_{7,2}$(Rn)	328.38 (3)	0.209 (10)	(E1)	0.0271 (4)	0.203 (10)
$\gamma_{6,1}$(Rn)	334.01 (6)	0.110 (7)	(E2)	0.1007 (15)	0.100 (6)
$\gamma_{6,0}$(Rn)	338.282 (10)	4.08 (9)	M1	0.430 (6)	2.85 (6)
$\gamma_{7,0}$(Rn)	342.78 (2)	0.232 (13)	E1	0.0246 (4)	0.226 (13)
$\gamma_{23,9}$(Rn)	355.5 (2)	0.0043 (14)			0.0043 (14)
$\gamma_{14,4}$(Rn)	355.7 (2)	0.0028 (14)			0.0028 (14)
$\gamma_{8,2}$(Rn)	361.89 (2)	0.028 (7)			0.028 (7)
$\gamma_{9,2}$(Rn)	362.9 (2)	0.016 (7)			0.016 (7)
$\gamma_{22,7}$(Rn)	368.56 (12)	0.009 (4)			0.009 (4)
$\gamma_{8,1}$(Rn)	371.676 (15)	0.665 (15)	M1	0.333 (5)	0.499 (11)
$\gamma_{9,1}$(Rn)	372.86 (6)	0.052	E1	0.0205 (3)	0.051
$\gamma_{8,0}$(Rn)	376.26 (2)	0.013 (4)			0.013 (4)
$\gamma_{16,4}$(Rn)	383.35 (2)	0.007 (4)			0.007 (4)
$\gamma_{14,3}$(Rn)	387.7 (2)	0.016 (6)			0.016 (6)
$\gamma_{23,7}$(Rn)	390.1 (2)	0.0046 (21)			0.0046 (21)
$\gamma_{11,2}$(Rn)	430.6 (3)	0.020 (6)			0.020 (6)
$\gamma_{12,2}$(Rn)	432.45 (3)	0.0356 (29)			0.0356 (29)
$\gamma_{11,0}$(Rn)	445.033 (12)	1.542 (48)	M1	0.205 (3)	1.28 (4)
$\gamma_{20,4}$(Rn)	487.5 (2)	0.011 (2)			0.011 (2)
$\gamma_{-1,1}$(Rn)	490.8 (3)	0.0017 (7)			0.0017 (7)
$\gamma_{14,2}$(Rn)	500.0 (4)	0.0014 (6)			0.0014 (6)
$\gamma_{14,1}$(Rn)	510.0 (4)	0.0004 (3)			0.0004 (3)
$\gamma_{-1,2}$(Rn)	523.2 (4)	0.0014 (6)			0.0014 (6)
$\gamma_{16,2}$(Rn)	527.611 (13)	0.073 (4)			0.073 (4)
$\gamma_{-1,3}$(Rn)	532.9 (4)	0.0014 (6)			0.0014 (6)
$\gamma_{16,1}$(Rn)	537.6 (1)	0.0021 (7)			0.0021 (7)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{16,0}$(Rn)	541.99 (2)	0.0014 (6)			0.0014 (6)
$\gamma_{21,3}$(Rn)	545.8 (5)	0.0011 (6)			0.0011 (6)
$\gamma_{23,4}$(Rn)	574.1 (7)	0.0011 (6)			0.0011 (6)
$\gamma_{17,2}$(Rn)	579.6 (3)	0.0014 (6)			0.0014 (6)
$\gamma_{18,2}$(Rn)	584.3 (3)	0.0014 (6)			0.0014 (6)
$\gamma_{17,0}$(Rn)	594.0 (3)	0.0014 (6)			0.0014 (6)
$\gamma_{18,0}$(Rn)	598.721 (24)	0.092 (4)			0.092 (4)
$\gamma_{19,2}$(Rn)	609.31 (4)	0.057 (3)			0.057 (3)
$\gamma_{19,1}$(Rn)	619.1 (4)	0.0036 (11)			0.0036 (11)
$\gamma_{19,0}$(Rn)	623.68 (4)	0.009 (4)			0.009 (4)
$\gamma_{20,2}$(Rn)	631.7 (7)	0.0004 (3)			0.0004 (3)
$\gamma_{20,1}$(Rn)	641.7 (4)	0.0017 (7)			0.0017 (7)
$\gamma_{20,0}$(Rn)	646.1 (5)	0.0004 (4)			0.0004 (4)
$\gamma_{22,2}$(Rn)	696.9 (7)	0.0007 (3)			0.0007 (3)
$\gamma_{22,0}$(Rn)	711.3 (2)	0.0037 (10)			0.0037 (10)
$\gamma_{23,2}$(Rn)	718.4 (4)	0.0014 (6)			0.0014 (6)
$\gamma_{23,1}$(Rn)	728.4 (8)	0.00028 (14)			0.00028 (14)
$\gamma_{23,0}$(Rn)	732.8 (6)	0.0006 (3)			0.0006 (3)
$\gamma_{-1,25}$(Rn)	737.2 (8)	0.00028 (14)			0.00028 (14)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	3.631	(2)	d
Q_α	:	5788.85	(15)	keV
α	:	100		%
^{14}C	:	5	(1)	$\times 10^{-9}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,4}$	5034.29 (18)	0.0030 (5)
$\alpha_{0,3}$	5051.56 (17)	0.0076 (10)
$\alpha_{0,2}$	5161.32 (18)	0.0072 (8)
$\alpha_{0,1}$	5448.80 (15)	5.25 (5)
$\alpha_{0,0}$	5685.48 (15)	94.73 (5)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Rn)	5.58 - 11.48		0.498 (16)
e_{AK}	(Rn)			0.0151 (19)
	KLL	62.017 - 68.885	}	
	KLX	75.744 - 83.785	}	
	KXY	89.45 - 98.39	}	
$ec_{1,0\ K}$	(Rn)	142.590 (6)		0.46 (2)
$ec_{1,0\ L}$	(Rn)	222.938 - 226.376		0.50 (3)
$ec_{1,0\ M}$	(Rn)	236.513 - 238.102		0.134 (3)
$ec_{1,0\ N}$	(Rn)	239.900 - 240.764		0.0347 (6)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Rn)	10.137 — 17.28		0.373 (16)	
$XK\alpha_2$	(Rn)	81.07		0.130 (3)	} $K\alpha$
$XK\alpha_1$	(Rn)	83.78		0.214 (4)	}
$XK\beta_3$	(Rn)	94.247	}		
$XK\beta_1$	(Rn)	94.868	}	0.0743 (18)	$K\beta_1'$
$XK\beta_5''$	(Rn)	95.449	}		
$XK\beta_2$	(Rn)	97.48	}		
$XK\beta_4$	(Rn)	97.853	}	0.0238 (7)	$K\beta_2'$
$XKO_{2,3}$	(Rn)	98.357	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Rn)	240.986 (6)	5.26 (5)	E2	0.276 (4)	4.12 (4)
$\gamma_{2,1}$(Rn)	292.7 (1)	0.0072 (8)	E2	0.1487 (21)	0.0063 (7)
$\gamma_{3,1}$(Rn)	404.45 (9)	0.0022 (5)	E1	0.01717 (24)	0.0022 (5)
$\gamma_{4,1}$(Rn)	422.04 (10)	0.0030 (5)	[E1]	0.01567 (22)	0.0030 (5)
$\gamma_{3,0}$(Rn)	645.44 (9)	0.0054 (9)	E1	0.00663 (10)	0.0054 (9)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	14.82	(19)	d
Q_{β^-}	:	356	(5)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,3}$	200 (5)	<0.01	2nd forbidden	>10.1
$\beta^-_{0,2}$	235 (5)	<0.01	1st forbidden unique	>9.9
$\beta^-_{0,1}$	316 (5)	68.8 (20)	Allowed	6.87
$\beta^-_{0,0}$	356 (5)	31.2 (20)	1st forbidden	7.38

3 Electron Emissions

		Energy keV	Electrons per 100 disint.		Energy keV
e_{AL}	(Ac)	5.87 - 19.69	15.7 (7)		
$ec_{1,0\ L}$	(Ac)	20.24 - 24.22	29.2 (8)		
$ec_{1,0\ M}$	(Ac)	35.09 - 36.87	7.2 (12)		
$ec_{1,0\ N}$	(Ac)	38.82 - 39.78	1.86 (27)		
$\beta^-_{0,3}$	max:	200 (5)	<0.01	avg:	54.0 (15)
$\beta^-_{0,2}$	max:	235 (5)	<0.01	avg:	70.5 (16)
$\beta^-_{0,1}$	max:	316 (5)	68.8 (20)	avg:	88.3 (16)
$\beta^-_{0,0}$	max:	356 (5)	31.2 (20)	avg:	100.7 (16)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.
XL	(Ac)	10.8701 — 18.9228	13.6 (6)

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Ac)	40.09 (5)	68.8 (17)	E1	1.293 (19)	30.0 (7)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	1600	(7)	y
Q_α	:	4870.62	(25)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,4}$	4160 (2)	0.0002
$\alpha_{0,3}$	4191 (2)	0.0008
$\alpha_{0,2}$	4340 (1)	0.0066 (22)
$\alpha_{0,1}$	4601 (1)	5.95 (4)
$\alpha_{0,0}$	4784.34 (25)	94.038 (40)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
$ec_{1,0\ K}$	(Rn)	87.814 (13)	0.675 (11)
$ec_{1,0\ L}$	(Rn)	168.163 - 171.600	1.280 (18)
$ec_{1,0\ M}$	(Rn)	181.738 - 183.327	0.342 (5)
$ec_{1,0\ N}$	(Rn)	185.120 - 185.989	0.0892 (14)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Rn)	10.14 — 17.26		0.807 (14)	
$XK\alpha_2$	(Rn)	81.07		0.192 (4)	} $K\alpha$
$XK\alpha_1$	(Rn)	83.78		0.317 (6)	}
$XK\beta_3$	(Rn)	94.247	}		
$XK\beta_1$	(Rn)	94.868	}	0.1098 (25)	$K\beta_1'$
$XK\beta_5''$	(Rn)	95.449	}		
$XK\beta_2$	(Rn)	97.48	}		
$XK\beta_4$	(Rn)	97.853	}	0.0351 (10)	$K\beta_2'$
$XKO_{2,3}$	(Rn)	98.357	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Rn)	186.211 (13)	5.962 (48)	E2	0.677 (10)	3.555 (19)
$\gamma_{2,1}$(Rn)	262.27 (5)	0.0066 (22)	[E2]	0.209 (4)	0.0055 (18)
$\gamma_{3,1}$(Rn)	414.60 (5)	0.0003	[E1]	0.01628 (23)	0.0003
$\gamma_{4,1}$(Rn)	449.37 (10)	0.0002	[E1]	0.01373 (20)	0.0002
$\gamma_{3,0}$(Rn)	600.66 (5)	0.0005	[E1]	0.00762 (11)	0.0005

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	5.75	(4)	y
Q_{β^-}	:	45.8	(7)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,4}$	12.7 (7)	30 (10)	Allowed	5.11
$\beta^-_{0,3}$	25.6 (7)	8.7 (9)	1st forbidden	6.2
$\beta^-_{0,2}$	39.1 (7)	49 (10)	Allowed	6.45
$\beta^-_{0,1}$	39.5 (7)	12 (10)	1st forbidden	7.07

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Ac)	5.87 - 19.67	12 (5)	
$ec_{1,0\ M}$	(Ac)	1.28 - 3.06	9 (7)	
$ec_{1,0\ N}$	(Ac)	5.01 - 5.97	2.5 (21)	
$ec_{2,0\ M}$	(Ac)	1.67 - 3.45	67 (11)	
$ec_{2,0\ N}$	(Ac)	5.40 - 6.36	17.8 (28)	
$ec_{3,2\ M}$	(Ac)	8.52 - 10.30	7.17 (46)	
$ec_{3,2\ N}$	(Ac)	12.25 - 13.21	1.82 (12)	
$ec_{4,2\ L}$	(Ac)	6.6 - 10.5	21 (8)	
$ec_{4,2\ M}$	(Ac)	21.4 - 23.2	5.2 (19)	
$ec_{4,2\ N}$	(Ac)	25.1 - 26.1	1.38 (49)	
$ec_{4,3\ M}$	(Ac)	7.88 - 9.66	1.53 (31)	
$ec_{4,3\ N}$	(Ac)	11.61 - 12.57	0.39 (8)	
$\beta^-_{0,4}$	max:	12.7 (7)	30 (10)	avg: 3.2 (2)
$\beta^-_{0,3}$	max:	25.6 (7)	8.7 (9)	avg: 6.5 (2)
$\beta^-_{0,2}$	max:	39.1 (7)	49 (10)	avg: 9.9 (2)
$\beta^-_{0,1}$	max:	39.5 (7)	12 (10)	avg: 10.0 (2)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.
XL	(Ac)	10.8701 — 18.9228	9.6 (19)

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Ac)	6.28 (3)	12 (10)	M2	6680000 (190000)	0.0000018 (15)
$\gamma_{2,0}$(Ac)	6.67 (2)	89 (14)	E2	1560000 (40000)	0.000057 (9)
$\gamma_{4,3}$(Ac)	12.88 (11)	2.30 (46)	E1	6.67 (18)	0.30 (6)
$\gamma_{3,2}$(Ac)	13.520 (36)	11.0 (7)	E1	5.86 (10)	1.6 (1)
$\gamma_{4,2}$(Ac)	26.40 (11)	28 (10)	M1+E2	201 (4)	0.14 (5)

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(Q)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	10.0	(1)	d
Q_α	:	5935.1	(14)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,48}$	4903.6 (14)	0.0011 (4)
$\alpha_{0,47}$	4992.7 (14)	0.0013 (3)
$\alpha_{0,46}$	5019.3 (14)	0.00015 (5)
$\alpha_{0,45}$	5025.5 (14)	0.00083 (21)
$\alpha_{0,44}$	5035.5 (14)	0.0021 (3)
$\alpha_{0,43}$	5064.1 (14)	0.00114 (18)
$\alpha_{0,42}$	5076.8 (14)	0.0038 (19)
$\alpha_{0,41}$	5094.1 (14)	0.015 (7)
$\alpha_{0,40}$	5129.0 (14)	0.0058 (8)
$\alpha_{0,39}$	5162.1 (14)	0.00066 (12)
$\alpha_{0,38}$	5195.1 (14)	0.00015 (5)
$\alpha_{0,37}$	5203.3 (14)	0.0101 (10)
$\alpha_{0,36}$	5210.2 (14)	0.022 (1)
$\alpha_{0,35}$	5239.3 (14)	0.0026 (5)
$\alpha_{0,34}$	5269.1 (14)	0.048 (19)
$\alpha_{0,33}$	5287.6 (14)	0.214 (10)
$\alpha_{0,32}$	5321.2 (14)	0.007 (7)
$\alpha_{0,31}$	5341.9 (14)	0.0027 (8)
$\alpha_{0,30}$	5356.2 (14)	0.000097 (2)
$\alpha_{0,29}$	5379.0 (14)	0.0020 (5)
$\alpha_{0,28}$	5391.2 (14)	0.0006 (4)
$\alpha_{0,27}$	5414.5 (14)	0.0030 (4)
$\alpha_{0,26}$	5428.3 (14)	0.0023 (3)
$\alpha_{0,25}$	5430.1 (14)	0.0028 (8)
$\alpha_{0,24}$	5435.8 (14)	0.0083 (6)
$\alpha_{0,23}$	5443.3 (14)	0.098 (19)
$\alpha_{0,22}$	5468.4 (14)	0.00052 (18)
$\alpha_{0,21}$	5487.4 (14)	0.0020 (3)
$\alpha_{0,20}$	5497.4 (14)	0.0022 (7)
$\alpha_{0,19}$	5515.2 (14)	0.0052 (19)
$\alpha_{0,18}$	5523.7 (14)	0.013 (6)
$\alpha_{0,17}$	5540.1 (14)	0.0072 (8)
$\alpha_{0,16}$	5546.5 (14)	0.055 (12)
$\alpha_{0,15}$	5555.3 (14)	0.084 (10)
$\alpha_{0,14}$	5563.3 (14)	0.017 (7)
$\alpha_{0,13}$	5580.5 (14)	0.95 (4)
$\alpha_{0,12}$	5599.3 (14)	0.114 (7)
$\alpha_{0,11}$	5609.0 (14)	1.09 (5)
$\alpha_{0,10}$	5637.3 (14)	4.16 (23)
$\alpha_{0,9}$	5682.2 (14)	1.31 (4)
$\alpha_{0,8}$	5686.4 (14)	0.021 (14)

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	Energy keV	Probability × 100
$\alpha_{0,7}$	5723.1 (14)	2.03 (23)
$\alpha_{0,6}$	5730.5 (14)	1.6 (3)
$\alpha_{0,5}$	5731.6 (14)	1.24 (10)
$\alpha_{0,4}$	5731.9 (17)	9.0 (5)
$\alpha_{0,3}$	5791.7 (14)	6.2 (9)
$\alpha_{0,2}$	5793.1 (21)	18.9 (20)
$\alpha_{0,1}$	5804.2 (14)	0.3
$\alpha_{0,0}$	5829.6 (14)	52.4 (24)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Fr)	5.73 - 18.52		23.8 (12)
e_{AK}	(Fr)			0.115 (9)
	KLL	63.576 - 70.787	}	
	KLX	77.720 - 86.101	}	
	KXY	91.84 - 101.12	}	
$ec_{13,9\ K}$	(Fr)	2.4 (1)		0.015 (7)
$ec_{7,0\ K}$	(Fr)	7.27 (3)		1.84 (15)
$ec_{1,0\ L}$	(Fr)	7.39 - 11.00		7.0 (9)
$ec_{9,3\ K}$	(Fr)	10.40 (3)		0.088 (6)
$ec_{2,0\ L}$	(Fr)	18.06 - 21.66		14.6 (12)
$ec_{8,1\ K}$	(Fr)	18.72 (3)		0.0191 (12)
$ec_{3,0\ L}$	(Fr)	19.95 - 23.56		6.7 (6)
$ec_{1,0\ M}$	(Fr)	21.38 - 23.03		1.88 (25)
$ec_{11,6\ K}$	(Fr)	22.62 (4)		0.0192 (14)
$ec_{11,5\ K}$	(Fr)	23.68 (3)		0.113 (7)
$ec_{1,0\ N}$	(Fr)	24.87 - 25.77		0.49 (7)
$ec_{9,5\ L}$	(Fr)	31.6 - 35.2		0.1080 (16)
$ec_{2,0\ M}$	(Fr)	32.05 - 33.70		3.93 (33)
$ec_{3,0\ M}$	(Fr)	33.94 - 35.59		1.81 (17)
$ec_{2,0\ N}$	(Fr)	35.54 - 36.44		1.02 (9)
$ec_{3,0\ N}$	(Fr)	37.43 - 38.33		0.474 (45)
$ec_{6,3\ L}$	(Fr)	44.0 - 47.6		0.32 (7)
$ec_{13,7\ K}$	(Fr)	44.04 (3)		0.0221 (14)
$ec_{4,2\ L}$	(Fr)	44.32 - 47.92		4.04 (25)
$ec_{9,5\ M}$	(Fr)	45.6 - 47.2		0.02914 (43)
$ec_{6,2\ L}$	(Fr)	45.637 - 49.246		0.80 (16)
$ec_{9,0\ K}$	(Fr)	48.93 (2)		0.0968 (22)
$ec_{7,3\ L}$	(Fr)	51.22 - 54.82		0.166 (42)
$ec_{13,4\ K}$	(Fr)	52.80 (3)		0.0270 (18)
$ec_{7,2\ L}$	(Fr)	53.10 - 56.71		0.411 (41)
$ec_{4,1\ L}$	(Fr)	54.91 - 58.52		0.52 (14)
$ec_{5,1\ L}$	(Fr)	55.23 - 58.84		0.0562 (43)

		Energy keV			Electrons per 100 disint.
$ec_{10,3\ K}$	(Fr)	56.12		(3)	1.12 (17)
$ec_{6,1\ L}$	(Fr)	56.2	-	59.8	0.136 (27)
$ec_{6,3\ M}$	(Fr)	58.0	-	59.6	0.086 (20)
$ec_{4,2\ M}$	(Fr)	58.31	-	59.96	0.96 (6)
$ec_{6,2\ M}$	(Fr)	59.627	-	61.277	0.207 (42)
$ec_{11,8\ L}$	(Fr)	60.2	-	63.8	0.053 (8)
$ec_{7,3\ M}$	(Fr)	65.21	-	66.86	0.045 (11)
$ec_{7,2\ M}$	(Fr)	67.09	-	68.74	0.111 (11)
$ec_{23,11\ K}$	(Fr)	68.05		(4)	0.017 (16)
$ec_{7,3\ N}$	(Fr)	68.7	-	69.6	0.0118 (30)
$ec_{10,7\ L}$	(Fr)	68.78	-	72.38	0.86 (6)
$ec_{4,1\ M}$	(Fr)	68.90	-	70.55	0.142 (37)
$ec_{5,1\ M}$	(Fr)	69.22	-	70.87	0.0136 (10)
$ec_{6,1\ M}$	(Fr)	70.19	-	71.84	0.035 (7)
$ec_{7,2\ N}$	(Fr)	70.58	-	71.48	0.0292 (29)
$ec_{11,8\ M}$	(Fr)	74.2	-	75.8	0.0125 (19)
$ec_{10,6\ L}$	(Fr)	76.3	-	79.9	0.261 (25)
$ec_{10,5\ L}$	(Fr)	77.53	-	81.13	0.149 (46)
$ec_{16,7\ K}$	(Fr)	78.65		(4)	0.013 (11)
$ec_{4,0\ L}$	(Fr)	81.02	-	84.62	1.76 (13)
$ec_{5,0\ L}$	(Fr)	81.28	-	84.88	0.088 (7)
$ec_{6,0\ L}$	(Fr)	82.3	-	85.9	0.33 (14)
$ec_{10,7\ M}$	(Fr)	82.77	-	84.42	0.204 (15)
$ec_{13,9\ L}$	(Fr)	84.85	-	88.46	0.011 (6)
$ec_{11,2\ K}$	(Fr)	86.84		(3)	0.0432 (25)
$ec_{7,0\ L}$	(Fr)	89.8	-	93.4	0.586 (48)
$ec_{10,6\ M}$	(Fr)	90.3	-	91.9	0.062 (6)
$ec_{10,5\ M}$	(Fr)	91.52	-	93.17	0.040 (13)
$ec_{9,3\ L}$	(Fr)	92.9	-	96.5	0.0191 (13)
$ec_{10,0\ K}$	(Fr)	94.62		(3)	0.16 (9)
$ec_{4,0\ M}$	(Fr)	95.01	-	96.66	0.426 (32)
$ec_{5,0\ M}$	(Fr)	95.27	-	96.92	0.0212 (16)
$ec_{6,0\ M}$	(Fr)	96.3	-	97.9	0.086 (39)
$ec_{7,0\ M}$	(Fr)	103.8	-	105.4	0.148 (14)
$ec_{11,5\ L}$	(Fr)	106.18	-	109.78	0.0465 (29)
$ec_{7,0\ N}$	(Fr)	107.3	-	108.2	0.0388 (33)
$ec_{13,2\ K}$	(Fr)	115.77		(3)	0.0186 (12)
$ec_{11,5\ M}$	(Fr)	120.17	-	121.82	0.0119 (7)
$ec_{9,0\ L}$	(Fr)	131.43	-	135.04	0.01940 (44)
$ec_{10,3\ L}$	(Fr)	138.619	-	142.228	0.212 (21)
$ec_{10,3\ M}$	(Fr)	152.609	-	154.259	0.051 (5)
$ec_{10,0\ L}$	(Fr)	177.12	-	180.72	0.0465 (29)
$ec_{10,0\ M}$	(Fr)	191.11	-	192.76	0.0117 (9)
$ec_{33,4\ K}$	(Fr)	351.11		(3)	0.0185 (14)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Fr)	10.38 — 17.799		18.7 (9)	
$XK\alpha_2$	(Fr)	83.23		1.00 (8)	} $K\alpha$
$XK\alpha_1$	(Fr)	86.1		1.64 (12)	}
$XK\beta_3$	(Fr)	96.815	}		
$XK\beta_1$	(Fr)	97.474	}	0.57 (5)	$K\beta_1'$
$XK\beta_5''$	(Fr)	98.069	}		
$XK\beta_2$	(Fr)	100.16	}		
$XK\beta_4$	(Fr)	100.548	}	0.19 (2)	$K\beta_2'$
$XKO_{2,3}$	(Fr)	100.972	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{2,1}$(Fr)	10.6	7.7 (10)	M1	510 (7)	0.015 (2)
$\gamma_{1,0}$(Fr)	26.0 (1)	9.4 (13)	E2	5940 (150)	0.00159 (21)
$\gamma_{2,0}$(Fr)	36.69 (3)	19.8 (17)	E2	1092 (16)	0.0181 (15)
$\gamma_{3,0}$(Fr)	38.58 (4)	9.1 (9)	E2	854 (13)	0.0107 (10)
$\gamma_{8,4}$(Fr)	46.24 (5)	0.0090 (13)	[E1]	0.841 (12)	0.0049 (7)
$\gamma_{9,6}$(Fr)	49.12 (4)	0.0137 (14)	[E1]	0.715 (11)	0.0080 (8)
$\gamma_{9,5}$(Fr)	50.2	0.15	[E2]	236.0 (34)	0.00062
$\gamma_{34,32}$(Fr)	53.4 (4)	0.074	[M1]	17.6 (5)	0.004
$\gamma_{13,10}$(Fr)	57.71 (4)	0.0075 (12)	(E1)	0.465 (7)	0.0051 (8)
$\gamma_{6,3}$(Fr)	62.6 (3)	0.44 (10)	[E2]	81.2 (23)	0.0053 (12)
$\gamma_{4,2}$(Fr)	62.94 (3)	5.81 (36)	M1	10.85 (15)	0.49 (3)
$\gamma_{5,2}$(Fr)	63.5 (3)	0.0286 (41)	[E1]	0.360 (7)	0.021 (3)
$\gamma_{6,2}$(Fr)	64.27 (3)	1.13 (21)	M1+E2	23 (4)	0.047 (4)
$\gamma_{7,3}$(Fr)	69.86 (5)	0.23 (6)	E2	47.9 (7)	0.0047 (12)
$\gamma_{7,2}$(Fr)	71.71 (4)	0.57 (6)	E2	42.3 (6)	0.0132 (13)
$\gamma_{4,1}$(Fr)	73.55 (9)	0.73 (19)	E2	37.5 (6)	0.019 (5)
$\gamma_{5,1}$(Fr)	73.85 (3)	0.383 (29)	E1	0.240 (3)	0.309 (23)
$\gamma_{6,1}$(Fr)	74.82 (5)	0.197 (39)	(M1+E2)	12.15 (18)	0.015 (3)
$\gamma_{11,8}$(Fr)	78.8	0.082 (13)	M1	5.63 (8)	0.0123 (19)
$\gamma_{10,7}$(Fr)	87.41 (3)	1.4 (1)	M1	4.16 (6)	0.271 (19)
$\gamma_{10,6}$(Fr)	94.90 (2)	0.449 (43)	M1	3.28 (5)	0.105 (10)
$\gamma_{10,5}$(Fr)	96.16 (5)	0.23 (7)	M1+E2	6.0 (14)	0.033 (7)
$\gamma_{4,0}$(Fr)	99.67 (5)	3.09 (22)	M1+E2	3.06 (11)	0.76 (5)
$\gamma_{5,0}$(Fr)	99.89 (6)	1.20 (9)	E1	0.1073 (15)	1.08 (8)
$\gamma_{6,0}$(Fr)	100.86 (4)	0.54 (19)	M1+E2	4.6 (19)	0.096 (8)
$\gamma_{13,9}$(Fr)	103.48 (10)	0.033 (12)	[M1,E2]	10 (3)	0.0030 (7)
$\gamma_{7,0}$(Fr)	108.38 (3)	2.87 (19)	M1+E2	10.27 (25)	0.255 (16)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{9,3}$(Fr)	111.52 (3)	0.427 (29)	(E1)	0.363 (5)	0.313 (21)
$\gamma_{24,16}$(Fr)	112.80 (2)	0.00284 (41)	[E1]	0.353 (5)	0.0021 (3)
$\gamma_{23,15}$(Fr)	114	0.0094 (14)	M1	9.86 (14)	0.00087 (13)
$\gamma_{8,1}$(Fr)	119.85 (3)	0.104 (7)	[E1]	0.305 (4)	0.080 (5)
$\gamma_{14,9}$(Fr)	121.06 (7)	0.022 (6)	(E1)	0.298 (4)	0.017 (5)
$\gamma_{11,6}$(Fr)	123.75 (4)	0.112 (8)	[E1]	0.282 (4)	0.087 (6)
$\gamma_{11,5}$(Fr)	124.81 (3)	0.205 (13)	M1+E2	6.01	0.0292 (18)
$\gamma_{12,7}$(Fr)	126.10 (5)	0.0100 (9)	(E1)	0.270 (4)	0.0079 (7)
$\gamma_{15,9}$(Fr)	129.22 (7)	0.016 (9)	[M1,E2]	5 (2)	0.0027 (5)
$\gamma_{12,6}$(Fr)	133.60 (3)	0.0242 (20)	(E1)	0.234 (3)	0.0196 (16)
$\gamma_{12,4}$(Fr)	134.85 (3)	0.0393 (37)	(E1)	0.229 (3)	0.032 (3)
$\gamma_{26,14}$(Fr)	137.4 (1)	0.0023 (3)			0.0023 (3)
$\gamma_{23,13}$(Fr)	139.6	0.0068 (26)	M1+E2	3.9 (17)	0.00139 (21)
$\gamma_{17,9}$(Fr)	144.7 (2)	0.0022 (6)	(M1+E2)	3.79	0.00046 (12)
$\gamma_{13,7}$(Fr)	145.15 (3)	0.174 (11)	(E1)	0.191 (3)	0.146 (9)
$\gamma_{9,0}$(Fr)	150.05 (3)	0.815 (14)	E1	0.1766 (25)	0.693 (12)
$\gamma_{13,6}$(Fr)	152.64 (3)	0.0230 (15)	[E1]	0.1694 (24)	0.0197 (13)
$\gamma_{13,4}$(Fr)	153.92 (3)	0.239 (15)	E1	0.1660 (23)	0.205 (13)
$\gamma_{10,3}$(Fr)	157.25 (3)	1.73 (18)	M1+E2	3.8 (3)	0.36 (3)
$\gamma_{18,9}$(Fr)	161.35 (7)	0.013 (6)	[M1,E2]	2.5 (13)	0.0036 (9)
$\gamma_{23,11}$(Fr)	169.18 (4)	0.037 (20)	[M1,E2]	2.1 (11)	0.012 (5)
$\gamma_{10,1}$(Fr)	169.9	0.0139 (14)			0.0139 (14)
$\gamma_{15,7}$(Fr)	170.77 (5)	0.015 (8)	(E1)	0.1290 (18)	0.013 (7)
$\gamma_{15,6}$(Fr)	178.29 (3)	0.0180 (13)	E1	0.1162 (16)	0.0161 (12)
$\gamma_{16,7}$(Fr)	179.78 (4)	0.030 (11)	(M1,E2)	1.8 (10)	0.0108 (8)
$\gamma_{11,3}$(Fr)	186.1	0.0127 (14)			0.0127 (14)
$\gamma_{17,7}$(Fr)	186.29 (3)	0.0046 (6)	E1	0.1045 (15)	0.0042 (5)
$\gamma_{16,6}$(Fr)	187.2	0.0103 (7)			0.0103 (7)
$\gamma_{11,2}$(Fr)	187.96 (3)	0.584 (33)	E1	0.1023 (14)	0.53 (3)
$\gamma_{10,0}$(Fr)	195.74 (3)	0.37 (9)	M1+E2	1.5 (6)	0.148 (9)
$\gamma_{23,10}$(Fr)	197.50 (3)	0.0284 (33)	E1	0.0908 (13)	0.026 (3)
$\gamma_{12,2}$(Fr)	197.7 (1)	0.041 (5)	[E1]	0.0906 (13)	0.038 (5)
$\gamma_{11,1}$(Fr)	198.47 (23)	0.0205 (14)	[E1]	0.0898 (13)	0.0188 (13)
$\gamma_{29,13}$(Fr)	205.07 (11)	0.0015 (5)			0.0015 (5)
$\gamma_{13,2}$(Fr)	216.89 (3)	0.343 (21)	(E1)	0.0726 (10)	0.32 (2)
$\gamma_{19,4}$(Fr)	220.43 (8)	0.0060 (18)			0.0060 (18)
$\gamma_{11,0}$(Fr)	224.59 (3)	0.119 (9)	[E1]	0.0669 (9)	0.112 (8)
$\gamma_{13,1}$(Fr)	228.2 (4)	0.0046 (12)			0.0046 (12)
$\gamma_{41,32}$(Fr)	231.16 (7)	0.012 (7)	(M1)	1.338 (19)	0.005 (3)
$\gamma_{14,2}$(Fr)	236.0 (6)	0.0017 (3)			0.0017 (3)
$\gamma_{20,4}$(Fr)	238.64 (8)	0.0022 (7)	(M1)	1.225 (17)	0.0010 (3)
$\gamma_{15,3}$(Fr)	240.68 (3)	0.0124 (11)	[E1]	0.0568 (8)	0.0117 (10)
$\gamma_{23,9}$(Fr)	243.12 (5)	0.0067 (9)	[M1]	1.163 (16)	0.0031 (4)
$\gamma_{16,3}$(Fr)	249.60 (3)	0.0170 (13)	(E2)	0.258 (4)	0.0135 (10)
$\gamma_{13,0}$(Fr)	253.46 (3)	0.139 (8)	[E1]	0.0504 (7)	0.132 (8)
$\gamma_{17,3}$(Fr)	256.0 (2)	0.00039 (7)	[E1]	0.0492 (7)	0.00037 (7)
$\gamma_{15,0}$(Fr)	279.18 (3)	0.0317 (23)	E1	0.0403 (6)	0.0305 (22)
$\gamma_{36,21}$(Fr)	282.1 (2)	0.00097 (9)	[M1]	0.771 (11)	0.00055 (5)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{23,7}$(Fr)	284.75 (3)	0.0077 (6)	[E1]	0.0385 (5)	0.0074 (6)
$\gamma_{25,7}$(Fr)	298.33 (5)	0.0028 (7)	(M1,E2)	0.4 (3)	0.0020 (3)
$\gamma_{34,13}$(Fr)	317.23 (18)	0.00065 (33)	M1	0.558 (8)	0.00042 (21)
$\gamma_{27,6}$(Fr)	321.77 (4)	0.00340 (41)	[E1]	0.0292 (4)	0.0033 (4)
$\gamma_{21,0}$(Fr)	348.33 (5)	0.0030 (3)			0.0030 (3)
$\gamma_{23,3}$(Fr)	354.56 (6)	0.0020 (7)	[E1]	0.0236 (3)	0.0020 (7)
$\gamma_{33,10}$(Fr)	356.6	0.00026 (11)			0.00026 (11)
$\gamma_{24,3}$(Fr)	362.38 (3)	0.0055 (5)	(E1)	0.0225 (3)	0.0054 (5)
$\gamma_{22,0}$(Fr)	367.74 (12)	0.00052 (18)			0.00052 (18)
$\gamma_{34,10}$(Fr)	374.98 (5)	0.0019 (5)	[E1]	0.0209 (3)	0.0019 (5)
$\gamma_{31,7}$(Fr)	388.07 (7)	0.00125 (21)			0.00125 (21)
$\gamma_{37,12}$(Fr)	403.13 (10)	0.00019 (16)			0.00019 (16)
$\gamma_{33,8}$(Fr)	405.95 (3)	0.0079 (5)	[E1]	0.01759 (25)	0.0078 (5)
$\gamma_{32,5}$(Fr)	417.90 (2)	0.0056 (5)			0.0056 (5)
$\gamma_{47,27}$(Fr)	429.80 (18)	0.00038 (19)			0.00038 (19)
$\gamma_{36,10}$(Fr)	434.82 (5)	0.0029 (3)			0.0029 (3)
$\gamma_{40,14}$(Fr)	442.16 (8)	0.0045 (7)			0.0045 (7)
$\gamma_{30,3}$(Fr)	443.43 (10)	0.0001			0.0001
$\gamma_{33,7}$(Fr)	443.43 (10)	0.0015 (5)	[E2]	0.0494 (7)	0.0014 (5)
$\gamma_{28,0}$(Fr)	446.31 (10)	0.0006 (4)			0.0006 (4)
$\gamma_{33,6}$(Fr)	451.04 (5)	0.0036 (6)	[M1]	0.215 (3)	0.0030 (5)
$\gamma_{33,4}$(Fr)	452.23 (3)	0.13 (1)	[M1]	0.213 (3)	0.107 (8)
$\gamma_{29,0}$(Fr)	458.79 (8)	0.00053 (13)			0.00053 (13)
$\gamma_{34,7}$(Fr)	462.43 (13)	0.00045 (11)	[E1]	0.01338 (19)	0.00044 (11)
$\gamma_{34,6}$(Fr)	469.48 (5)	0.0028 (4)			0.0028 (4)
$\gamma_{32,2}$(Fr)	480.85 (11)	0.0340 (22)			0.0340 (22)
$\gamma_{32,1}$(Fr)	491.45 (10)	0.00035 (14)			0.00035 (14)
$\gamma_{31,0}$(Fr)	496.9 (3)	0.0015 (7)			0.0015 (7)
$\gamma_{45,19}$(Fr)	498.6 (6)	0.00083 (21)			0.00083 (21)
$\gamma_{33,3}$(Fr)	512.5 (7)	0.00055 (21)			0.00055 (21)
$\gamma_{33,2}$(Fr)	515.13 (3)	0.0246 (15)	[M1]	0.1506 (21)	0.0214 (13)
$\gamma_{32,0}$(Fr)	517.51 (3)	0.0159 (10)			0.0159 (10)
$\gamma_{36,7}$(Fr)	522.14 (4)	0.00208 (15)			0.00208 (15)
$\gamma_{33,1}$(Fr)	525.94 (17)	0.0403 (25)	[M1]	0.1425 (20)	0.0353 (22)
$\gamma_{36,6}$(Fr)	529.59 (3)	0.0076 (7)			0.0076 (7)
$\gamma_{36,4}$(Fr)	530.87 (4)	0.0047 (5)			0.0047 (5)
$\gamma_{34,3}$(Fr)	532.11 (9)	0.00077 (21)	[E1]	0.01005 (14)	0.00076 (21)
$\gamma_{37,4}$(Fr)	538.1 (1)	0.0038 (10)			0.0038 (10)
$\gamma_{43,12}$(Fr)	545.8 (6)	0.00053 (14)			0.00053 (14)
$\gamma_{33,0}$(Fr)	551.79 (3)	0.0059 (16)	[M1]	0.1254 (17)	0.0052 (14)
$\gamma_{35,2}$(Fr)	564.34 (11)	0.00022 (9)			0.00022 (9)
$\gamma_{40,8}$(Fr)	567.48 (5)	0.0012 (4)			0.0012 (4)
$\gamma_{34,0}$(Fr)	570.69 (3)	0.0040 (5)	[E1]	0.00874 (12)	0.0040 (5)
$\gamma_{36,3}$(Fr)	590.42 (5)	0.00083 (14)			0.00083 (14)
$\gamma_{36,2}$(Fr)	593.87 (4)	0.0029 (3)			0.0029 (3)
$\gamma_{35,0}$(Fr)	600.92 (3)	0.0024 (5)			0.0024 (5)
$\gamma_{37,2}$(Fr)	600.92 (3)	0.006			0.006
$\gamma_{41,8}$(Fr)	603.09 (4)	0.00173 (21)			0.00173 (21)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{43,9}$(Fr)	628.95 (10)	0.00032 (7)			0.00032 (7)
$\gamma_{37,0}$(Fr)	637.1 (7)	0.00012			0.00012
$\gamma_{38,0}$(Fr)	645.94 (12)	0.00015 (5)			0.00015 (5)
$\gamma_{41,5}$(Fr)	649.03 (4)	0.0017 (5)			0.0017 (5)
$\gamma_{47,10}$(Fr)	656.18 (11)	0.00049 (21)			0.00049 (21)
$\gamma_{42,7}$(Fr)	657.88 (5)	0.0014 (3)			0.0014 (3)
$\gamma_{42,4}$(Fr)	667.14 (8)	0.0021 (18)			0.0021 (18)
$\gamma_{46,9}$(Fr)	674.9 (3)	0.00010 (5)			0.00010 (5)
$\gamma_{39,0}$(Fr)	679.36 (6)	0.00066 (12)			0.00066 (12)
$\gamma_{47,9}$(Fr)	702.00 (14)	0.00016 (7)			0.00016 (7)
$\gamma_{48,10}$(Fr)	747.0 (1)	0.0011 (4)			0.0011 (4)
$\gamma_{47,4}$(Fr)	752.46 (12)	0.00026 (7)			0.00026 (7)
$\gamma_{43,1}$(Fr)	754.04 (13)	0.00023 (7)			0.00023 (7)
$\gamma_{42,0}$(Fr)	767.9 (3)	0.00030 (6)			0.00030 (6)
$\gamma_{43,0}$(Fr)	780.6 (6)	0.000055 (14)			0.000055 (14)
$\gamma_{44,0}$(Fr)	808.48 (10)	0.0021 (3)			0.0021 (3)
$\gamma_{46,0}$(Fr)	824.2 (7)	0.000049			0.000049

5 References

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(Q)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	21.772	(3)	y
Q_{α}	:	5042.19	(14)	keV
Q_{β^-}	:	44.8	(8)	keV
β^-	:	98.620	(4)	%
α	:	1.380	(4)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,3}$	6.9 (8)	0.3	Allowed	6.9
$\beta^-_{0,2}$	20.5 (8)	10	1st forbidden	6.8
$\beta^-_{0,1}$	35.5 (8)	35	1st forbidden	7
$\beta^-_{0,0}$	44.8 (8)	53	1st forbidden	7.1

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,24}$	4362.83 (15)	0.00004
$\alpha_{0,23}$	4422.03 (28)	0.00008
$\alpha_{0,22}$	4447.12 (26)	0.0007
$\alpha_{0,21}$	4459 (7)	0.00007
$\alpha_{0,20}$	4512 (5)	0.00004
$\alpha_{0,19}$	4581 (7)	0.00004
$\alpha_{0,18}$	4594.21 (17)	0.0003
$\alpha_{0,16}$	4712.89 (20)	
$\alpha_{0,15}$	4713.68 (19)	
$\alpha_{0,14}$	4714.88 (15)	0.006 (3)
$\alpha_{0,13}$	4734.41 (17)	
$\alpha_{0,12}$	4737.50 (16)	0.0012
$\alpha_{0,11}$	4767.47 (15)	
$\alpha_{0,10}$	4769.35 (17)	0.025 (7)
$\alpha_{0,9}$	4784.19 (15)	0.0011
$\alpha_{0,8}$	4795.58 (15)	0.014 (7)
$\alpha_{0,6}$	4821.09 (15)	0.001
$\alpha_{0,5}$	4854.01 (15)	
$\alpha_{0,4}$	4855.36 (15)	0.08 (1)
$\alpha_{0,3}$	4872.55 (15)	0.087 (7)
$\alpha_{0,2}$	4899.23 (15)	0.0015
$\alpha_{0,1}$	4940.57 (15)	0.546 (17)
$\alpha_{0,0}$	4953.23 (14)	0.658 (14)

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Th)	5.8 - 20.3	3.9	
e_{AL}	(Fr)	5.73 - 18.52	0.097 (10)	
e_{AK}	(Fr)		0.00050 (15)	
	KLL	63.576 - 70.787 }		
	KLX	77.720 - 86.101 }		
	KXY	91.84 - 101.12 }		
$ec_{2,0\ L}$	(Th)	3.9 - 8.0	7.1	
$ec_{1,0\ M}$	(Th)	4.1 - 6.0	27	
$ec_{3,1\ L}$	(Th)	8.1 - 12.3	0.1016 (21)	
$ec_{2,1\ M}$	(Th)	10.0 - 11.9	0.11	
$ec_{3,0\ L}$	(Th)	17.4 - 21.6	0.0568 (15)	
$ec_{2,0\ M}$	(Th)	19.2 - 21.0	1.8	
$ec_{3,1\ M}$	(Th)	23.39 - 25.24	0.0259 (5)	
$ec_{3,0\ M}$	(Th)	32.7 - 34.6	0.01411 (29)	
$ec_{1,0\ M}$	(Fr)	8.3 - 9.9	0.528 (11)	
$ec_{4,2\ L}$	(Fr)	26.1 - 29.7	0.018 (17)	
$ec_{3,1\ L}$	(Fr)	50.65 - 54.26	0.053 (10)	
$ec_{3,0\ L}$	(Fr)	63.6 - 67.2	0.0135 (16)	
$ec_{3,1\ M}$	(Fr)	64.64 - 66.29	0.0140 (27)	
$ec_{4,1\ L}$	(Fr)	68.1 - 71.7	0.022 (14)	
$ec_{4,0\ L}$	(Fr)	81.0 - 84.6	0.022 (12)	
$\beta^-_{0,3}$	max:	6.9 (8)	0.3	avg: 1.7 (3)
$\beta^-_{0,2}$	max:	20.5 (8)	10	avg: 5.1 (3)
$\beta^-_{0,1}$	max:	35.5 (8)	35	avg: 9.0 (3)
$\beta^-_{0,0}$	max:	44.8 (8)	53	avg: 11.4 (3)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Th)	11.118 — 19.599	2.64	
XL	(Fr)	10.381 — 17.839	0.074 (8)	
$XK\alpha_2$	(Fr)	83.23	0.0043 (12)	} $K\alpha$
$XK\alpha_1$	(Fr)	86.1	0.0070 (19)	}
$XK\beta_3$	(Fr)	96.815 }		
$XK\beta_1$	(Fr)	97.474 }	0.0024 (7)	$K\beta_1'$
$XK\beta_5''$	(Fr)	98.069 }		

		Energy keV		Photons per 100 disint.	
$XK\beta_2$	(Fr)	100.16	}		
$XK\beta_4$	(Fr)	100.548	}	0.00079 (22)	$K\beta_2'$
$XKO_{2,3}$	(Fr)	100.972	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Th)	9.3	36	E2	326000	0.00011
$\gamma_{1,0}$(Fr)	12.9 (1)	0.698	(E2)	49860 (1000)	0.000014
$\gamma_{2,1}$(Th)	15.2 (1)	0.15	M1	238 (5)	0.00063
$\gamma_{2,0}$(Th)	24.33 (5)	9.5	M1+E2	340 (11)	0.028
$\gamma_{8,6}$(Fr)	25.95	0.00000055			0.00000055
$\gamma_{3,1}$(Th)	28.57 (5)	0.18	E1	3.24 (7)	0.042
$\gamma_{6,5}$(Fr)	33.5 (1)	0.00033 (9)	[E1]	1.99 (4)	0.00011 (3)
$\gamma_{6,4}$(Fr)	35.0 (2)	0.000078 (28)	[E1]	1.77 (4)	0.000028 (10)
$\gamma_{3,0}$(Th)	37.90 (3)	0.12	E1	1.54 (3)	0.049
$\gamma_{4,2}$(Fr)	44.7 (1)	0.025 (23)	[M1+E2]	223 (200)	0.00011 (3)
$\gamma_{13,9}$(Fr)	51.06	0.00000028			0.00000028
$\gamma_{10,6}$(Fr)	52.32	0.0000014			0.0000014
$\gamma_{14,11}$(Fr)	53.7 (2)	0.000064 (16)	[E1]	0.563 (11)	0.000041 (10)
$\gamma_{2,0}$(Fr)	55.0 (1)	0.0077 (14)	M1+E2	16.4 (8)	0.00044 (8)
$\gamma_{16,11}$(Fr)	55.80 (5)	0.0000039			0.0000039
$\gamma_{16,10}$(Fr)	57.56 (5)	0.0000032			0.0000032
$\gamma_{8,5}$(Fr)	59.4 (2)	0.000059 (14)	[E1]	0.430 (9)	0.000041 (10)
$\gamma_{8,4}$(Fr)	60.6 (3)	0.000058 (14)	[E1]	0.408 (9)	0.000041 (10)
$\gamma_{3,1}$(Fr)	69.28 (8)	0.076 (14)	M1+E2	18.4 (19)	0.0039 (6)
$\gamma_{14,10}$(Fr)	70.6 (2)	0.0023 (18)	[M1+E2]	27 (19)	0.000083 (30)
$\gamma_{16,9}$(Fr)	72.5 (2)	0.000086 (38)	[E1]	0.252 (5)	0.000069 (30)
$\gamma_{9,4}$(Fr)	72.5 (2)	0.000086 (38)	[E1]	0.252 (5)	0.000069 (30)
$\gamma_{6,2}$(Fr)	79.54 (8)	0.00132 (12)	E1	0.197 (4)	0.0011 (1)
$\gamma_{3,0}$(Fr)	82.2 (1)	0.0192 (23)	E2	22.1 (5)	0.00083 (10)
$\gamma_{15,8}$(Fr)	83.0 (1)	0.0000014			0.0000014
$\gamma_{12,6}$(Fr)	85.0 (5)	0.000011			0.000011
$\gamma_{10,5}$(Fr)	86.1 (1)	0.00047			0.00047
$\gamma_{4,1}$(Fr)	86.7 (2)	0.034 (20)	[M1+E2]	11 (7)	0.0028 (4)
$\gamma_{5,1}$(Fr)	88.1 (1)	0.0076 (43)	[M1+E2]	10 (6)	0.00069 (10)
$\gamma_{11,5}$(Fr)	88.1 (1)	0.0076 (43)	[M1+E2]	10 (6)	0.00069 (10)
$\gamma_{13,6}$(Fr)	88.5 (6)	0.00000097			0.00000097
$\gamma_{9,3}$(Fr)	90.0 (1)	0.00021 (8)	[E1]	0.142 (3)	0.00018 (7)
$\gamma_{4,0}$(Fr)	99.6 (1)	0.036 (16)	M1+E2	6 (3)	0.0051 (7)
$\gamma_{5,0}$(Fr)	101.0 (1)	0.0048 (29)	[M1+E2]	6 (3)	0.00069 (30)
$\gamma_{10,3}$(Fr)	105.0 (2)	0.0046 (16)	M1	12.4 (25)	0.00034 (10)
$\gamma_{11,3}$(Fr)	106.85 (10)	0.0110 (34)	M(+E2)	9 (3)	0.0011 (1)
$\gamma_{14,6}$(Fr)	108.0 (3)	0.00041 (16)	[M1+E2]	9 (3)	0.000041 (10)
$\gamma_{12,5}$(Fr)	118.7 (4)	0.000054 (13)	[E1]	0.312 (6)	0.000041 (10)
$\gamma_{18,15}$(Fr)	121.6 (1)	0.00155 (39)	[E1]	0.295 (6)	0.0012 (3)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{6,1}$(Fr)	121.6 (1)	0.00155 (39)	[E1]	0.295 (6)	0.0012 (3)
$\gamma_{6,0}$(Fr)	134.5 (1)	0.00068 (12)	E1	0.230 (5)	0.00055 (10)
$\gamma_{12,3}$(Fr)	137.4 (1)	0.00050 (12)	[E1]	0.220 (5)	0.00041 (10)
$\gamma_{13,3}$(Fr)	140.9 (1)	0.00025 (7)	[E1]	0.206 (4)	0.00021 (6)
$\gamma_{14,4}$(Fr)	143.0 (1)	0.00034 (7)	[E1]	0.198 (4)	0.00028 (6)
$\gamma_{18,13}$(Fr)	143.0 (1)	0.0013 (6)	[M1+E2]	3.6 (18)	0.00028 (6)
$\gamma_{16,5}$(Fr)	143.65 (5)	0.00015886	M1	5.11 (11)	0.000026
$\gamma_{18,12}$(Fr)	146.0 (2)	0.0000088			0.0000088
$\gamma_{8,1}$(Fr)	147.61 (8)	0.00296 (36)	E1	0.184 (4)	0.0025 (3)
$\gamma_{7,0}$(Fr)	149.3 (3)	0.000014			0.000014
$\gamma_{9,1}$(Fr)	159.2 (1)	0.00063 (12)	[E1]	0.153 (3)	0.00055 (10)
$\gamma_{8,0}$(Fr)	160.49 (10)	0.00506 (46)	E1	0.150 (3)	0.0044 (4)
$\gamma_{15,3}$(Fr)	161.4 (4)	0.00049 (23)	[M1+E2]	2.5 (13)	0.00014 (4)
$\gamma_{16,3}$(Fr)	162.6 (2)	0.00019 (12)	M1,E2	2.4 (13)	0.000055 (30)
$\gamma_{9,0}$(Fr)	172.0 (1)	0.00109 (11)	E1	0.127 (3)	0.00097 (10)
$\gamma_{10,1}$(Fr)	174.3 (1)	0.00081 (35)	[M1+E2]	1.9 (11)	0.00028 (6)
$\gamma_{18,11}$(Fr)	176.1 (1)	0.000370 (45)	[E1]	0.120 (3)	0.00033 (4)
$\gamma_{11,1}$(Fr)	176.1 (1)	0.00096 (40)	M1,E2	1.9 (11)	0.00033 (6)
$\gamma_{12,1}$(Fr)	206.8 (1)	0.00105 (11)	E1	0.0814 (17)	0.00097 (10)
$\gamma_{17,1}$(Fr)	216.6 (3)	0.00011 (7)	[M1+E2]	1.0 (7)	0.000055 (30)
$\gamma_{-1,1}$(Fr)	219.2 (4)	0.0000140 (4)			0.0000140 (4)
$\gamma_{14,1}$(Fr)	229.7 (1)	0.00044 (7)	[E1]	0.0634 (13)	0.00041 (7)
$\gamma_{15,1}$(Fr)	230.9 (5)	0.0000252	[M1+E2]	0.8 (5)	0.000014
$\gamma_{16,1}$(Fr)	231.79 (5)	0.0000072			0.0000072
$\gamma_{14,0}$(Fr)	242.6 (2)	0.00030 (7)	[E1]	0.0558 (12)	0.00028 (7)
$\gamma_{15,0}$(Fr)	243.9 (4)	0.0000358 (10)	[E2]	0.279 (6)	0.0000280 (8)
$\gamma_{18,3}$(Fr)	283.4 (3)	0.000057 (31)	[E1]	0.0389 (8)	0.000055 (30)
$\gamma_{23,11}$(Fr)	351.7 (3)	0.000056 (31)	[E1]	0.0240 (5)	0.000055 (30)
$\gamma_{22,4}$(Fr)	415.6 (3)	0.00024 (7)		0.16 (11)	0.00021 (6)
$\gamma_{23,5}$(Fr)	439.60 (5)	0.000034 (1)			0.000034 (1)
$\gamma_{23,4}$(Fr)	441.0 (4)	0.000056 (30)	[E1]	0.0148 (3)	0.000055 (30)
$\gamma_{22,2}$(Fr)	460.2 (3)	0.00024 (7)	M1+E2	0.12 (9)	0.00021 (6)
$\gamma_{23,1}$(Fr)	527.6 (1)	0.000029			0.000029
$\gamma_{23,0}$(Fr)	540.40 (5)	0.00007			0.00007

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	6.15	(3)	h
Q_α	:	4814	(50)	keV
Q_{β^-}	:	2123.8	(27)	keV
β^-	:	100		%
α	:	5.5	(22)	$\times 10^{-8}$ %

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,60}$	0.7 (27)	0.0047 (11)	Allowed	3.3
$\beta^-_{0,59}$	86.8 (27)	0.0069 (11)	Allowed	7.38
$\beta^-_{0,58}$	94.0 (27)	0.026 (4)	Allowed	6.91
$\beta^-_{0,57}$	101.0 (27)	0.061 (6)	Allowed or 1st forbidden	6.64
$\beta^-_{0,56}$	110.2 (27)	0.0032 (10)	Allowed	8.03
$\beta^-_{0,55}$	113.7 (27)	0.238 (15)	Allowed	6.2
$\beta^-_{0,54}$	136.3 (27)	0.07 (4)	Allowed	7
$\beta^-_{0,53}$	158.8 (27)	0.0132 (14)	Allowed	7.91
$\beta^-_{0,52}$	165.1 (27)	0.0038 (8)	Allowed	8.5
$\beta^-_{0,51}$	178.9 (27)	0.307 (22)	Allowed	6.7
$\beta^-_{0,50}$	186.6 (27)	0.053 (6)	Allowed	7.52
$\beta^-_{0,49}$	195.2 (27)	0.061 (8)	Allowed	7.52
$\beta^-_{0,48}$	217.2 (27)	0.025 (5)	Allowed	8.05
$\beta^-_{0,47}$	223.9 (27)	0.069 (8)	Allowed	7.65
$\beta^-_{0,46}$	230.8 (27)	0.109 (8)	Allowed	7.5
$\beta^-_{0,45}$	326.2 (27)	0.051 (8)	Allowed	8.3
$\beta^-_{0,44}$	327.9 (27)	0.035 (6)	Allowed	8.48
$\beta^-_{0,43}$	363.6 (27)	0.139 (12)	Allowed	8.02
$\beta^-_{0,42}$	365.6 (27)	0.060 (8)	Allowed	8.39
$\beta^-_{0,41}$	379.9 (27)	0.378 (16)	Allowed	7.65
$\beta^-_{0,40}$	388.4 (27)	0.149 (11)	Allowed	8.08
$\beta^-_{0,39}$	399.5 (27)	1.93 (8)	Allowed	7.01
$\beta^-_{0,38}$	435.4 (27)	2.50 (16)	Allowed	7.02
$\beta^-_{0,37}$	440.0 (27)	0.20 (3)	1st forbidden	8.13
$\beta^-_{0,36}$	441.0 (27)	1.21 (4)	Allowed	7.35
$\beta^-_{0,35}$	477.8 (27)	4.12 (20)	Allowed	6.94
$\beta^-_{0,34}$	480.7 (27)	0.82 (3)	1st forbidden	7.64
$\beta^-_{0,33}$	485.5 (27)	1.23 (6)	Allowed	7.48
$\beta^-_{0,32}$	506.0 (27)	0.071 (10)	Allowed	8.78
$\beta^-_{0,31}$	535.5 (27)	8.8 (23)	1st forbidden	6.77
$\beta^-_{0,30}$	584.6 (27)	0.030 (6)	Allowed	9.36
$\beta^-_{0,27}$	691.8 (27)	1.6 (5)	Allowed	7.88
$\beta^-_{0,26}$	707.7 (27)	0.060 (8)	Allowed or 1st forbidden	9.34
$\beta^-_{0,25}$	779.7 (27)	0.208 (18)	1st forbidden	8.94
$\beta^-_{0,24}$	826.4 (27)	1.46 (11)	1st forbidden unique	8.18
$\beta^-_{0,23}$	897.2 (27)	0.67 (8)	1st forbidden	8.65
$\beta^-_{0,22}$	948.4 (27)	0.166 (19)	Allowed	9.34

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,20}$	955.4 (27)	3.39 (13)	1st forbidden	8.04
$\beta^-_{0,19}$	970.3 (27)	6 (3)	Allowed	7.8
$\beta^-_{0,18}$	1000.8 (27)	6.67 (18)	1st forbidden	7.81
$\beta^-_{0,16}$	1063.9 (27)	0.099 (11)	1st forbidden	9.74
$\beta^-_{0,15}$	1101.3 (27)	3.0 (4)	Allowed	8.31
$\beta^-_{0,14}$	1107.4 (27)	0.39 (6)	Allowed or 1st forbidden	9.2
$\beta^-_{0,13}$	1144.3 (27)	0.238 (20)	Allowed	9.47
$\beta^-_{0,12}$	1154.8 (27)	31 (4)	Allowed	7.37
$\beta^-_{0,11}$	1155.4 (27)	0.18 (3)	1st forbidden	9.6
$\beta^-_{0,10}$	1179.6 (27)	0.087 (16)	Allowed or 1st forbidden	9.95
$\beta^-_{0,8}$	1249.3 (27)	0.17 (10)	Allowed	9.7
$\beta^-_{0,5}$	1727.7 (27)	12.4 (5)	1st forbidden	8.4
$\beta^-_{0,4}$	1745.6 (27)	0.147 (21)	2nd forbidden unique	12.29
$\beta^-_{0,3}$	1795.8 (27)	0.72 (23)	1st forbidden unique	10.65
$\beta^-_{0,2}$	1937.0 (27)	0.6 (5)	Allowed	10
$\beta^-_{0,1}$	2066.0 (27)	6 (4)	Allowed	9

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Th)	5.8 - 20.3	39.9 (21)	
e_{AK}	(Th)		0.27 (8)	
	KLL	68.406 - 76.745	}	
	KLX	83.857 - 93.345	}	
	KXY	99.29 - 109.64	}	
$ec_{35,29}$ K	(Th)	4.830 (13)	0.05 (5)	
$ec_{28,27}$ M	(Th)	13.233 - 15.083	0.038 (8)	
$ec_{2,1}$ K	(Th)	19.414 (6)	0.660 (21)	
$ec_{38,35}$ L	(Th)	21.97 - 26.10	0.32 (11)	
$ec_{31,28}$ K	(Th)	28.291 (17)	0.168 (24)	
$ec_{20,15}$ K	(Th)	36.198 (8)	0.0264 (10)	
$ec_{31,29}$ L	(Th)	36.389 - 40.600	5.2 (35)	
$ec_{38,35}$ M	(Th)	37.26 - 39.11	0.076 (25)	
$ec_{1,0}$ L	(Th)	37.287 - 41.500	52.7 (21)	
$ec_{38,35}$ N	(Th)	41.11 - 42.10	0.020 (7)	
$ec_{18,12}$ K	(Th)	44.333 (8)	0.1037 (35)	
$ec_{31,29}$ M	(Th)	51.679 - 53.529	1.4 (11)	
$ec_{1,0}$ M	(Th)	52.577 - 54.427	14.4 (6)	
$ec_{31,29}$ N	(Th)	55.530 - 56.526	0.40 (26)	
$ec_{1,0}$ N	(Th)	56.430 - 57.424	3.87 (15)	
$ec_{19,12}$ K	(Th)	74.849 (11)	4.3 (22)	
$ec_{29,27}$ L	(Th)	79.023 - 83.200	3.65 (13)	
$ec_{18,15}$ L	(Th)	79.952 - 84.100	0.259 (14)	
$ec_{4,2}$ K	(Th)	81.706 (11)	0.0227 (14)	

		Energy keV	Electrons per 100 disint.	Energy keV
$ec_{20,12\ K}$	(Th)	89.757 (7)	0.0225 (18)	
$ec_{35,29\ L}$	(Th)	94.01 - 98.20	0.033 (15)	
$ec_{29,27\ M}$	(Th)	94.313 - 96.163	0.881 (31)	
$ec_{24,15\ K}$	(Th)	94.388 (9)	0.83 (6)	
$ec_{18,15\ M}$	(Th)	95.242 - 97.092	0.0701 (38)	
$ec_{29,27\ N}$	(Th)	98.16 - 99.16	0.234 (8)	
$ec_{18,15\ N}$	(Th)	99.090 - 100.089	0.0191 (10)	
$ec_{5,2\ K}$	(Th)	99.605 (6)	0.267 (10)	
$ec_{2,1\ L}$	(Th)	108.592 - 112.800	6.35 (20)	
$ec_{28,23\ K}$	(Th)	114.179 (12)	0.086 (9)	
$ec_{31,28\ L}$	(Th)	117.469 - 121.600	0.0321 (46)	
$ec_{2,1\ M}$	(Th)	123.882 - 125.732	1.74 (5)	
$ec_{2,1\ N}$	(Th)	127.730 - 128.729	0.468 (15)	
$ec_{18,12\ L}$	(Th)	133.511 - 137.700	0.0218 (7)	
$ec_{27,21\ K}$	(Th)	147.821 (19)	0.0294 (20)	
$ec_{3,1\ K}$	(Th)	160.594 (6)	0.1335 (43)	
$ec_{19,8\ K}$	(Th)	169.344 (21)	0.10 (8)	
$ec_{4,2\ L}$	(Th)	170.884 - 175.100	0.0589 (37)	
$ec_{28,20\ K}$	(Th)	172.369 (11)	0.036 (38)	
$ec_{24,15\ L}$	(Th)	183.566 - 187.700	0.286 (21)	
$ec_{4,2\ M}$	(Th)	186.174 - 188.024	0.0161 (10)	
$ec_{5,2\ L}$	(Th)	188.783 - 193.000	0.0529 (19)	
$ec_{24,15\ M}$	(Th)	198.856 - 200.706	0.074 (5)	
$ec_{24,15\ N}$	(Th)	202.710 - 203.703	0.0202 (14)	
$ec_{28,23\ L}$	(Th)	203.357 - 207.500	0.0166 (17)	
$ec_{5,2\ M}$	(Th)	204.073 - 205.923	0.01274 (46)	
$ec_{19,7\ K}$	(Th)	211.994 (14)	0.0147 (9)	
$ec_{3,0\ K}$	(Th)	218.353 (4)	0.0745 (30)	
$ec_{5,1\ K}$	(Th)	228.669 (6)	0.261 (10)	
$ec_{27,17\ K}$	(Th)	231.31 (1)	0.029 (8)	
$ec_{51,31\ K}$	(Th)	246.910 (18)	0.011 (11)	
$ec_{3,1\ L}$	(Th)	249.772 - 253.900	0.0254 (8)	
$ec_{19,8\ L}$	(Th)	258.522 - 262.700	0.024 (7)	
$ec_{28,20\ L}$	(Th)	261.547 - 265.700	0.0108 (45)	
$ec_{27,15\ K}$	(Th)	299.802 (8)	0.32 (26)	
$ec_{19,7\ L}$	(Th)	301.172 - 305.300	0.0125 (8)	
$ec_{3,0\ L}$	(Th)	307.531 - 311.700	0.0138 (5)	
$ec_{5,1\ L}$	(Th)	317.847 - 322.000	0.0483 (18)	
$ec_{27,17\ L}$	(Th)	320.49 - 324.70	0.0183 (12)	
$ec_{29,17\ K}$	(Th)	330.81 (1)	0.0303 (24)	
$ec_{5,1\ M}$	(Th)	333.137 - 334.987	0.01156 (44)	
$ec_{27,12\ K}$	(Th)	353.361 (8)	0.139 (8)	
$ec_{27,15\ L}$	(Th)	388.98 - 393.20	0.077 (32)	
$ec_{29,15\ K}$	(Th)	399.297 (8)	0.0444 (35)	
$ec_{27,15\ M}$	(Th)	404.27 - 406.12	0.018 (8)	
$ec_{27,12\ L}$	(Th)	442.539 - 446.700	0.0665 (37)	
$ec_{29,12\ K}$	(Th)	452.856 (8)	0.062 (45)	
$ec_{27,12\ M}$	(Th)	457.829 - 459.679	0.0174 (10)	

		Energy keV		Electrons per 100 disint.		Energy keV
$ec_{39,19\ K}$	(Th)	461.166	(12)	0.022 (6)		
$ec_{11,5\ K}$	(Th)	462.641	(21)	0.011 (8)		
$ec_{29,15\ L}$	(Th)	488.475	- 492.600	0.0100 (8)		
$ec_{29,12\ L}$	(Th)	542.034	- 546.200	0.013 (7)		
$ec_{39,15\ K}$	(Th)	592.106	(8)	0.0124 (10)		
$ec_{39,12\ K}$	(Th)	645.665	(8)	0.0580 (24)		
$ec_{20,5\ K}$	(Th)	662.647	(7)	0.0283 (20)		
$ec_{18,3\ K}$	(Th)	685.298	(7)	0.057 (5)		
$ec_{15,2\ K}$	(Th)	726.054	(7)	0.0178 (8)		
$ec_{20,3\ K}$	(Th)	730.722	(6)	0.01008 (44)		
$ec_{39,12\ L}$	(Th)	734.843	- 739.000	0.01067 (44)		
$ec_{18,3\ L}$	(Th)	774.476	- 778.600	0.0147 (9)		
$ec_{12,1\ K}$	(Th)	801.559	(6)	0.236 (8)		
$ec_{15,1\ K}$	(Th)	855.118	(7)	0.0426 (17)		
$ec_{12,0\ K}$	(Th)	859.318	(5)	0.1282 (45)		
$ec_{12,1\ L}$	(Th)	890.737	- 894.900	0.0579 (19)		
$ec_{12,1\ M}$	(Th)	906.027	- 907.877	0.01438 (49)		
$ec_{12,0\ L}$	(Th)	948.496	- 952.700	0.0304 (11)		
$ec_{35,1\ K}$	(Th)	1478.545	(13)	0.017 (7)		
$\beta^-_{0,60}$	max:	0.7	(27)	0.0047 (11)	avg:	0.18 (68)
$\beta^-_{0,59}$	max:	86.8	(27)	0.0069 (11)	avg:	22.4 (8)
$\beta^-_{0,58}$	max:	94.0	(27)	0.026 (4)	avg:	24.3 (7)
$\beta^-_{0,57}$	max:	101.0	(27)	0.061 (6)	avg:	26.2 (7)
$\beta^-_{0,56}$	max:	110.2	(27)	0.0032 (10)	avg:	28.7 (7)
$\beta^-_{0,55}$	max:	113.7	(27)	0.238 (15)	avg:	29.7 (8)
$\beta^-_{0,54}$	max:	136.3	(27)	0.07 (4)	avg:	35.9 (8)
$\beta^-_{0,53}$	max:	158.8	(27)	0.0132 (14)	avg:	42.2 (8)
$\beta^-_{0,52}$	max:	165.1	(27)	0.0038 (8)	avg:	43.9 (8)
$\beta^-_{0,51}$	max:	178.9	(27)	0.307 (22)	avg:	47.8 (8)
$\beta^-_{0,50}$	max:	186.6	(27)	0.053 (6)	avg:	50.0 (8)
$\beta^-_{0,49}$	max:	195.2	(27)	0.061 (8)	avg:	52.5 (8)
$\beta^-_{0,48}$	max:	217.2	(27)	0.025 (5)	avg:	58.8 (8)
$\beta^-_{0,47}$	max:	223.9	(27)	0.069 (8)	avg:	60.8 (8)
$\beta^-_{0,46}$	max:	230.8	(27)	0.109 (8)	avg:	62.8 (8)
$\beta^-_{0,45}$	max:	326.2	(27)	0.051 (8)	avg:	91.4 (8)
$\beta^-_{0,44}$	max:	327.9	(27)	0.035 (6)	avg:	91.9 (8)
$\beta^-_{0,43}$	max:	363.6	(27)	0.139 (12)	avg:	103.0 (9)
$\beta^-_{0,42}$	max:	365.6	(27)	0.060 (8)	avg:	103.6 (9)
$\beta^-_{0,41}$	max:	379.9	(27)	0.378 (16)	avg:	108.1 (9)
$\beta^-_{0,40}$	max:	388.4	(27)	0.149 (11)	avg:	110.7 (9)
$\beta^-_{0,39}$	max:	399.5	(27)	1.93 (8)	avg:	114.3 (9)
$\beta^-_{0,38}$	max:	435.4	(27)	2.50 (16)	avg:	125.7 (9)
$\beta^-_{0,37}$	max:	440.0	(27)	0.20 (3)	avg:	127.2 (9)
$\beta^-_{0,36}$	max:	441.0	(27)	1.21 (4)	avg:	127.5 (9)
$\beta^-_{0,35}$	max:	477.8	(27)	4.12 (20)	avg:	139.5 (9)
$\beta^-_{0,34}$	max:	480.7	(27)	0.82 (3)	avg:	140.4 (9)
$\beta^-_{0,33}$	max:	485.5	(27)	1.23 (6)	avg:	142.0 (9)

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,32}$	max:	506.0	(27)	0.071 (10)	avg:	148.7 (9)
$\beta^-_{0,31}$	max:	535.5	(27)	8.8 (23)	avg:	158.5 (9)
$\beta^-_{0,30}$	max:	584.6	(27)	0.030 (6)	avg:	175.0 (9)
$\beta^-_{0,27}$	max:	691.8	(27)	1.6 (5)	avg:	211.8 (10)
$\beta^-_{0,26}$	max:	707.7	(27)	0.060 (8)	avg:	217.3 (10)
$\beta^-_{0,25}$	max:	779.7	(27)	0.208 (18)	avg:	242.7 (10)
$\beta^-_{0,24}$	max:	826.4	(27)	1.46 (11)	avg:	259.4 (10)
$\beta^-_{0,23}$	max:	897.2	(27)	0.67 (8)	avg:	285.1 (10)
$\beta^-_{0,22}$	max:	948.4	(27)	0.166 (19)	avg:	303.9 (10)
$\beta^-_{0,20}$	max:	955.4	(27)	3.39 (13)	avg:	306.4 (10)
$\beta^-_{0,19}$	max:	970.3	(27)	6 (3)	avg:	311.9 (10)
$\beta^-_{0,18}$	max:	1000.8	(27)	6.67 (18)	avg:	323.2 (10)
$\beta^-_{0,16}$	max:	1063.9	(27)	0.099 (11)	avg:	346.7 (11)
$\beta^-_{0,15}$	max:	1101.3	(27)	3.0 (4)	avg:	360.8 (11)
$\beta^-_{0,14}$	max:	1107.4	(27)	0.39 (6)	avg:	363.1 (11)
$\beta^-_{0,13}$	max:	1144.3	(27)	0.238 (20)	avg:	377.1 (11)
$\beta^-_{0,12}$	max:	1154.8	(27)	31 (4)	avg:	381.1 (11)
$\beta^-_{0,11}$	max:	1155.4	(27)	0.18 (3)	avg:	381.4 (11)
$\beta^-_{0,10}$	max:	1179.6	(27)	0.087 (16)	avg:	390.6 (11)
$\beta^-_{0,8}$	max:	1249.3	(27)	0.17 (10)	avg:	417.2 (11)
$\beta^-_{0,5}$	max:	1727.7	(27)	12.4 (5)	avg:	605.7 (11)
$\beta^-_{0,4}$	max:	1745.6	(27)	0.147 (21)	avg:	587.3 (11)
$\beta^-_{0,3}$	max:	1795.8	(27)	0.72 (23)	avg:	605.4 (11)
$\beta^-_{0,2}$	max:	1937.0	(27)	0.6 (5)	avg:	690.2 (11)
$\beta^-_{0,1}$	max:	2066.0	(27)	6 (4)	avg:	742.8 (11)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Th)	11.1177 — 19.5043		37 (4)	
XKα_2	(Th)	89.954		2.5 (7)	} Kα
XKα_1	(Th)	93.351		4.1 (11)	}
XKβ_3	(Th)	104.819	}		
XKβ_1	(Th)	105.604	}	1.5 (4)	K$\beta_1^{'}$
XK$\beta_5^{''}$	(Th)	106.239	}		
XKβ_2	(Th)	108.509	}		
XKβ_4	(Th)	108.955	}	0.49 (13)	K$\beta_2^{'}$
XKO$_{2,3}$	(Th)	109.442	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{28,27}$(Th)	18.415 (12)	0.142 (30)	E1	6.46 (10)	0.019 (4)
$\gamma_{38,35}$(Th)	42.46 (5)	0.43 (14)	M1	46.3 (7)	0.009 (3)
$\gamma_{31,29}$(Th)	56.88 (5)	8 (8)	E1+[M2]	360 (220)	0.020 (5)
$\gamma_{1,0}$(Th)	57.752 (13)	72.5 (28)	E2	153.2 (22)	0.470 (17)
$\gamma_{20,17}$(Th)	77.34 (3)	0.027 (6)	E1	0.232 (4)	0.027 (6)
$\gamma_{29,27}$(Th)	99.505 (12)	6.10 (21)	M1	3.84 (6)	1.26 (4)
$\gamma_{18,15}$(Th)	100.41 (3)	0.114 (6)	E1+M2	3.10 (5)	0.114 (6)
$\gamma_{35,29}$(Th)	114.56 (7)	0.102 (46)	M1+E2	9 (4)	0.0102 (22)
$\gamma_{2,1}$(Th)	129.065 (3)	11.85 (36)	E2	3.74 (6)	2.50 (7)
$\gamma_{23,17}$(Th)	135.507 (22)	0.024 (6)	E1	0.238 (4)	0.024 (6)
$\gamma_{31,28}$(Th)	137.936 (22)	0.239 (34)	M1	7.52 (11)	0.028 (4)
$\gamma_{6,4}$(Th)	140.999 (20)	0.055 (11)	E1	0.217 (3)	0.045 (9)
$\gamma_{20,15}$(Th)	145.842 (20)	0.169 (6)	E1	0.200 (3)	0.169 (6)
$\gamma_{18,12}$(Th)	153.967 (11)	0.754 (23)	E1	0.1757 (25)	0.754 (23)
$\gamma_{25,22}$(Th)	168.53 (12)	0.0127 (31)	M1+E2	2.7 (15)	0.0111 (27)
$\gamma_{49,43}$(Th)	168.53 (12)	0.0093 (46)	M1+E2	2.7 (15)	0.0025 (7)
$\gamma_{19,13}$(Th)	173.96 (3)	0.036 (5)	M1+E2	2.5 (14)	0.036 (5)
$\gamma_{19,12}$(Th)	184.547 (19)	5.5 (29)	E0+M1	100 (40)	0.054 (19)
$\gamma_{4,2}$(Th)	191.351 (17)	0.236 (14)	E2	0.776 (11)	0.133 (8)
$\gamma_{20,12}$(Th)	199.402 (15)	0.299 (23)	E1	0.0950 (14)	0.299 (23)
$\gamma_{24,15}$(Th)	204.029 (11)	0.114 (8)	M2	10.65 (15)	0.114 (8)
$\gamma_{5,2}$(Th)	209.248 (7)	4.31 (14)	E1	0.0848 (12)	3.97 (13)
$\gamma_{19,9}$(Th)	214.89 (10)	0.047 (8)	E2	0.514 (8)	0.031 (5)
$\gamma_{28,23}$(Th)	223.793 (21)	0.058 (6)	M1+E2	1.85 (4)	0.058 (6)
$\gamma_{22,10}$(Th)	231.42 (10)	0.026 (4)	E2	0.392 (6)	0.026 (4)
$\gamma_{27,21}$(Th)	257.482 (21)	0.0286 (19)	M1	1.285 (18)	0.0286 (19)
$\gamma_{27,20}$(Th)	263.58 (10)	0.0451 (31)	E1	0.0498 (7)	0.043 (3)
$\gamma_{3,1}$(Th)	270.245 (7)	3.72 (10)	E1	0.0470 (7)	3.55 (10)
$\gamma_{19,8}$(Th)	278.80 (15)	0.33 (9)	M1+E2	0.6 (4)	0.204 (28)
$\gamma_{27,19}$(Th)	278.80 (15)	0.038 (6)	E2	0.212 (3)	0.031 (5)
$\gamma_{28,20}$(Th)	282.02 (4)	0.14 (6)	M1+E2	0.6 (4)	0.09 (3)
$\gamma_{19,7}$(Th)	321.646 (8)	0.232 (14)	E2	0.1369 (20)	0.232 (14)
$\gamma_{42,27}$(Th)	326.04 (20)	0.035 (6)	E2	0.1315 (19)	0.035 (6)
$\gamma_{3,0}$(Th)	328.004 (7)	3.13 (11)	E1	0.0305 (5)	3.04 (11)
$\gamma_{6,2}$(Th)	332.371 (6)	0.38 (6)	E1	0.0297 (5)	0.37 (6)
$\gamma_{5,1}$(Th)	338.320 (5)	11.72 (41)	E1	0.0285 (4)	11.4 (4)
$\gamma_{27,17}$(Th)	340.969 (21)	0.405 (20)	E2+M1	0.133 (21)	0.405 (20)
$\gamma_{51,31}$(Th)	356.7 (3)	0.032 (15)	E1+M2	0.8 (8)	0.0178 (21)
$\gamma_{55,33}$(Th)	372.59 (3)	0.0070 (17)	E2	0.0902 (13)	0.0070 (17)
$\gamma_{29,19}$(Th)	377.99 (10)	0.033 (6)	M1+E2	0.27 (18)	0.026 (3)
$\gamma_{57,33}$(Th)	384.47 (9)	0.0070 (17)	E2	0.0828 (12)	0.0070 (17)
$\gamma_{49,30}$(Th)	389.32 (13)	0.0108 (17)	M1+E2	0.25 (17)	0.0108 (17)
$\gamma_{50,30}$(Th)	397.95 (10)	0.029 (3)			0.029 (3)
$\gamma_{41,25}$(Th)	399.83 (14)	0.0316 (41)	E1	0.0200 (3)	0.031 (4)
$\gamma_{27,15}$(Th)	409.460 (13)	2.02 (6)	E2+M1	0.21 (15)	2.02 (6)
$\gamma_{30,18}$(Th)	415.96 (14)	0.0138 (23)	E1	0.0184 (3)	0.0138 (23)
$\gamma_{35,23}$(Th)	419.38 (7)	0.0224 (31)	E1	0.0181 (3)	0.022 (3)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{29,17}$(Th)	440.450 (24)	0.166 (13)	M1	0.295 (5)	0.128 (10)
$\gamma_{11,6}$(Th)	449.11 (6)	0.053 (6)	E2	0.0554 (8)	0.050 (6)
$\gamma_{27,13}$(Th)	452.50 (6)	0.0199 (19)	E2	0.0544 (8)	0.0199 (19)
$\gamma_{37,23}$(Th)	457.18 (15)	0.0186 (39)	M1+E2	0.16 (11)	0.016 (3)
$\gamma_{27,12}$(Th)	463.002 (6)	4.45 (24)	E2	0.0514 (8)	4.45 (24)
$\gamma_{33,20}$(Th)	470.21 (20)	0.0142 (30)	E1	0.01428 (20)	0.014 (3)
$\gamma_{26,10}$(Th)	471.77 (15)	0.0357 (42)	E2	0.0491 (7)	0.034 (4)
$\gamma_{34,20}$(Th)	474.79 (10)	0.026 (5)	M1+E2	0.14 (10)	0.023 (4)
$\gamma_{8,5}$(Th)	478.40 (5)	0.227 (19)	E1	0.01379 (20)	0.224 (19)
$\gamma_{48,26}$(Th)	490.33 (15)	0.0116 (25)	E2	0.0447 (7)	0.0116 (25)
$\gamma_{35,19}$(Th)	492.29 (8)	0.0282 (41)	M1+E2	0.13 (9)	0.025 (3)
$\gamma_{39,23}$(Th)	497.64 (10)	0.0062 (19)	M2	0.581 (9)	0.0062 (19)
$\gamma_{7,3}$(Th)	503.819 (23)	0.173 (19)	E1	0.01243 (18)	0.171 (19)
$\gamma_{29,15}$(Th)	508.955 (13)	0.568 (45)	E2+M1	0.1130 (16)	0.51 (4)
$\gamma_{33,18}$(Th)	515.12 (7)	0.051 (6)	E1	0.01189 (17)	0.051 (6)
$\gamma_{34,18}$(Th)	520.16 (3)	0.070 (7)	M1+E2	0.11 (8)	0.070 (7)
$\gamma_{35,18}$(Th)	523.129 (22)	0.129 (10)	E1	0.01153 (17)	0.129 (10)
$\gamma_{16,6}$(Th)	540.67 (5)	0.0297 (38)	M1+E2	0.10 (7)	0.027 (3)
$\gamma_{8,3}$(Th)	546.445 (21)	0.201 (16)	E1	0.01058 (15)	0.199 (16)
$\gamma_{39,22}$(Th)	548.73 (11)	0.0264 (47)	M1+E2	0.10 (7)	0.024 (4)
$\gamma_{35,17}$(Th)	555.07 (16)	0.048 (6)	M1+E2		0.048 (6)
$\gamma_{29,12}$(Th)	562.496 (7)	0.97 (7)	E2+M1	0.09 (6)	0.89 (4)
$\gamma_{39,19}$(Th)	570.88 (4)	0.22 (6)	M1	0.1472 (21)	0.19 (5)
$\gamma_{11,5}$(Th)	572.10 (5)	0.170 (22)	M1+E2	0.09 (6)	0.156 (18)
$\gamma_{13,5}$(Th)	583.391 (10)	0.120 (11)	E1	0.00932 (13)	0.120 (11)
$\gamma_{9,3}$(Th)	610.65 (10)	0.024 (5)	E1	0.00853 (12)	0.024 (5)
$\gamma_{10,3}$(Th)	616.21 (3)	0.085 (7)	E1	0.00838 (12)	0.084 (7)
$\gamma_{14,5}$(Th)	620.32 (7)	0.084 (7)			0.084 (7)
$\gamma_{35,15}$(Th)	623.48 (22)	0.0128 (33)	M1+E2	0.07 (5)	0.012 (3)
$\gamma_{34,14}$(Th)	626.80 (22)	0.015 (3)			0.015 (3)
$\gamma_{35,14}$(Th)	629.41 (5)	0.047 (5)	E2	0.0254 (4)	0.047 (5)
$\gamma_{11,3}$(Th)	640.32 (4)	0.058 (6)	E2	0.0245 (4)	0.057 (6)
$\gamma_{20,6}$(Th)	649.02 (12)	0.043 (11)	E2	0.0238 (4)	0.0332 (36)
$\gamma_{32,12}$(Th)	649.02 (12)	0.0086 (9)			0.0086 (9)
$\gamma_{13,3}$(Th)	651.53 (3)	0.094 (10)	E1	0.00754 (11)	0.094 (10)
$\gamma_{36,15}$(Th)	660.1 (3)	0.00572 (38)	M1+E2	0.06 (4)	0.0054 (3)
$\gamma_{16,5}$(Th)	663.88 (8)	0.029 (6)	M1+E2	0.06 (4)	0.029 (6)
$\gamma_{46,23}$(Th)	666.45 (5)	0.0068 (7)	E1	0.00722 (11)	0.0068 (7)
$\gamma_{35,13}$(Th)	666.45 (5)	0.061 (7)	M1+E2	0.06 (4)	0.058 (6)
$\gamma_{38,14}$(Th)	671.95 (8)	0.027 (8)			0.027 (8)
$\gamma_{34,12}$(Th)	674.63 (4)	0.105 (10)	M1+E2	0.06 (4)	0.105 (10)
$\gamma_{35,12}$(Th)	677.08 (10)	0.065 (6)	M1+E2	0.06 (4)	0.065 (6)
$\gamma_{14,3}$(Th)	688.12 (4)	0.070 (7)			0.070 (7)
$\gamma_{34,10}$(Th)	698.99 (10)	0.038 (6)	E2	0.0203 (3)	0.038 (6)
$\gamma_{39,15}$(Th)	701.742 (15)	0.181 (15)	M1	0.0850 (12)	0.181 (15)
$\gamma_{23,6}$(Th)	707.42 (5)	0.162 (18)	E2	0.0198 (3)	0.162 (18)
$\gamma_{51,23}$(Th)	718.30 (3)	0.0191 (40)	E1	0.00628 (9)	0.019 (4)
$\gamma_{18,5}$(Th)	726.88 (10)	0.68 (8)	E2	0.0187 (3)	0.68 (8)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{43,15}$(Th)	737.74 (5)	0.039 (5)	M1+E2	0.05 (3)	0.039 (5)
$\gamma_{39,12}$(Th)	755.313 (9)	1.102 (43)	M1	0.070 (1)	1.03 (4)
$\gamma_{20,5}$(Th)	772.291 (7)	1.52 (6)	M1+E2	0.0244 (14)	1.52 (6)
$\gamma_{7,1}$(Th)	774.07 (10)	0.0630 (41)	E2	0.01649 (23)	0.062 (4)
$\gamma_{51,20}$(Th)	776.51 (3)	0.020 (6)			0.020 (6)
$\gamma_{12,2}$(Th)	782.140 (6)	0.508 (41)	E2	0.01615 (23)	0.50 (4)
$\gamma_{51,19}$(Th)	791.43 (9)	0.0149 (42)	M1	0.0618 (9)	0.014 (4)
$\gamma_{43,12}$(Th)	791.43 (9)	0.0104 (31)	M1+E2	0.039 (23)	0.010 (3)
$\gamma_{13,2}$(Th)	792.69 (10)	0.082 (5)	E2	0.01572 (22)	0.081 (5)
$\gamma_{18,3}$(Th)	794.942 (14)	4.31 (14)	E2+M1	0.0179 (14)	4.31 (14)
$\gamma_{38,8}$(Th)	813.88 (10)	0.0073 (17)	M1+E2	0.036 (22)	0.0073 (17)
$\gamma_{8,1}$(Th)	816.82 (10)	0.0321 (42)	M1+E2	0.036 (21)	0.031 (4)
$\gamma_{25,6}$(Th)	824.931 (25)	0.054 (6)	E2	0.01452 (21)	0.053 (6)
$\gamma_{23,5}$(Th)	830.481 (8)	0.61 (6)	E2+M1	0.0150 (3)	0.61 (6)
$\gamma_{15,2}$(Th)	835.704 (8)	1.70 (7)	E2	0.01415 (20)	1.70 (7)
$\gamma_{20,3}$(Th)	840.372 (9)	0.984 (41)	E2	0.0140 (2)	0.97 (4)
$\gamma_{51,17}$(Th)	853.96 (8)	0.0128 (21)	M1+E2	0.032 (19)	0.0124 (20)
$\gamma_{46,15}$(Th)	870.47 (7)	0.046 (5)	M1	0.0481 (7)	0.046 (5)
$\gamma_{16,2}$(Th)	873.10 (15)	0.032 (7)	E1	0.00440 (7)	0.032 (7)
$\gamma_{8,0}$(Th)	874.45 (8)	0.051 (11)	E2	0.01294 (19)	0.050 (11)
$\gamma_{47,15}$(Th)	877.38 (7)	0.0144 (31)	M1+E2	0.030 (18)	0.014 (3)
$\gamma_{9,1}$(Th)	880.76 (10)	0.0066 (19)	E2	0.01276 (18)	0.0065 (19)
$\gamma_{55,18}$(Th)	887.26 (10)	0.029 (3)	M1+E2	0.029 (17)	0.029 (3)
$\gamma_{24,5}$(Th)	901.38 (3)	0.0172 (40)	E2	0.01220 (17)	0.017 (4)
$\gamma_{17,2}$(Th)	904.20 (5)	0.78 (4)	E2	0.01212 (17)	0.78 (4)
$\gamma_{12,1}$(Th)	911.196 (6)	26.5 (8)	E2	0.01194 (17)	26.2 (8)
$\gamma_{55,17}$(Th)	919.03 (12)	0.028 (3)			0.028 (3)
$\gamma_{13,1}$(Th)	921.87 (12)	0.0158 (24)	M1+E2	0.027 (15)	0.0154 (23)
$\gamma_{28,6}$(Th)	930.99 (7)	0.0026 (24)	M1+E2	0.026 (15)	0.0025 (23)
$\gamma_{47,12}$(Th)	930.99 (7)	0.004 (1)			0.004 (1)
$\gamma_{58,17}$(Th)	939.89 (15)	0.009 (3)			0.009 (3)
$\gamma_{10,0}$(Th)	944.19 (3)	0.102 (10)	E1+M2	0.025 (14)	0.10 (1)
$\gamma_{25,5}$(Th)	947.976 (24)	0.111 (10)	M1+E2	0.025 (14)	0.111 (10)
$\gamma_{14,1}$(Th)	958.59 (4)	0.29 (5)			0.29 (5)
$\gamma_{15,1}$(Th)	964.786 (8)	4.99 (17)	E2+M1	0.01119 (23)	4.99 (17)
$\gamma_{12,0}$(Th)	968.960 (9)	16.1 (5)	E2	0.01061 (15)	15.9 (5)
$\gamma_{51,12}$(Th)	975.98 (5)	0.052 (6)	M1	0.0356 (5)	0.052 (6)
$\gamma_{13,0}$(Th)	979.49 (10)	0.0283 (30)	E2	0.01039 (15)	0.028 (3)
$\gamma_{21,2}$(Th)	987.87 (10)	0.14 (6)	M1+E2	0.022 (13)	0.14 (6)
$\gamma_{22,2}$(Th)	988.65 (20)	0.081 (14)	E2	0.01021 (15)	0.081 (14)
$\gamma_{51,10}$(Th)	1000.68 (10)	0.0054 (3)			0.0054 (3)
$\gamma_{58,14}$(Th)	1013.55 (13)	0.0097 (16)			0.0097 (16)
$\gamma_{14,0}$(Th)	1016.44 (10)	0.0194 (31)	M1+E2	0.021 (12)	0.019 (3)
$\gamma_{54,12}$(Th)	1017.94 (20)	0.032 (32)	E2+M3	0.07 (7)	0.03 (3)
$\gamma_{26,5}$(Th)	1019.88 (10)	0.022 (5)			0.022 (5)
$\gamma_{17,1}$(Th)	1033.244 (23)	0.204 (12)	E2	0.00938 (14)	0.204 (12)
$\gamma_{23,2}$(Th)	1039.83 (7)	0.056 (18)			0.056 (18)
$\gamma_{55,12}$(Th)	1040.94 (15)	0.047 (10)	E2+M3	0.07 (6)	0.047 (10)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{57,12}$(Th)	1053.11 (20)	0.0143 (41)	M1+E2	0.019 (10)	0.014 (4)
$\gamma_{28,5}$(Th)	1054.13 (20)	0.019 (6)	M1+E2	0.019 (10)	0.019 (6)
$\gamma_{50,8}$(Th)	1062.57 (15)	0.011 (4)			0.011 (4)
$\gamma_{18,1}$(Th)	1065.168 (15)	0.135 (8)			0.135 (8)
$\gamma_{48,7}$(Th)	1074.73 (15)	0.011 (4)			0.011 (4)
$\gamma_{26,3}$(Th)	1088.20 (15)	0.0062 (14)			0.0062 (14)
$\gamma_{19,1}$(Th)	1095.671 (23)	0.126 (10)	M1+E2	0.017 (9)	0.126 (10)
$\gamma_{27,3}$(Th)	1103.43 (10)	0.0102 (11)	E3	0.0195 (3)	0.0102 (11)
$\gamma_{20,1}$(Th)	1110.604 (9)	0.285 (22)	E1	0.00288 (4)	0.284 (22)
$\gamma_{24,2}$(Th)	1110.604 (9)	0.0273 (21)	E1	0.00288 (4)	0.0272 (21)
$\gamma_{22,1}$(Th)	1117.65 (10)	0.061 (7)			0.061 (7)
$\gamma_{29,5}$(Th)	1135.26 (15)	0.0102 (17)			0.0102 (17)
$\gamma_{30,5}$(Th)	1142.87 (15)	0.0108 (22)			0.0108 (22)
$\gamma_{57,8}$(Th)	1148.17 (14)	0.0062 (14)	M1+E2	0.015 (8)	0.0062 (14)
$\gamma_{19,0}$(Th)	1153.27 (4)	0.148 (13)	E1+M2	0.03 (3)	0.148 (13)
$\gamma_{25,2}$(Th)	1157.16 (15)	0.0073 (14)	E1+M2	0.03 (3)	0.0073 (14)
$\gamma_{37,6}$(Th)	1164.55 (7)	0.067 (7)	M1+E2	0.015 (8)	0.067 (7)
$\gamma_{22,0}$(Th)	1175.33 (10)	0.0257 (42)	E1+M2	0.027 (24)	0.025 (4)
$\gamma_{57,7}$(Th)	1190.83 (20)	0.0065 (17)	M1+E2	0.014 (7)	0.0065 (17)
$\gamma_{40,6}$(Th)	1217.03 (10)	0.022 (4)			0.022 (4)
$\gamma_{26,2}$(Th)	1229.42 (15)	0.0078 (25)			0.0078 (25)
$\gamma_{27,2}$(Th)	1245.15 (6)	0.110 (8)	M1+E2	0.013 (6)	0.110 (8)
$\gamma_{34,5}$(Th)	1247.10 (5)	0.524 (24)	M1	0.0187 (3)	0.524 (24)
$\gamma_{35,5}$(Th)	1250.06 (5)	0.065 (6)			0.065 (6)
$\gamma_{44,6}$(Th)	1276.72 (10)	0.015 (3)			0.015 (3)
$\gamma_{25,1}$(Th)	1286.29 (20)	0.052 (11)	E1+M2		0.052 (11)
$\gamma_{37,5}$(Th)	1287.77 (8)	0.109 (25)	M1+E2	0.012 (6)	0.109 (25)
$\gamma_{33,3}$(Th)	1309.76 (20)	0.020 (7)	E1+M2	0.020 (18)	0.020 (7)
$\gamma_{34,3}$(Th)	1315.33 (10)	0.0152 (30)	M1+E2	0.011 (6)	0.015 (3)
$\gamma_{29,2}$(Th)	1344.62 (15)	0.0094 (20)	M1+E2	0.011 (5)	0.0094 (20)
$\gamma_{41,5}$(Th)	1347.50 (15)	0.0163 (41)	E1+M2	0.019 (17)	0.016 (4)
$\gamma_{40,4}$(Th)	1357.81 (15)	0.021 (5)			0.021 (5)
$\gamma_{41,4}$(Th)	1365.71 (12)	0.0144 (31)	E2+M3	0.03 (3)	0.014 (3)
$\gamma_{27,1}$(Th)	1374.24 (7)	0.0196 (14)	E2+M3	0.03 (3)	0.0196 (14)
$\gamma_{45,5}$(Th)	1401.52 (10)	0.0132 (31)	E1+M2	0.017 (15)	0.013 (3)
$\gamma_{41,3}$(Th)	1415.55 (14)	0.022 (5)	E3	0.01141 (16)	0.022 (5)
$\gamma_{32,2}$(Th)	1430.99 (10)	0.037 (8)			0.037 (8)
$\gamma_{28,0}$(Th)	1451.43 (15)	0.0111 (22)	M1+E2	0.009 (4)	0.0111 (22)
$\gamma_{35,2}$(Th)	1459.131 (22)	0.89 (6)	E2	0.00498 (7)	0.87 (5)
$\gamma_{45,3}$(Th)	1469.74 (15)	0.021 (5)	E1+M2	0.015 (14)	0.021 (5)
$\gamma_{36,2}$(Th)	1495.904 (16)	0.924 (30)	E2	0.00477 (7)	0.92 (3)
$\gamma_{38,2}$(Th)	1501.59 (5)	0.513 (17)			0.513 (17)
$\gamma_{39,2}$(Th)	1537.89 (10)	0.049 (6)	E2+M3	0.023 (19)	0.049 (6)
$\gamma_{40,2}$(Th)	1548.65 (6)	0.040 (5)			0.040 (5)
$\gamma_{41,2}$(Th)	1557.13 (7)	0.173 (9)	E2+M1	0.0070 (6)	0.173 (9)
$\gamma_{32,1}$(Th)	1560.02 (7)	0.021 (5)			0.021 (5)
$\gamma_{42,2}$(Th)	1571.55 (20)	0.0059 (17)			0.0059 (17)
$\gamma_{43,2}$(Th)	1573.389 (24)	0.0341 (40)	E2	0.00438 (7)	0.034 (4)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{33,1}$(Th)	1580.531 (25)	0.624 (40)	M1+E2	0.007 (3)	0.62 (4)
$\gamma_{35,1}$(Th)	1588.200 (25)	3.06 (12)	E2	0.007 (3)	3.06 (12)
$\gamma_{54,4}$(Th)	1609.44 (15)	0.0081 (17)	E2	0.00422 (6)	0.0081 (17)
$\gamma_{36,1}$(Th)	1625.09 (4)	0.270 (23)	E2+M3	0.020 (17)	0.270 (23)
$\gamma_{38,1}$(Th)	1630.618 (20)	1.52 (6)	M1+E2	0.007 (3)	1.52 (6)
$\gamma_{33,0}$(Th)	1638.272 (23)	0.462 (30)	E2	0.00410 (6)	0.46 (3)
$\gamma_{39,1}$(Th)	1666.514 (13)	0.173 (9)	M1	0.00895 (13)	0.173 (9)
$\gamma_{40,1}$(Th)	1677.66 (6)	0.057 (6)			0.057 (6)
$\gamma_{41,1}$(Th)	1686.22 (11)	0.094 (7)	E2	0.00391 (6)	0.094 (7)
$\gamma_{42,1}$(Th)	1700.62 (20)	0.0105 (25)			0.0105 (25)
$\gamma_{43,1}$(Th)	1702.40 (8)	0.055 (7)	E2+M3	0.018 (15)	0.055 (7)
$\gamma_{46,2}$(Th)	1706.17 (7)	0.0089 (12)	M1+E2	0.0078 (12)	0.0089 (12)
$\gamma_{47,2}$(Th)	1713.49 (20)	0.0057 (11)	E2+M3	0.018 (14)	0.0057 (11)
$\gamma_{39,0}$(Th)	1724.19 (5)	0.030 (4)	E1+M2		0.030 (4)
$\gamma_{44,1}$(Th)	1738.46 (5)	0.018 (4)			0.018 (4)
$\gamma_{45,1}$(Th)	1740.5 (3)	0.011 (4)			0.011 (4)
$\gamma_{49,2}$(Th)	1742.1 (3)	0.0084 (25)	M1+E2		0.0084 (25)
$\gamma_{50,2}$(Th)	1750.58 (20)	0.0084 (9)			0.0084 (9)
$\gamma_{51,2}$(Th)	1758.11 (5)	0.0361 (40)	E2+M1	0.00371 (6)	0.036 (4)
$\gamma_{52,2}$(Th)	1772.2 (3)	0.0019 (5)	E2+M3	0.016 (13)	0.0019 (5)
$\gamma_{60,3}$(Th)	1795.13 (6)	0.0022 (8)			0.0022 (8)
$\gamma_{45,0}$(Th)	1797.5 (5)	0.0022 (8)	E1+M2	0.009 (8)	0.0022 (8)
$\gamma_{54,2}$(Th)	1800.9 (2)	0.0046 (8)			0.0046 (8)
$\gamma_{55,2}$(Th)	1823.22 (10)	0.046 (5)			0.046 (5)
$\gamma_{56,2}$(Th)	1826.8 (3)	0.0022 (8)			0.0022 (8)
$\gamma_{46,1}$(Th)	1835.29 (10)	0.0381 (40)	E2+M1	0.00382 (10)	0.038 (4)
$\gamma_{47,1}$(Th)	1842.15 (8)	0.037 (6)	M1+E2	0.0055 (4)	0.037 (6)
$\gamma_{59,2}$(Th)	1850.17 (20)	0.0046 (8)			0.0046 (8)
$\gamma_{49,1}$(Th)	1870.82 (9)	0.0257 (24)	M1+E2	0.0051 (18)	0.0257 (24)
$\gamma_{50,1}$(Th)	1879.6 (3)	0.0013 (5)			0.0013 (5)
$\gamma_{51,1}$(Th)	1887.13 (5)	0.094 (7)	E2+M1	0.0050 (17)	0.094 (7)
$\gamma_{47,0}$(Th)	1900.16 (20)	0.0030 (6)	E1+M2	0.008 (7)	0.0030 (6)
$\gamma_{53,1}$(Th)	1907.14 (11)	0.0124 (13)			0.0124 (13)
$\gamma_{54,1}$(Th)	1929.78 (20)	0.0208 (14)	E2+M3	0.013 (10)	0.0208 (14)
$\gamma_{60,2}$(Th)	1936.3 (3)	0.0022 (6)			0.0022 (6)
$\gamma_{55,1}$(Th)	1952.37 (10)	0.062 (5)	E2+M3	0.013 (10)	0.062 (5)
$\gamma_{56,1}$(Th)	1955.9 (5)	0.0008 (3)			0.0008 (3)
$\gamma_{52,0}$(Th)	1958.4 (3)	0.0016 (5)	E1+M2		0.0016 (5)
$\gamma_{57,1}$(Th)	1965.22 (12)	0.0223 (22)	M1+E2	0.0046 (15)	0.0223 (22)
$\gamma_{58,1}$(Th)	1972.0 (3)	0.0038 (8)			0.0038 (8)
$\gamma_{59,1}$(Th)	1979.3 (3)	0.0019 (5)			0.0019 (5)
$\gamma_{58,0}$(Th)	2029.4 (5)	0.0019 (5)	E1+M2	0.007 (6)	0.0019 (5)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	698.55	(32)	d
Q_{α}	:	5520.08	(22)	keV
α	:	100		%
^{20}O	:	1.13	(22)	$\times 10^{-11}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,8}$	4448.00 (23)	0.0000045 (7)
$\alpha_{0,7}$	4522.97 (23)	0.000017 (3)
$\alpha_{0,6}$	4952.5 (3)	0.000024 (5)
$\alpha_{0,5}$	4997.76 (24)	0.000010 (2)
$\alpha_{0,4}$	5137.97 (22)	0.036 (6)
$\alpha_{0,3}$	5176.86 (22)	0.218 (4)
$\alpha_{0,2}$	5211.05 (22)	0.408 (7)
$\alpha_{0,1}$	5340.35 (22)	26.0 (5)
$\alpha_{0,0}$	5423.24 (22)	73.4 (5)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Ra)	5.71 - 12.04	10.4 (4)
e_{AK}	(Ra)		0.0020 (3)
	KLL	65.149 - 72.729	}
	KLX	79.721 - 88.466	}
	KXY	94.27 - 103.91	}
$ec_{1,0\ L}$	(Ra)	65.14 - 68.93	18.5 (5)
$ec_{1,0\ M}$	(Ra)	79.55 - 81.27	5.0 (2)
$ec_{1,0\ N+}$	(Ra)	83.17 - 84.36	1.65 (5)
$ec_{2,0\ K}$	(Ra)	112.072 (4)	0.015 (6)
$ec_{3,1\ K}$	(Ra)	62.497 (4)	0.023 (1)
$ec_{3,1\ L}$	(Ra)	147.17 - 150.97	0.069 (2)
$ec_{3,1\ M+}$	(Ra)	161.59 - 166.40	0.025 (1)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Ra)	10.622 — 18.412		8.6 (4)	
XKα_2	(Ra)	85.43		0.0180 (3)	} Kα
XKα_1	(Ra)	88.47		0.0295 (5)	}
XKβ_3	(Ra)	99.432	}		
XKβ_1	(Ra)	100.13	}	0.01034 (21)	Kβ_1'
XKβ_5''	(Ra)	100.738	}		
XKβ_2	(Ra)	102.89	}		
XKβ_4	(Ra)	103.295	}	0.00339 (9)	Kβ_2'
XKO$_{2,3}$	(Ra)	103.74	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{4,2}$(Ra)	74.38 (4)	0.015 (5)	[E2]	38.6 (6)	0.00039 (14)
$\gamma_{1,0}$(Ra)	84.373 (3)	26.4 (7)	E2	21.2 (3)	1.19 (3)
$\gamma_{2,1}$(Ra)	131.612 (5)	0.158 (3)	E1	0.247 (4)	0.127 (2)
$\gamma_{5,4}$(Ra)	142.71 (11)	0.0000041 (13)	[E2]	2.14 (3)	0.0000013 (4)
$\gamma_{3,1}$(Ra)	166.410 (4)	0.217 (4)	E2	1.164 (17)	0.1004 (14)
$\gamma_{5,3}$(Ra)	182.29 (10)	0.0000057 (20)	[E1]	0.1126 (16)	0.0000051 (18)
$\gamma_{4,1}$(Ra)	205.99 (4)	0.0204 (5)	[E1]	0.0841 (12)	0.0188 (5)
$\gamma_{2,0}$(Ra)	215.985 (4)	0.265 (4)	E1	0.0752 (11)	0.246 (4)
$\gamma_{6,3}$(Ra)	228.42 (18)	0.000025 (6)	[E2]	0.366 (6)	0.000018 (4)
$\gamma_{7,2}$(Ra)	700.36 (7)	0.000003 (1)	E1	0.00611 (9)	0.000003 (1)
$\gamma_{8,3}$(Ra)	741.87 (6)	0.0000014 (4)	[E2]	0.01625 (23)	0.0000014 (4)
$\gamma_{7,1}$(Ra)	831.97 (7)	0.000014 (2)	E2	0.01289 (18)	0.000014 (2)
$\gamma_{8,1}$(Ra)	908.28 (6)	0.0000017 (5)	[M1+50%E2]	0.024 (3)	0.0000017 (5)
$\gamma_{8,0}$(Ra)	992.65 (6)	0.0000014 (4)	[E2]	0.00913 (13)	0.0000014 (4)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	7.88	(12)	$\times 10^3$ y
Q_α	:	5167.6	(10)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,44}$	4478 (3)	0.005
$\alpha_{0,43}$	4484 (2)	0.03 (2)
$\alpha_{0,40}$	4599 (3)	0.02 (1)
$\alpha_{0,38}$	4608 (2)	0.050 (8)
$\alpha_{0,36}$	4667	0.001
$\alpha_{0,33}$	4690 (2)	0.23 (8)
$\alpha_{0,30}$	4694 (2)	0.12 (2)
$\alpha_{0,29}$	4737	0.01
$\alpha_{0,28}$	4748	0.005
$\alpha_{0,27}$	4754	0.05
$\alpha_{0,26}$	4761 (2)	1.0 (4)
$\alpha_{0,24}$	4797.8 (12)	1.5 (2)
$\alpha_{0,23}$	4809	0.22
$\alpha_{0,22}$	4814.6 (12)	9.30 (8)
$\alpha_{0,20}$	4833	0.29
$\alpha_{0,19}$	4838 (2)	5.0 (2)
$\alpha_{0,18}$	4845.3 (12)	56.2 (2)
$\alpha_{0,17}$	4852	0.03
$\alpha_{0,15}$	4861 (2)	0.28 (10)
$\alpha_{0,14}$	4865	0.03
$\alpha_{0,13}$	4878	0.03
$\alpha_{0,12}$	4901.0 (12)	10.20 (8)
$\alpha_{0,10}$	4930 (2)	0.16 (5)
$\alpha_{0,8}$	4967.5 (12)	5.97 (6)
$\alpha_{0,6}$	4978.5 (12)	3.17 (4)
$\alpha_{0,5}$	5009 (2)	0.09 (1)
$\alpha_{0,4}$	5023 (2)	0.009 (3)
$\alpha_{0,3}$	5036 (2)	0.24 (2)
$\alpha_{0,2}$	5047 (2)	0.2
$\alpha_{0,1}$	5053 (2)	6.6 (1)
$\alpha_{0,0}$	5078 (2)	0.05 (1)

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3 Electron Emissions

		Energy keV				Electrons per 100 disint.
e_{AL}	(Ra)	5.71	-	12.04		132 (7)
e_{AK}	(Ra)					1.60 (21)
	KLL	65.149	-	72.729	}	
	KLX	79.721	-	88.466	}	
	KXY	94.27	-	103.91	}	
$ec_{3,1\ L}$	(Ra)	1.92	-	1.92		0.52 (26)
$ec_{10,3\ K}$	(Ra)	3.193		(8)		7.6 (16)
$ec_{4,2\ L}$	(Ra)	4.4	-	8.2		0.218 (21)
$ec_{15,8\ K}$	(Ra)	5.285		(8)		0.45 (11)
$ec_{1,0\ L}$	(Ra)	6.16	-	9.95		43 (21)
$ec_{12,5\ K}$	(Ra)	6.417		(10)		0.037 (4)
$ec_{12,10\ L}$	(Ra)	10.7	-	14.5		18.4 (33)
$ec_{6,5\ L}$	(Ra)	11.9	-	15.7		1.56 (15)
$ec_{2,0\ L}$	(Ra)	12.3	-	16.1		2.14 (8)
$ec_{22,18\ L}$	(Ra)	12.34	-	16.13		4.7 (7)
$ec_{3,1\ M}$	(Ra)	12.54	-	14.26		18 (9)
$ec_{15,6\ K}$	(Ra)	16.065		(8)		0.402 (3)
$ec_{3,1\ N}$	(Ra)	16.15	-	17.08		4.6 (23)
$ec_{5,2\ L}$	(Ra)	18.6	-	22.4		2.4 (12)
$ec_{4,2\ M}$	(Ra)	18.8	-	20.5		0.053 (5)
$ec_{19,9\ K}$	(Ra)	19.278		(11)		0.035 (5)
$ec_{1,0\ M}$	(Ra)	20.57	-	22.28		11 (6)
$ec_{10,1\ K}$	(Ra)	20.63		(5)		4.63 (41)
$ec_{18,8\ K}$	(Ra)	20.74		(5)		4.95 (41)
$ec_{17,6\ K}$	(Ra)	22.5650		(17)		0.05 (1)
$ec_{33,22\ K}$	(Ra)	22.565		(17)		0.032 (3)
$ec_{8,5\ L}$	(Ra)	23.1	-	26.9		0.068 (7)
$ec_{3,0\ L}$	(Ra)	23.59	-	27.38		9.0 (23)
$ec_{1,0\ N}$	(Ra)	24.18	-	25.11		3.0 (15)
$ec_{5,1\ L}$	(Ra)	24.76	-	28.55		0.491 (23)
$ec_{12,10\ M}$	(Ra)	25.1	-	26.8		4.6 (8)
$ec_{6,5\ M}$	(Ra)	26.3	-	28.0		0.391 (38)
$ec_{2,0\ M}$	(Ra)	26.7	-	28.4		0.536 (20)
$ec_{22,18\ M}$	(Ra)	26.75	-	28.46		1.12 (17)
$ec_{19,8\ K}$	(Ra)	28.011		(5)		1.91 (7)
$ec_{6,5\ N}$	(Ra)	29.9	-	30.8		0.10 (1)
$ec_{24,10\ K}$	(Ra)	30.275		(20)		0.0165 (7)
$ec_{2,0\ N}$	(Ra)	30.3	-	31.2		0.137 (5)
$ec_{13,5\ K}$	(Ra)	30.3		(1)		0.051 (8)
$ec_{22,18\ N}$	(Ra)	30.36	-	31.29		0.297 (44)
$ec_{26,23\ L}$	(Ra)	30.518	-	34.306		0.42 (6)
$ec_{9,5\ L}$	(Ra)	31.76	-	35.55		0.29 (7)
$ec_{5,2\ M}$	(Ra)	33.0	-	34.7		0.65 (33)
$ec_{12,3\ K}$	(Ra)	33.075		(4)		6.04 (18)
$ec_{26,22\ L}$	(Ra)	34.52	-	38.31		0.158 (43)

		Energy keV			Electrons per 100 disint.
$ec_{5,2\ N}$	(Ra)	36.6	-	37.5	0.17 (9)
$ec_{18,12\ L}$	(Ra)	37.286	-	41.074	4.1 (12)
$ec_{8,5\ M}$	(Ra)	37.5	-	39.2	0.0166 (17)
$ec_{3,0\ M}$	(Ra)	38.00	-	39.72	2.2 (7)
$ec_{19,6\ K}$	(Ra)	39.047		(5)	1.83 (6)
$ec_{5,1\ M}$	(Ra)	39.17	-	40.89	0.121 (6)
$ec_{3,0\ N}$	(Ra)	41.61	-	42.54	0.61 (16)
$ec_{5,1\ N}$	(Ra)	42.78	-	43.71	0.0311 (15)
$ec_{22,9\ K}$	(Ra)	43.725		(30)	0.031 (2)
$ec_{12,2\ K}$	(Ra)	44.24		(4)	0.129 (9)
$ec_{26,23\ M}$	(Ra)	44.928	-	46.645	0.10 (2)
$ec_{10,0\ K}$	(Ra)	46.12		(3)	0.20 (6)
$ec_{9,5\ M}$	(Ra)	46.17	-	47.89	0.068 (16)
$ec_{33,19\ K}$	(Ra)	47.7		(3)	0.0960 (15)
$ec_{26,23\ N}$	(Ra)	48.542	-	49.471	0.034 (5)
$ec_{12,8\ L}$	(Ra)	48.86	-	52.65	0.76 (30)
$ec_{26,22\ M}$	(Ra)	48.93	-	50.64	0.038 (10)
$ec_{8,3\ L}$	(Ra)	49.60	-	53.39	5.6 (5)
$ec_{9,5\ N}$	(Ra)	49.78	-	50.71	0.0180 (43)
$ec_{12,1\ K}$	(Ra)	50.42		(1)	2.5 (7)
$ec_{18,12\ M}$	(Ra)	51.696	-	53.413	0.96 (27)
$ec_{22,8\ K}$	(Ra)	52.494		(9)	4.19 (12)
$ec_{26,22\ N}$	(Ra)	52.54	-	53.47	0.0100 (27)
$ec_{33,18\ K}$	(Ra)	54.50		(12)	0.17 (7)
$ec_{18,12\ N}$	(Ra)	55.310	-	56.239	0.25 (7)
$ec_{6,1\ L}$	(Ra)	55.9	-	59.7	16.5 (35)
$ec_{26,19\ L}$	(Ra)	59.068	-	62.856	0.041 (7)
$ec_{30,17\ K}$	(Ra)	59.425		(40)	0.069 (7)
$ec_{18,5\ K}$	(Ra)	63.061		(50)	0.023 (2)
$ec_{12,8\ M}$	(Ra)	63.27	-	64.98	0.19 (7)
$ec_{22,6\ K}$	(Ra)	63.53		(8)	0.145 (29)
$ec_{8,3\ M}$	(Ra)	64.01	-	65.72	1.52 (15)
$ec_{12,8\ N}$	(Ra)	66.88	-	67.81	0.048 (22)
$ec_{8,1\ L}$	(Ra)	67.02	-	70.81	5.6 (8)
$ec_{18,10\ L}$	(Ra)	67.2	-	71.0	93.6 (13)
$ec_{8,3\ N}$	(Ra)	67.62	-	68.55	0.401 (39)
$ec_{24,8\ K}$	(Ra)	69.011		(18)	0.292 (27)
$ec_{6,1\ M}$	(Ra)	70.3	-	72.0	4.5 (10)
$ec_{6,1\ N}$	(Ra)	73.9	-	74.8	1.18 (25)
$ec_{10,4\ L}$	(Ra)	75.498	-	79.286	0.026 (3)
$ec_{12,0\ K}$	(Ra)	75.842		(60)	0.039 (5)
$ec_{24,6\ K}$	(Ra)	80.013		(8)	0.324 (16)
$ec_{8,1\ M}$	(Ra)	81.43	-	83.14	1.39 (21)
$ec_{18,10\ M}$	(Ra)	81.6	-	83.3	22.39 (35)
$ec_{8,1\ N}$	(Ra)	85.04	-	85.97	0.36 (6)
$ec_{18,10\ N}$	(Ra)	85.2	-	86.1	5.90 (11)
$ec_{10,3\ L}$	(Ra)	87.876	-	91.664	1.78 (49)
$ec_{18,3\ K}$	(Ra)	89.60		(5)	8.9

		Energy keV	Electrons per 100 disint.
$ec_{15,8\ L}$	(Ra)	89.968 - 93.756	0.085 (22)
$ec_{15,1\ K}$	(Ra)	90.385 (70)	0.034 (5)
$ec_{19,3\ K}$	(Ra)	96.892 (80)	0.011 (2)
$ec_{22,10\ L}$	(Ra)	98.868 - 102.656	0.043 (5)
$ec_{15,6\ L}$	(Ra)	100.748 - 104.536	0.075 (5)
$ec_{18,2\ K}$	(Ra)	100.775 (80)	0.041 (6)
$ec_{10,3\ M}$	(Ra)	102.286 - 104.003	0.44 (14)
$ec_{15,8\ M}$	(Ra)	104.378 - 106.095	0.023 (5)
$ec_{10,1\ L}$	(Ra)	105.32 - 109.11	0.86 (8)
$ec_{18,8\ L}$	(Ra)	105.42 - 109.21	0.92 (8)
$ec_{10,3\ N}$	(Ra)	105.900 - 106.829	0.113 (41)
$ec_{26,8\ K}$	(Ra)	106.24 (8)	0.29 (6)
$ec_{18,1\ K}$	(Ra)	106.938 (3)	4.25 (46)
$ec_{33,22\ L}$	(Ra)	107.248 - 111.036	0.016 (2)
$ec_{17,6\ L}$	(Ra)	107.248 - 111.036	0.025 (3)
$ec_{19,8\ L}$	(Ra)	112.694 - 116.482	0.355 (14)
$ec_{22,10\ M}$	(Ra)	113.278 - 114.995	0.0116 (23)
$ec_{19,1\ K}$	(Ra)	114.239 (17)	0.248 (28)
$ec_{24,10\ L}$	(Ra)	114.958 - 118.746	0.0109 (6)
$ec_{15,6\ M}$	(Ra)	115.158 - 116.875	0.018 (2)
$ec_{26,6\ K}$	(Ra)	117.305 (100)	0.032 (5)
$ec_{12,3\ L}$	(Ra)	117.76 - 121.55	1.125 (33)
$ec_{10,1\ M}$	(Ra)	119.73 - 121.44	0.206 (18)
$ec_{18,8\ M}$	(Ra)	119.83 - 121.54	0.221 (18)
$ec_{26,12\ L}$	(Ra)	122.768 - 126.556	0.016 (3)
$ec_{10,1\ N}$	(Ra)	123.34 - 124.27	0.0544 (48)
$ec_{18,8\ N}$	(Ra)	123.44 - 124.37	0.0583 (48)
$ec_{19,6\ L}$	(Ra)	123.730 - 127.518	0.341 (11)
$ec_{19,8\ M}$	(Ra)	127.104 - 128.821	0.0851 (33)
$ec_{12,2\ L}$	(Ra)	128.92 - 132.71	0.0263 (18)
$ec_{19,8\ N}$	(Ra)	130.718 - 131.647	0.0224 (9)
$ec_{10,0\ L}$	(Ra)	130.81 - 134.60	0.047 (6)
$ec_{12,3\ M}$	(Ra)	132.17 - 133.89	0.269 (8)
$ec_{18,0\ K}$	(Ra)	132.334 (100)	0.021 (3)
$ec_{33,19\ L}$	(Ra)	132.4 - 136.2	0.01782 (28)
$ec_{12,1\ L}$	(Ra)	135.104 - 138.892	0.55 (6)
$ec_{12,3\ N}$	(Ra)	135.78 - 136.71	0.0709 (21)
$ec_{22,8\ L}$	(Ra)	137.177 - 140.965	0.777 (23)
$ec_{19,6\ M}$	(Ra)	138.140 - 139.857	0.0816 (27)
$ec_{22,1\ K}$	(Ra)	138.685 (110)	0.09 (1)
$ec_{33,18\ L}$	(Ra)	139.19 - 142.98	0.032 (6)
$ec_{19,6\ N}$	(Ra)	141.754 - 142.683	0.0215 (7)
$ec_{30,17\ L}$	(Ra)	144.108 - 147.896	0.013 (2)
$ec_{10,0\ M}$	(Ra)	145.22 - 146.94	0.0114 (18)
$ec_{18,5\ L}$	(Ra)	147.744 - 151.532	0.046 (5)
$ec_{22,6\ L}$	(Ra)	148.22 - 152.01	0.027 (5)
$ec_{12,1\ M}$	(Ra)	149.514 - 151.231	0.139 (23)
$ec_{22,8\ M}$	(Ra)	151.587 - 153.304	0.186 (5)

		Energy keV	Electrons per 100 disint.
$ec_{12,1\ N}$	(Ra)	153.128 - 154.057	0.035 (5)
$ec_{24,8\ L}$	(Ra)	153.694 - 157.482	0.054 (5)
$ec_{24,1\ K}$	(Ra)	155.165 (130)	0.031 (4)
$ec_{22,8\ N}$	(Ra)	155.201 - 156.130	0.0489 (14)
$ec_{12,0\ L}$	(Ra)	160.525 - 164.313	0.099 (16)
$ec_{24,6\ L}$	(Ra)	164.696 - 168.484	0.060 (3)
$ec_{24,8\ M}$	(Ra)	168.104 - 169.821	0.0129 (12)
$ec_{18,3\ L}$	(Ra)	174.29 - 178.08	1.6
$ec_{12,0\ M}$	(Ra)	174.935 - 176.652	0.027 (6)
$ec_{15,1\ L}$	(Ra)	175.068 - 178.856	0.011 (2)
$ec_{24,6\ M}$	(Ra)	179.106 - 180.823	0.0144 (7)
$ec_{19,3\ L}$	(Ra)	181.575 - 185.363	0.022 (3)
$ec_{18,3\ M}$	(Ra)	188.70 - 190.42	0.4
$ec_{26,8\ L}$	(Ra)	190.92 - 194.71	0.054 (11)
$ec_{18,1\ L}$	(Ra)	191.621 - 195.409	0.78 (8)
$ec_{18,3\ N}$	(Ra)	192.31 - 193.24	0.14
$ec_{19,1\ L}$	(Ra)	198.922 - 202.710	0.046 (5)
$ec_{26,8\ M}$	(Ra)	205.33 - 207.04	0.0128 (27)
$ec_{22,3\ L}$	(Ra)	206.028 - 209.816	0.012 (2)
$ec_{18,1\ M}$	(Ra)	206.031 - 207.748	0.187 (20)
$ec_{18,1\ N}$	(Ra)	209.645 - 210.574	0.049 (5)
$ec_{19,1\ M}$	(Ra)	213.332 - 215.049	0.0109 (12)
$ec_{18,0\ L}$	(Ra)	217.017 - 220.805	0.028 (3)
$ec_{22,1\ L}$	(Ra)	223.368 - 227.156	0.017 (2)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Ra)	10.62 — 18.41		106 (7)	
$XK\alpha_2$	(Ra)	85.43		14.3 (6)	} $K\alpha$
$XK\alpha_1$	(Ra)	88.47		23.4 (9)	}
$XK\beta_3$	(Ra)	99.432	}		
$XK\beta_1$	(Ra)	100.13	}	8.2 (4)	$K\beta_1'$
$XK\beta_5''$	(Ra)	100.738	}		
$XK\beta_2$	(Ra)	102.89	}		
$XK\beta_4$	(Ra)	103.295	}	2.69 (12)	$K\beta_2'$
$XKO_{2,3}$	(Ra)	103.74	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{8,6}$(Ra)	11.10 (8)	12.0 (18)	(M1+E2)	60000 (6)	0.00020 (3)
$\gamma_{43,42}$(Ra)	11.79 (20)	0.0005			0.0005
$\gamma_{3,1}$(Ra)	17.360 (36)	24 (12)	(M1)	133.2 (21)	0.18 (9)
$\gamma_{4,2}$(Ra)	23.6	0.291 (24)	(M1+E2)	241.33	0.0012 (1)
$\gamma_{1,0}$(Ra)	25.39 (2)	58 (29)	(E2)	7240 (110)	0.008 (4)
$\gamma_{23,19}$(Ra)	28.68 (10)	0.10 (3)			0.10 (3)
$\gamma_{12,10}$(Ra)	29.9 (1)	24.6 (45)	(M1+E2)	223	0.11 (2)
$\gamma_{10,9}$(Ra)	29.9 (1)	0.002			0.002
$\gamma_{6,5}$(Ra)	31.10 (5)	2.92 (28)	(E1)	2.48 (4)	0.84 (8)
$\gamma_{2,0}$(Ra)	31.50 (5)	4.03 (14)	E1	2.39 (4)	1.19 (4)
$\gamma_{22,18}$(Ra)	31.57 (9)	6.3 (9)	(M1)	91.1 (15)	0.068 (10)
$\gamma_{25,21}$(Ra)	33.04 (20)	0.01			0.01
$\gamma_{5,2}$(Ra)	37.8 (1)	3.3 (16)	(E2)	1023 (20)	0.0032 (16)
$\gamma_{8,5}$(Ra)	42.3 (1)	0.172 (17)	(E1)	1.094 (17)	0.082 (8)
$\gamma_{3,0}$(Ra)	42.82 (5)	12.2 (31)	(M1+E2)	75 (19)	0.16 (1)
$\gamma_{5,1}$(Ra)	43.99 (1)	1.31 (6)	E1	0.985 (14)	0.66 (3)
$\gamma_{22,15}$(Ra)	46.52 (4)	0.021 (2)			0.021 (2)
$\gamma_{26,23}$(Ra)	49.75 (8)	0.58 (5)	(M1)	25.2	0.022 (2)
$\gamma_{9,5}$(Ra)	50.99 (4)	0.39 (9)	(M1)	22.2 (4)	0.017 (4)
$\gamma_{26,22}$(Ra)	53.75 (20)	0.22 (6)	(M1)	19.0 (4)	0.011 (3)
$\gamma_{4,0}$(Ra)	55.11 (3)	0.0042 (6)	(E1)	0.540 (8)	0.0027 (4)
$\gamma_{18,12}$(Ra)	56.518 (5)	5.5 (15)	M1(+E2)	18 (5)	0.29 (2)
$\gamma_{12,9}$(Ra)	59.33 (10)	0.012 (2)			0.012 (2)
$\gamma_{24,15}$(Ra)	63.7 (2)	0.005 (2)			0.005 (2)
$\gamma_{9,4}$(Ra)	64.96 (10)	0.087 (11)			0.087 (11)
$\gamma_{25,17}$(Ra)	65.91 (10)	0.161 (17)			0.161 (17)
$\gamma_{12,8}$(Ra)	68.09 (4)	1.04 (38)	M1+E2	14 (5)	0.069 (10)
$\gamma_{15,11}$(Ra)	68.8 (1)	0.04			0.04
$\gamma_{20,12}$(Ra)	68.8 (10)	0.09			0.09
$\gamma_{8,3}$(Ra)	68.83 (3)	7.7 (7)	E2	55.9 (8)	0.136 (13)
$\gamma_{33,26}$(Ra)	72.739 (10)	0.14 (2)			0.14 (2)
$\gamma_{6,1}$(Ra)	75.1 (1)	23.1 (49)	E2	36.9 (6)	0.61 (13)
$\gamma_{16,10}$(Ra)	75.19 (10)	0.002 (1)			0.002 (1)
$\gamma_{9,3}$(Ra)	77.63 (5)	0.055 (7)	(E1)	0.216 (3)	0.045 (6)
$\gamma_{26,19}$(Ra)	78.3 (2)	0.059 (15)	(M1)	6.33 (10)	0.008 (2)
$\gamma_{8,1}$(Ra)	86.25 (4)	8.7 (11)	M1+E2	5.7 (7)	1.3 (1)
$\gamma_{18,10}$(Ra)	86.40 (5)	100.0 (19)	M1	4.75 (7)	26.0 (1)
$\gamma_{29,21}$(Ra)	89.09 (20)	0.01			0.01
$\gamma_{36,27}$(Ra)	89.09 (20)	0.005			0.005
$\gamma_{9,2}$(Ra)	89.09 (20)	0.14			0.14
$\gamma_{26,17}$(Ra)	94.7 (1)	0.028 (10)			0.028 (10)
$\gamma_{10,4}$(Ra)	94.73 (8)	0.304 (23)	(E1)	0.1274 (18)	0.27 (2)
$\gamma_{9,1}$(Ra)	94.92 (8)	0.0146 (34)	(E1)	0.1268 (18)	0.013 (3)
$\gamma_{40,30}$(Ra)	97.01 (12)	0.011 (3)			0.011 (3)
$\gamma_{20,10}$(Ra)	98.86 (10)	0.120 (15)			0.120 (15)
$\gamma_{26,15}$(Ra)	101.1 (2)	0.018 (3)			0.018 (3)
$\gamma_{7,0}$(Ra)	101.58 (10)	0.049 (7)			0.049 (7)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{33,25}$(Ra)	101.58 (10)	0.049 (7)			0.049 (7)
$\gamma_{27,16}$(Ra)	102.54 (2)	0.160 (19)			0.160 (19)
$\gamma_{24,12}$(Ra)	104.6 (2)	0.058 (30)	(M1+E2)	5.4 (25)	0.009 (3)
$\gamma_{10,3}$(Ra)	107.108 (8)	10.8 (10)	M1(+E2)	12.3 (11)	0.81 (4)
$\gamma_{15,8}$(Ra)	109.1 (1)	0.58 (11)	(M1)	12.15 (18)	0.044 (8)
$\gamma_{21,10}$(Ra)	110.3 (5)	0.009 (2)			0.009 (2)
$\gamma_{12,5}$(Ra)	110.332 (8)	0.171 (17)	(E1)	0.377 (6)	0.124 (12)
$\gamma_{42,38}$(Ra)	114.75 (10)	0.0151 (22)			0.0151 (22)
$\gamma_{14,6}$(Ra)	115.85 (10)	0.01			0.01
$\gamma_{18,9}$(Ra)	115.85 (10)	0.014	(E1)	0.336 (5)	0.01
$\gamma_{10,2}$(Ra)	118.1 (1)	0.007 (3)			0.007 (3)
$\gamma_{22,10}$(Ra)	118.1 (1)	0.074 (23)	(E2)	4.72 (7)	0.013 (4)
$\gamma_{15,6}$(Ra)	119.98 (2)	0.52 (21)	(M1)	9.30 (13)	0.05 (2)
$\gamma_{19,9}$(Ra)	123.193 (13)	0.195 (9)	(E1)	0.290 (4)	0.151 (7)
$\gamma_{10,1}$(Ra)	124.55 (5)	6.5 (6)	(M1)	8.36 (12)	0.69 (6)
$\gamma_{18,8}$(Ra)	124.65 (5)	6.9 (6)	(M1)	8.34 (12)	0.74 (6)
$\gamma_{33,22}$(Ra)	126.48 (10)	0.061 (34)	(M1,E2)	5.8 (23)	0.009 (4)
$\gamma_{17,6}$(Ra)	126.48 (10)	0.095 (42)	(M1,E2)	5.8 (23)	0.014 (4)
$\gamma_{19,8}$(Ra)	131.926 (5)	2.71 (10)	M1	7.1 (1)	0.335 (12)
$\gamma_{13,5}$(Ra)	134.19 (10)	0.073 (12)	(M1)	6.76 (10)	0.0094 (15)
$\gamma_{24,10}$(Ra)	134.19 (10)	0.022 (11)	(E2)	2.75 (4)	0.006 (3)
$\gamma_{33,21}$(Ra)	134.19 (10)	0.0014 (7)			0.0014 (7)
$\gamma_{12,3}$(Ra)	136.990 (4)	8.71 (25)	M1	6.38 (9)	1.18 (3)
$\gamma_{20,8}$(Ra)	137.0 (1)	0.04 (1)			0.04 (1)
$\gamma_{21,9}$(Ra)	139.8 (1)	0.0045 (10)			0.0045 (10)
$\gamma_{26,12}$(Ra)	142.0 (1)	0.035 (10)	(E2)	2.18 (4)	0.011 (3)
$\gamma_{19,6}$(Ra)	142.962 (5)	2.69 (9)	M1	5.65 (8)	0.404 (12)
$\gamma_{22,9}$(Ra)	147.64 (5)	0.237 (24)	E1	0.187 (3)	0.20 (2)
$\gamma_{12,2}$(Ra)	148.15 (4)	1.04 (7)	E1	0.186 (3)	0.88 (6)
$\gamma_{10,0}$(Ra)	150.04 (3)	0.33	(M1+E2)	4.5 (8)	0.06
$\gamma_{11,0}$(Ra)	151.6 (3)	0.025			0.025
$\gamma_{33,19}$(Ra)	151.6 (3)	0.15	(M1)	4.78 (8)	0.025
$\gamma_{12,1}$(Ra)	154.336 (10)	3.9 (6)	M1+E2	4.1 (8)	0.77 (2)
$\gamma_{22,8}$(Ra)	156.409 (9)	6.40 (18)	M1	4.38 (7)	1.19 (3)
$\gamma_{33,18}$(Ra)	158.42 (12)	0.26 (7)	M1(+E2)	4.5 (14)	0.048 (5)
$\gamma_{30,17}$(Ra)	163.34 (17)	0.097 (34)	(M1)	3.87 (6)	0.020 (7)
$\gamma_{18,5}$(Ra)	166.976 (7)	0.234 (11)	(E1)	0.1391 (20)	0.205 (10)
$\gamma_{22,6}$(Ra)	167.45 (5)	0.230 (46)	(M1)	3.61 (5)	0.05 (1)
$\gamma_{31,16}$(Ra)	169.2 (3)	0.0029 (14)			0.0029 (14)
$\gamma_{16,4}$(Ra)	169.2 (3)	0.0010 (5)			0.0010 (5)
$\gamma_{30,15}$(Ra)	169.2 (3)	0.0039 (14)			0.0039 (14)
$\gamma_{23,6}$(Ra)	171.76 (5)	0.040 (4)			0.040 (4)
$\gamma_{24,8}$(Ra)	172.926 (18)	0.472 (43)	M1	3.29 (5)	0.11 (1)
$\gamma_{19,5}$(Ra)	174.05 (7)	0.0023		0.1258 (18)	0.002
$\gamma_{30,14}$(Ra)	174.05 (11)	0.0071 (18)			0.0071 (18)
$\gamma_{33,15}$(Ra)	174.05 (11)	0.0067 (18)			0.0067 (18)
$\gamma_{37,23}$(Ra)	174.7 (2)	0.030 (3)			0.030 (3)
$\gamma_{12,0}$(Ra)	179.757 (7)	0.368 (28)	E2	0.867 (13)	0.197 (15)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{16,3}$(Ra)	182.12 (10)	0.0054 (11)			0.0054 (11)
$\gamma_{35,15}$(Ra)	183.0 (1)	0.0071 (12)			0.0071 (12)
$\gamma_{24,6}$(Ra)	183.928 (8)	0.541 (27)	M1(+E2)	2.92	0.138 (7)
$\gamma_{38,25}$(Ra)	185.6 (1)	0.002			0.002
$\gamma_{28,10}$(Ra)	185.6 (1)	0.002			0.002
$\gamma_{37,21}$(Ra)	186.1 (1)	0.013 (5)			0.013 (5)
$\gamma_{42,35}$(Ra)	189.25 (6)	0.0104 (21)			0.0104 (21)
$\gamma_{21,5}$(Ra)	190.63 (20)	0.0101 (20)			0.0101 (20)
$\gamma_{16,2}$(Ra)	193.52 (5)	0.0007 (3)			0.0007 (3)
$\gamma_{18,3}$(Ra)	193.52 (5)	15.53	M1	2.53	4.4
$\gamma_{15,1}$(Ra)	194.3 (3)	0.08 (6)	(M1,E2)	1.5 (9)	0.03 (2)
$\gamma_{19,3}$(Ra)	200.807 (16)	0.1088 (48)	(E2)	0.577 (8)	0.069 (3)
$\gamma_{18,2}$(Ra)	204.690 (5)	0.640 (33)	(E1)	0.0854 (12)	0.59 (3)
$\gamma_{26,8}$(Ra)	210.15 (8)	0.55 (12)	(M1)	1.90 (3)	0.19 (4)
$\gamma_{18,1}$(Ra)	210.853 (3)	8.1 (9)	M1	1.89 (3)	2.8 (3)
$\gamma_{41,26}$(Ra)	213.48 (5)	0.0087 (16)			0.0087 (16)
$\gamma_{24,5}$(Ra)	215.10 (1)	0.147 (11)	(E1)	0.0759 (11)	0.137 (10)
$\gamma_{27,8}$(Ra)	216.0 (1)	0.053 (6)			0.053 (6)
$\gamma_{21,3}$(Ra)	217.41 (10)	0.0065 (11)			0.0065 (11)
$\gamma_{19,1}$(Ra)	218.154 (17)	0.49 (5)	M1	1.715 (24)	0.18 (2)
$\gamma_{34,12}$(Ra)	219.8 (1)	0.0033 (8)			0.0033 (8)
$\gamma_{37,17}$(Ra)	219.8 (1)	0.0008			0.0008
$\gamma_{26,6}$(Ra)	221.22 (5)	0.058 (16)	(M1)	1.650 (24)	0.022 (6)
$\gamma_{16,0}$(Ra)	225.26 (10)	0.003 (1)			0.003 (1)
$\gamma_{22,3}$(Ra)	225.26 (10)	0.086 (8)	(E2)	0.384 (6)	0.062 (6)
$\gamma_{21,2}$(Ra)	228.6 (1)	0.0006 (2)			0.0006 (2)
$\gamma_{21,1}$(Ra)	234.8 (1)	0.0008 (2)			0.0008 (2)
$\gamma_{38,19}$(Ra)	234.8 (1)	0.0008			0.00084
$\gamma_{18,0}$(Ra)	236.249 (20)	0.231 (12)	E2	0.327 (5)	0.174 (9)
$\gamma_{22,1}$(Ra)	242.6 (2)	0.189 (18)	M1	1.275 (18)	0.083 (8)
$\gamma_{31,10}$(Ra)	244.4 (1)	0.0013 (3)			0.0013 (3)
$\gamma_{25,3}$(Ra)	250.1 (1)	0.00034 (16)			0.00034 (16)
$\gamma_{26,5}$(Ra)	252.43 (3)	0.100 (13)	(E1)	0.0522 (8)	0.095 (12)
$\gamma_{24,1}$(Ra)	259.08 (4)	0.07 (1)	(M1)	1.063 (15)	0.034 (5)
$\gamma_{25,1}$(Ra)	267.4 (1)	0.0008 (3)			0.0008 (3)
$\gamma_{33,9}$(Ra)	274.1 (1)	0.0007 (2)			0.0007 (2)
$\gamma_{43,27}$(Ra)	276.85 (10)	0.0042 (10)			0.0042 (10)
$\gamma_{30,8}$(Ra)	278.65 (5)	0.0068 (8)			0.0068 (8)
$\gamma_{44,27}$(Ra)	281.27 (10)	0.007 (1)			0.007 (1)
$\gamma_{33,8}$(Ra)	282.6 (1)	0.0038 (7)			0.0038 (7)
$\gamma_{30,6}$(Ra)	289.62 (5)	0.0150 (17)			0.0150 (17)
$\gamma_{33,6}$(Ra)	293.78 (10)	0.0065 (8)			0.0065 (8)
$\gamma_{26,1}$(Ra)	296.21 (10)	0.0191 (20)	(E2)	0.1581 (23)	0.0165 (17)
$\gamma_{38,12}$(Ra)	298.72 (12)	0.0070 (8)			0.0070 (8)
$\gamma_{28,2}$(Ra)	303.75 (10)	0.0017 (30)			0.0017 (30)
$\gamma_{39,12}$(Ra)	307.3 (1)	0.006 (3)			0.006 (3)
$\gamma_{28,1}$(Ra)	310.1 (1)	0.0020 (3)			0.0020 (3)
$\gamma_{45,29}$(Ra)	313.3 (1)	0.0037 (11)			0.0037 (11)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{29,2}$(Ra)	317.8 (1)	0.00055 (14)			0.00055 (14)
$\gamma_{42,23}$(Ra)	320.8 (1)	0.00016 (7)			0.00016 (7)
$\gamma_{31,5}$(Ra)	324.6 (1)	0.00043 (13)			0.00043 (13)
$\gamma_{45,28}$(Ra)	327.9 (1)	0.003			0.003
$\gamma_{27,0}$(Ra)	327.9 (1)	0.016 (3)			0.016 (3)
$\gamma_{38,10}$(Ra)	328.2 (1)	0.0020 (8)			0.0020 (8)
$\gamma_{34,5}$(Ra)	329.9 (2)	0.0006 (2)			0.0006 (2)
$\gamma_{37,8}$(Ra)	334.74 (10)	0.00043 (11)			0.00043 (11)
$\gamma_{43,22}$(Ra)	336.7 (1)	0.0082 (1)			0.0082 (1)
$\gamma_{39,10}$(Ra)	336.7 (1)	0.0001			0.0001
$\gamma_{45,26}$(Ra)	341.1 (1)	0.0008 (2)			0.0008 (2)
$\gamma_{34,4}$(Ra)	344.3 (1)	0.0001			0.0001
$\gamma_{36,5}$(Ra)	347.4 (1)	0.0006 (1)			0.0006 (1)
$\gamma_{42,19}$(Ra)	349.4 (1)	0.0001			0.0001
$\gamma_{29,0}$(Ra)	349.4 (1)	0.0004 (1)			0.0004 (1)
$\gamma_{32,3}$(Ra)	351.7 (1)	0.0005 (1)			0.0005 (1)
$\gamma_{38,9}$(Ra)	358.0 (1)	0.006 (1)			0.006 (1)
$\gamma_{43,19}$(Ra)	361.0 (1)	0.0006 (1)			0.0006 (1)
$\gamma_{38,8}$(Ra)	366.5 (1)	0.0004 (1)			0.0004 (1)
$\gamma_{39,9}$(Ra)	366.5 (1)	0.0001			0.0001
$\gamma_{43,18}$(Ra)	368.1 (1)	0.0019 (3)			0.0019 (3)
$\gamma_{31,1}$(Ra)	368.9 (1)	0.0019 (3)			0.0019 (3)
$\gamma_{39,8}$(Ra)	375.1 (1)	0.0003 (1)			0.0003 (1)
$\gamma_{38,6}$(Ra)	377.4 (1)	0.0029 (3)			0.0029 (3)
$\gamma_{43,16}$(Ra)	379.4 (1)	0.0013 (2)			0.0013 (2)
$\gamma_{39,6}$(Ra)	386.4 (1)	0.0008 (2)			0.0008 (2)
$\gamma_{32,0}$(Ra)	395.3 (2)	0.0008 (1)			0.0008 (1)
$\gamma_{34,0}$(Ra)	399.9 (2)	0.00014 (6)			0.00014 (6)
$\gamma_{35,0}$(Ra)	403.3 (1)	0.0018 (2)			0.0018 (2)
$\gamma_{38,5}$(Ra)	408.5 (1)	0.0010 (1)			0.0010 (1)
$\gamma_{41,9}$(Ra)	414.61 (10)	0.0003 (1)			0.0003 (1)
$\gamma_{39,5}$(Ra)	417.4 (1)	0.0014 (2)			0.0014 (2)
$\gamma_{45,19}$(Ra)	419.9 (2)	0.0006 (1)			0.0006 (1)
$\gamma_{43,12}$(Ra)	424.8 (1)	0.0032 (3)			0.0032 (3)
$\gamma_{38,3}$(Ra)	435.3 (1)	0.0031 (4)			0.0031 (4)
$\gamma_{39,3}$(Ra)	444.1 (1)	0.0005 (1)			0.0005 (1)
$\gamma_{38,1}$(Ra)	452.6 (1)	0.0017 (2)			0.0017 (2)
$\gamma_{43,10}$(Ra)	454.76 (10)	0.0105 (11)			0.0105 (11)
$\gamma_{44,10}$(Ra)	459.1 (3)	0.001			0.001
$\gamma_{41,5}$(Ra)	465 (1)	0.0001			0.0001
$\gamma_{38,0}$(Ra)	478.0 (1)	0.0037 (4)			0.0037 (4)
$\gamma_{45,12}$(Ra)	483.7 (1)	0.0018 (2)			0.0018 (2)
$\gamma_{39,0}$(Ra)	487.3 (2)	0.0004 (1)			0.0004 (1)
$\gamma_{43,8}$(Ra)	492.9 (1)	0.00152 (16)			0.00152 (16)
$\gamma_{43,6}$(Ra)	503.6 (1)	0.00005			0.00005
$\gamma_{41,2}$(Ra)	503.6 (1)	0.00012 (5)			0.00012 (5)
$\gamma_{45,10}$(Ra)	513.5 (2)	0.0007 (2)			0.0007 (2)
$\gamma_{42,5}$(Ra)	523.5 (1)	0.0005 (1)			0.0005 (1)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{41,0}$(Ra)	535.1 (1)	0.0013 (2)			0.0013 (2)
$\gamma_{43,5}$(Ra)	535.1 (1)	0.0002			0.0002
$\gamma_{45,9}$(Ra)	543.0 (3)	0.0001			0.0001
$\gamma_{42,3}$(Ra)	549.8 (5)	0.0001			0.0001
$\gamma_{45,8}$(Ra)	551.7 (2)	0.00011 (4)			0.00011 (4)
$\gamma_{43,3}$(Ra)	561.8 (1)	0.0019 (2)			0.0019 (2)
$\gamma_{44,3}$(Ra)	565.7 (3)	0.0009 (1)			0.0009 (1)
$\gamma_{43,2}$(Ra)	573.0 (1)	0.0028 (3)			0.0028 (3)
$\gamma_{43,1}$(Ra)	579.2 (2)	0.0006 (1)			0.0006 (1)
$\gamma_{42,0}$(Ra)	592.5 (1)	0.0003 (1)			0.0003 (1)
$\gamma_{45,5}$(Ra)	594.4 (3)	0.0001			0.0001

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	25.52	(1)	h
Q_{β^-}	:	391.6	(15)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,14}$	39.8 (15)	0.0032 (2)		7.33
$\beta^-_{0,13}$	71.4 (15)	0.066 (2)	1st forbidden	6.79
$\beta^-_{0,12}$	73.6 (15)	0.00078 (5)		8.76
$\beta^-_{0,11}$	144.3 (15)	2.7 (4)	Allowed	6.11
$\beta^-_{0,10}$	173.4 (15)	0.31 (23)		7.3
$\beta^-_{0,9}$	208.1 (15)	12.2 (15)	Allowed	5.95
$\beta^-_{0,8}$	217.4 (15)	1.36 (24)		6.96
$\beta^-_{0,6}$	289.3 (15)	13 (8)	Allowed	6.4
$\beta^-_{0,5}$	290.2 (15)	41 (16)	Allowed	5.88
$\beta^-_{0,4}$	307.4 (15)	29 (18)	Allowed	6.1
$\beta^-_{0,3}$	313.9 (15)	0.43 (2)	1st forbidden	7.97
$\beta^-_{0,2}$	333.0 (15)	0.17 (17)	1st forbidden	8.2
$\beta^-_{0,0}$	391.6 (15)	0.022 (7)	1st forbidden	9.57

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Pa)	5.9 - 21.0	68 (3)	
e_{AK}	(Pa)		0.038 (5)	
	KLL	70.081 - 78.822	}	
	KLX	85.989 - 95.858	}	
	KXY	101.87 - 112.59	}	
$ec_{4,2\ L}$	(Pa)	4.540 - 8.912	45.3 (24)	
$ec_{5,4\ M}$	(Pa)	11.8 - 13.8	31 (11)	
$ec_{9,2\ K}$	(Pa)	12.320 (19)	0.01333 (41)	
$ec_{6,4\ M}$	(Pa)	12.71 - 14.63	8.2 (36)	
$ec_{4,2\ M}$	(Pa)	20.284 - 22.203	11.7 (6)	
$ec_{5,2\ L}$	(Pa)	21.78 - 26.16	0.0507 (14)	
$ec_{10,8\ L}$	(Pa)	22.98 - 27.35	0.16 (16)	
$ec_{11,7\ K}$	(Pa)	23.071 (11)	0.49 (11)	
$ec_{11,5\ K}$	(Pa)	33.34 (2)	0.110 (33)	
$ec_{2,0\ L}$	(Pa)	37.467 - 41.839	54.5 (20)	
$ec_{5,2\ M}$	(Pa)	37.53 - 39.45	0.0125 (7)	
$ec_{10,8\ M}$	(Pa)	38.72 - 40.64	0.041 (40)	
$ec_{11,9\ L}$	(Pa)	42.76 - 47.13	0.59 (26)	
$ec_{3,1\ L}$	(Pa)	47.4 - 51.8	0.316 (9)	

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		Energy keV		Electrons per 100 disint.		Energy keV
$ec_{11,4\ K}$	(Pa)	50.509	(4)	0.61 (7)		
$ec_{8,5\ L}$	(Pa)	51.647 - 56.019		0.0549 (37)		
$ec_{2,0\ M}$	(Pa)	53.211 - 55.130		15.0 (5)		
$ec_{11,9\ M}$	(Pa)	58.50 - 60.42		0.16 (7)		
$ec_{9,6\ L}$	(Pa)	60.123 - 64.495		5.5 (9)		
$ec_{9,5\ L}$	(Pa)	60.982 - 65.354		2.47 (38)		
$ec_{8,0\ K}$	(Pa)	61.56	(2)	0.032 (29)		
$ec_{3,1\ M}$	(Pa)	63.1 - 65.1		0.0873 (28)		
$ec_{4,0\ L}$	(Pa)	63.110 - 67.482		11.86 (18)		
$ec_{8,5\ M}$	(Pa)	67.391 - 69.310		0.0134 (9)		
$ec_{8,4\ L}$	(Pa)	68.84 - 73.22		0.1222 (42)		
$ec_{9,6\ M}$	(Pa)	75.867 - 77.786		1.36 (27)		
$ec_{9,5\ M}$	(Pa)	76.726 - 78.645		0.63 (13)		
$ec_{9,4\ L}$	(Pa)	78.176 - 82.548		0.607 (42)		
$ec_{4,0\ M}$	(Pa)	78.854 - 80.773		3.8 (7)		
$ec_{6,0\ L}$	(Pa)	81.16 - 85.54		0.0379 (10)		
$ec_{8,4\ M}$	(Pa)	84.59 - 86.51		0.0297 (10)		
$ec_{9,4\ M}$	(Pa)	93.920 - 95.839		0.155 (12)		
$ec_{11,7\ L}$	(Pa)	114.562 - 118.934		0.112 (15)		
$ec_{11,5\ L}$	(Pa)	124.836 - 129.208		0.0411 (36)		
$ec_{11,7\ M}$	(Pa)	130.306 - 132.225		0.0279 (48)		
$ec_{11,5\ M}$	(Pa)	140.580 - 142.499		0.0107 (14)		
$ec_{11,4\ L}$	(Pa)	142.000 - 146.372		0.122 (5)		
$ec_{8,0\ L}$	(Pa)	153.06 - 157.43		0.0122 (10)		
$ec_{11,4\ M}$	(Pa)	157.744 - 159.663		0.0296 (17)		
$\beta^-_{0,14}$	max:	39.8	(15)	0.0032 (2)	avg:	10.1 (5)
$\beta^-_{0,13}$	max:	71.4	(15)	0.066 (2)	avg:	18.3 (4)
$\beta^-_{0,12}$	max:	73.6	(15)	0.00078 (5)	avg:	18.9 (4)
$\beta^-_{0,11}$	max:	144.3	(15)	2.7 (4)	avg:	38.1 (5)
$\beta^-_{0,10}$	max:	173.4	(15)	0.31 (23)	avg:	46.2 (5)
$\beta^-_{0,9}$	max:	208.1	(15)	12.2 (15)	avg:	56.2 (5)
$\beta^-_{0,8}$	max:	217.4	(15)	1.36 (24)	avg:	58.9 (5)
$\beta^-_{0,6}$	max:	289.3	(15)	13 (8)	avg:	80.1 (5)
$\beta^-_{0,5}$	max:	290.2	(15)	41 (16)	avg:	80.4 (5)
$\beta^-_{0,4}$	max:	307.4	(15)	29 (18)	avg:	85.6 (5)
$\beta^-_{0,3}$	max:	313.9	(15)	0.43 (2)	avg:	87.6 (5)
$\beta^-_{0,2}$	max:	333.0	(15)	0.17 (17)	avg:	93.4 (5)
$\beta^-_{0,0}$	max:	391.6	(15)	0.022 (7)	avg:	111.6 (5)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pa)	11.3676 — 20.1126		65 (3)	
$XK\alpha_2$	(Pa)	92.288		0.37 (4)	} $K\alpha$
$XK\alpha_1$	(Pa)	95.869		0.59 (7)	}
$XK\beta_3$	(Pa)	107.595	}		
$XK\beta_1$	(Pa)	108.422	}	0.21 (2)	$K\beta_1'$
$XK\beta_5''$	(Pa)	109.072	}		
$XK\beta_2$	(Pa)	111.405	}		
$XK\beta_4$	(Pa)	111.87	}	0.071 (8)	$K\beta_2'$
$XKO_{2,3}$	(Pa)	112.38	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{4,2}$(Pa)	25.64 (2)	74.6 (39)	E1	4.37 (7)	13.9 (7)
$\gamma_{5,2}$(Pa)	42.86 (7)	0.1275 (34)	[E1]	1.14 (2)	0.0596 (15)
$\gamma_{10,8}$(Pa)	44.08 (17)	0.22 (23)	[M1+E2]	300 (300)	0.00074 (21)
$\gamma_{2,0}$(Pa)	58.5700 (24)	75.1 (27)	E2	155.5 (22)	0.480 (16)
$\gamma_{11,9}$(Pa)	63.86 (3)	0.82 (36)	M1+E2	34 (15)	0.0235 (21)
$\gamma_{3,1}$(Pa)	68.5 (1)	0.438 (13)	E2	73.3 (12)	0.00590 (15)
$\gamma_{8,5}$(Pa)	72.7510 (25)	0.333 (22)	[E1]	0.280 (4)	0.260 (17)
$\gamma_{3,0}$(Pa)	77.69	0.0042 (7)			0.0042 (7)
$\gamma_{9,6}$(Pa)	81.2280 (14)	8.2 (13)	M1(+E2)	8.1 (14)	0.905 (23)
$\gamma_{9,5}$(Pa)	82.0870 (13)	3.7 (6)	M1(+E2)	7.9 (13)	0.418 (13)
$\gamma_{4,0}$(Pa)	84.2140 (13)	23.4 (17)	E1	2.50 (25)	6.70 (7)
$\gamma_{8,4}$(Pa)	89.95 (2)	1.171 (35)	E1	0.1598 (22)	1.01 (3)
$\gamma_{6,1}$(Pa)	93.02 (4)	0.0459 (34)	[E1]	0.1463 (21)	0.040 (3)
$\gamma_{9,4}$(Pa)	99.278 (3)	0.96 (7)	M1+E2	6.0 (4)	0.137 (6)
$\gamma_{6,0}$(Pa)	102.2700 (13)	0.491 (12)	E1	0.1141 (16)	0.441 (11)
$\gamma_{9,3}$(Pa)	105.81 (3)	0.0087 (6)	[E1]	0.1043 (15)	0.0079 (5)
$\gamma_{10,7}$(Pa)	106.61 (3)	0.0197 (8)	[E1]	0.1023 (14)	0.0179 (7)
$\gamma_{8,2}$(Pa)	115.63 (3)	0.0121 (47)	[M1+E2]	10 (4)	0.00110 (16)
$\gamma_{10,5}$(Pa)	116.82 (2)	0.0302 (12)	E1	0.342 (5)	0.0225 (9)
$\gamma_{9,2}$(Pa)	124.914 (17)	0.0763 (20)	E1	0.294 (4)	0.0590 (15)
$\gamma_{10,4}$(Pa)	134.03 (2)	0.0318 (10)	E1	0.249 (4)	0.0255 (8)
$\gamma_{11,7}$(Pa)	135.664 (11)	0.72 (9)	M1(+E2)	8.0 (11)	0.0797 (22)
$\gamma_{13,9}$(Pa)	136.75 (7)	0.00547 (19)	[E1]	0.237 (3)	0.00442 (15)
$\gamma_{10,3}$(Pa)	140.54 (4)	0.0047 (19)	[M1+E2]	5.3 (25)	0.00074 (7)
$\gamma_{11,6}$(Pa)	145.06 (4)	0.0201 (11)	[E2]	2.46 (3)	0.0058 (3)
$\gamma_{11,5}$(Pa)	145.94 (2)	0.198 (27)	M1+E2	5.1 (8)	0.0324 (12)
$\gamma_{11,4}$(Pa)	163.101 (4)	0.92 (7)	M1(+E2)	4.9 (4)	0.156 (5)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{8,1}$(Pa)	165.00 (5)	0.00857 (35)	[E2]	1.464 (2)	0.00348 (14)
$\gamma_{11,3}$(Pa)	169.66 (3)	0.00161 (8)	[E1]	0.1421 (20)	0.00141 (7)
$\gamma_{8,0}$(Pa)	174.15 (2)	0.067 (27)	[M1+E2]	2.7 (15)	0.0180 (6)
$\gamma_{9,0}$(Pa)	183.480 (25)	0.0375 (9)	E1	0.1181 (17)	0.0335 (8)
$\gamma_{11,2}$(Pa)	188.76 (2)	0.00378 (33)	[E1]	0.1105 (15)	0.0034 (3)
$\gamma_{13,6}$(Pa)	217.94 (3)	0.0434 (9)	E1	0.0789 (11)	0.0402 (8)
$\gamma_{13,4}$(Pa)	236.01 (3)	0.01002 (32)	[E1]	0.0657 (9)	0.0094 (3)
$\gamma_{12,3}$(Pa)	240.27 (5)	0.000308 (43)	[E1]	0.0630 (9)	0.00029 (4)
$\gamma_{13,3}$(Pa)	242.50 (4)	0.0016 (6)	[M1+E2]	1.0 (7)	0.00082 (5)
$\gamma_{14,6}$(Pa)	249.60 (7)	0.00085 (7)	[E1]	0.0578 (8)	0.00080 (7)
$\gamma_{14,5}$(Pa)	250.45 (7)	0.00071 (7)	[E1]	0.0573 (8)	0.00067 (7)
$\gamma_{14,4}$(Pa)	267.62 (8)	0.00148 (15)	[E1]	0.0493 (7)	0.00141 (14)
$\gamma_{14,3}$(Pa)	274.1 (1)	0.000058 (27)	[M1+E2]	0.7 (5)	0.000034 (12)
$\gamma_{12,1}$(Pa)	308.78 (7)	0.0003748 (19)	[E1]	0.0358 (5)	0.0003618 (18)
$\gamma_{13,1}$(Pa)	311.00 (5)	0.005 (1)	M1+E2	0.6 (3)	0.00315 (14)
$\gamma_{12,0}$(Pa)	317.87 (8)	0.0001039 (5)	[E1]	0.0336 (5)	0.0001005 (5)
$\gamma_{13,0}$(Pa)	320.15 (8)	0.00022 (7)	[M1+E2]	0.5 (4)	0.00015 (3)
$\gamma_{14,0}$(Pa)	351.8 (1)	0.000090 (24)	[M1+E2]	0.35 (25)	0.000067 (13)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	14.02	(6)	$\times 10^9$ y
Q_α	:	4081.6	(14)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,2}$	3810.0 (14)	0.068 (20)
$\alpha_{0,1}$	3948.5 (14)	21.0 (13)
$\alpha_{0,0}$	4011.2 (14)	78.9 (13)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Ra)	5.71 - 19.09		8.18 (29)
e_{AK}	(Ra)			0.00019 (6)
	KLL	65.149 - 72.729	}	
	KLX	79.721 - 88.466	}	
	KXY	94.27 - 103.91	}	

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Ra)	10.624 — 18.354		7.2 (3)	
XKα_2	(Ra)	85.43		0.0017 (5)	} Kα
XKα_1	(Ra)	88.47		0.0028 (8)	}
XKβ_3	(Ra)	99.432	}		
XKβ_1	(Ra)	100.13	}	0.00097 (28)	Kβ_1'
XKβ_5''	(Ra)	100.738	}		
XKβ_2	(Ra)	102.89	}		
XKβ_4	(Ra)	103.295	}	0.00032 (10)	Kβ_2'
XKO$_{2,3}$	(Ra)	103.74	}		

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4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Ra)	63.811 (10)	21.1 (13)	E2	80.4 (12)	0.259 (15)
$\gamma_{2,1}$(Ra)	140.88 (1)	0.068 (20)	E2	2.26 (4)	0.021 (6)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	22.15	(8)	min
Q_{β^-}	:	1243.1	(14)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,20}$	224.4 (14)	0.0434 (9)		6.7
$\beta^-_{0,19}$	258.3 (14)	0.205 (2)	Allowed	6.2
$\beta^-_{0,18}$	431.5 (14)	0.385 (4)	Allowed	6.6
$\beta^-_{0,17}$	478.5 (14)	1.19 (3)	Allowed	6.3
$\beta^-_{0,16}$	573.2 (14)	0.0174 (22)	1st forbidden	8.4
$\beta^-_{0,15}$	657.6 (14)	0.15 (3)	Allowed	7.6
$\beta^-_{0,14}$	689.2 (14)	1.23 (3)	Allowed	6.8
$\beta^-_{0,13}$	788.7 (14)	0.217 (13)	Allowed	7.7
$\beta^-_{0,12}$	795.3 (14)	0.821 (14)	1st forbidden	7.2
$\beta^-_{0,11}$	985.8 (14)	0.60 (3)	1st forbidden unique	8.1
$\beta^-_{0,8}$	1041.4 (14)	0.074 (8)	Allowed	8.6
$\beta^-_{0,7}$	1073.9 (14)	0.692 (12)	Allowed	7.7
$\beta^-_{0,5}$	1148.4 (14)	10.4 (4)	Allowed	6.6
$\beta^-_{0,1}$	1236.4 (14)	50 (6)	1st forbidden	6.1
$\beta^-_{0,0}$	1243.1 (14)	34 (6)	1st forbidden	6.2

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Pa)	5.9 - 21.6	8.6 (10)	
e_{AK}	(Pa)		0.041 (5)	
	KLL	70.081 - 78.822	}	
	KLX	88.03 - 95.56	}	
	KXY	101.78 - 112.40	}	
$ec_{1,0\ M}$	(Pa)	1.29 - 3.21	34.2 (9)	
$ec_{8,4\ K}$	(Pa)	2.54 (5)	0.013	
$ec_{9,5\ K}$	(Pa)	5.10 (2)	0.0270 (31)	
$ec_{1,0\ N}$	(Pa)	5.27 - 6.30	9.27 (26)	
$ec_{4,2\ L}$	(Pa)	8.268 - 12.640	4.97 (19)	
$ec_{8,3\ K}$	(Pa)	18.5 (1)	0.013	
$ec_{10,6\ K}$	(Pa)	21.689 (20)	0.015	
$ec_{4,2\ M}$	(Pa)	24.012 - 25.931	1.272 (49)	
$ec_{4,2\ N}$	(Pa)	27.990 - 29.018	0.332 (12)	
$ec_{10,5\ K}$	(Pa)	30.63 (2)	0.057 (16)	
$ec_{2,0\ L}$	(Pa)	36.0 - 40.4	6.39 (23)	
$ec_{10,4\ K}$	(Pa)	38.9 (2)	0.034	

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		Energy keV		Electrons per 100 disint.		Energy keV
$ec_{3,1\ L}$	(Pa)	42.82 - 47.19		0.052 (22)		
$ec_{3,0\ L}$	(Pa)	49.38 - 53.76		0.020 (17)		
$ec_{7,1\ K}$	(Pa)	49.908	(12)	0.0206 (6)		
$ec_{11,5\ K}$	(Pa)	50		0.01968 (29)		
$ec_{2,0\ M}$	(Pa)	51.7 - 53.7		1.76 (6)		
$ec_{7,5\ L}$	(Pa)	53.40 - 57.78		0.299 (14)		
$ec_{2,0\ N}$	(Pa)	55.7 - 56.7		0.475 (16)		
$ec_{7,0\ K}$	(Pa)	56.57	(1)	0.0281 (7)		
$ec_{11,4\ K}$	(Pa)	58.00	(6)	0.0557 (14)		
$ec_{3,1\ M}$	(Pa)	58.56 - 60.48		0.014 (6)		
$ec_{4,0\ L}$	(Pa)	65.372 - 69.744		2.08 (8)		
$ec_{17,15\ K}$	(Pa)	66.45	(8)	0.075 (22)		
$ec_{5,1\ L}$	(Pa)	66.88 - 71.26		0.0217 (6)		
$ec_{7,5\ M}$	(Pa)	69.15 - 71.07		0.0720 (34)		
$ec_{7,5\ N}$	(Pa)	73.13 - 74.16		0.0193 (9)		
$ec_{5,0\ L}$	(Pa)	73.54 - 77.91		0.0814 (18)		
$ec_{11,3\ K}$	(Pa)	74.20	(18)	0.031 (27)		
$ec_{12,11\ K}$	(Pa)	77.956	(14)	0.224 (6)		
$ec_{4,0\ M}$	(Pa)	81.116 - 83.035		0.41 (7)		
$ec_{5,0\ M}$	(Pa)	89.29 - 91.21		0.01992 (45)		
$ec_{17,14\ K}$	(Pa)	98.07	(8)	0.020 (16)		
$ec_{13,10\ K}$	(Pa)	104	(2)	0.029		
$ec_{18,15\ K}$	(Pa)	113.5	(2)	0.0275 (12)		
$ec_{10,5\ L}$	(Pa)	122.12 - 126.50		0.0138 (20)		
$ec_{10,4\ L}$	(Pa)	130.4 - 134.8		0.011		
$ec_{13,8\ K}$	(Pa)	140.18	(9)	0.014		
$ec_{11,0\ K}$	(Pa)	144.70	(15)	0.031 (31)		
$ec_{11,4\ L}$	(Pa)	149.5 - 153.9		0.01166 (33)		
$ec_{17,15\ L}$	(Pa)	157.95 - 162.32		0.0167 (6)		
$ec_{11,3\ L}$	(Pa)	165.7 - 170.1		0.0111 (5)		
$ec_{12,11\ L}$	(Pa)	169.447 - 173.819		0.0430 (11)		
$ec_{13,7\ K}$	(Pa)	172.64	(7)	0.017		
$ec_{12,11\ M}$	(Pa)	185.191 - 187.110		0.01037 (27)		
$ec_{12,3\ K}$	(Pa)	264.67	(11)	0.015		
$ec_{12,1\ K}$	(Pa)	328.34	(4)	0.046 (8)		
$ec_{12,0\ K}$	(Pa)	335.17	(2)	0.0240 (42)		
$ec_{14,5\ K}$	(Pa)	346.626	(7)	0.227 (6)		
$ec_{12,3\ L}$	(Pa)	356.2 - 360.6		0.029		
$ec_{15,5\ K}$	(Pa)	378.2	(6)	0.035		
$ec_{15,4\ K}$	(Pa)	386.42	(4)	0.042		
$ec_{14,5\ L}$	(Pa)	438.117 - 442.489		0.043 (1)		
$ec_{17,8\ K}$	(Pa)	450.33	(8)	0.01		
$ec_{14,5\ M}$	(Pa)	453.861 - 455.780		0.01035 (24)		
$ec_{17,7\ K}$	(Pa)	482.79	(6)	0.02		
$ec_{17,5\ K}$	(Pa)	557.305	(16)	0.0423 (10)		
$\beta^-_{0,20}$	max:	224.4	(14)	0.0434 (9)	avg:	60.9 (4)
$\beta^-_{0,19}$	max:	258.3	(14)	0.205 (2)	avg:	70.8 (4)
$\beta^-_{0,18}$	max:	431.5	(14)	0.385 (4)	avg:	124.3 (5)

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		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,17}$	max:	478.5	(14)	1.19 (3)	avg:	139.5 (5)
$\beta^-_{0,16}$	max:	573.2	(14)	0.0174 (22)	avg:	170.8 (5)
$\beta^-_{0,15}$	max:	657.6	(14)	0.15 (3)	avg:	199.6 (5)
$\beta^-_{0,14}$	max:	689.2	(14)	1.23 (3)	avg:	210.5 (5)
$\beta^-_{0,13}$	max:	788.7	(14)	0.217 (13)	avg:	245.5 (5)
$\beta^-_{0,12}$	max:	795.3	(14)	0.821 (14)	avg:	247.8 (5)
$\beta^-_{0,11}$	max:	985.8	(14)	0.60 (3)	avg:	317.0 (6)
$\beta^-_{0,8}$	max:	1041.4	(14)	0.074 (8)	avg:	337.6 (6)
$\beta^-_{0,7}$	max:	1073.9	(14)	0.692 (12)	avg:	349.7 (6)
$\beta^-_{0,5}$	max:	1148.4	(14)	10.4 (4)	avg:	377.8 (6)
$\beta^-_{0,1}$	max:	1236.4	(14)	50 (6)	avg:	411.2 (6)
$\beta^-_{0,0}$	max:	1243.1	(14)	34 (6)	avg:	413.8 (6)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pa)	11.366 — 21.6		8.2 (9)	
XKα_2	(Pa)	92.288		0.39 (1)	} Kα
XKα_1	(Pa)	95.869		0.615 (13)	}
XKβ_3	(Pa)	107.595	}		
XKβ_1	(Pa)	108.422	}	0.235 (6)	Kβ_1'
XKβ_5''	(Pa)	109.072	}		
XKβ_2	(Pa)	111.405	}		
XKβ_4	(Pa)	111.87	}	0.079 (3)	Kβ_2'
XKO$_{2,3}$	(Pa)	112.38	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pa)	6.65 (5)	51 (6)	(M1)	3080 (60)	0.0165 (18)
$\gamma_{4,2}$(Pa)	29.373 (10)	8.83 (31)	E1	3.07 (6)	2.17 (7)
$\gamma_{2,0}$(Pa)	57.10 (2)	8.81 (33)	E2	176 (4)	0.0498 (15)
$\gamma_{3,1}$(Pa)	63.92 (6)	0.072 (31)	(E2)	102.1 (21)	0.0007 (3)
$\gamma_{3,0}$(Pa)	70.49 (10)	0.029 (27)	[M1+E2]	40 (30)	0.0007 (4)
$\gamma_{7,5}$(Pa)	74.51 (5)	0.436 (20)	[M1]	9.85 (20)	0.0402 (17)
$\gamma_{4,0}$(Pa)	86.477 (10)	4.48 (16)	E1	1.43 (8)	1.843 (22)
$\gamma_{5,1}$(Pa)	87.99 (3)	0.1985 (24)	[E1]	0.169 (3)	0.1698 (20)
$\gamma_{5,0}$(Pa)	94.65 (5)	0.884 (11)	E1	0.140 (3)	0.775 (9)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{-1,2}$(Pa)	105.2 (1)	0.041			0.041
$\gamma_{9,6}$(Pa)	108.5 (1)	0.0027	M1+E2	3.5 (6)	0.0006
$\gamma_{8,4}$(Pa)	115.14 (5)	0.03 (8)	[M1+E2]	10 (4)	0.003 (7)
$\gamma_{9,5}$(Pa)	117.692 (20)	0.038 (4)	M1+E2	12.2 (4)	0.0029 (3)
$\gamma_{8,3}$(Pa)	131.101 (25)	0.0641 (17)	E1	0.262 (5)	0.0508 (13)
$\gamma_{10,6}$(Pa)	134.285 (20)	0.016 (5)	[M1+E2]	8.0 (14)	0.0018 (5)
$\gamma_{10,5}$(Pa)	143.23 (2)	0.088 (15)	M1+E2	6.7 (12)	0.0114 (7)
$\gamma_{-1,3}$(Pa)	147.5	0.0018 (6)			0.0018 (6)
$\gamma_{10,4}$(Pa)	151.409 (20)	0.040 (4)	[M1+E2]	4.9 (6)	0.0067 (3)
$\gamma_{11,6}$(Pa)	153.49 (18)	0.0480 (8)	[E1]	0.180 (4)	0.0407 (7)
$\gamma_{9,2}$(Pa)	155.239 (20)	0.000270 (35)	E1	0.176 (4)	0.00023 (3)
$\gamma_{11,5}$(Pa)	162.504	0.185	[E1]	0.157 (3)	0.16
$\gamma_{7,1}$(Pa)	162.504 (12)	0.194 (3)	[E1]	0.157 (3)	0.1674 (26)
$\gamma_{7,0}$(Pa)	169.162 (10)	0.287 (5)	[E1]	0.1431 (29)	0.251 (4)
$\gamma_{11,4}$(Pa)	170.60 (6)	0.578 (10)	[E1]	0.1403 (28)	0.507 (9)
$\gamma_{17,15}$(Pa)	179.05 (8)	0.125 (25)	(M1+E2)	3.5 (8)	0.0278 (7)
$\gamma_{10,2}$(Pa)	180.76 (3)	0.000123 (3)	[E1]	0.1223 (24)	0.00011 (3)
$\gamma_{11,3}$(Pa)	186.80 (18)	0.067 (27)	[M1+E2]	2.2 (13)	0.0209 (9)
$\gamma_{12,11}$(Pa)	190.552 (14)	0.367 (8)	M1	3.26 (6)	0.0861 (15)
$\gamma_{8,1}$(Pa)	194.97 (7)	0.1183 (19)	E1	0.1024 (20)	0.1073 (17)
$\gamma_{8,0}$(Pa)	201.62 (5)	0.0242 (9)	E1	0.0946 (19)	0.0221 (8)
$\gamma_{17,14}$(Pa)	210.67 (8)	0.044 (18)	[M1+E2]	1.5 (10)	0.0178 (11)
$\gamma_{-1,4}$(Pa)	211.3 (2)	0.0202 (9)			0.0202 (9)
$\gamma_{9,0}$(Pa)	212.34 (5)	0.0070 (7)	E1	0.0839 (17)	0.0065 (6)
$\gamma_{13,10}$(Pa)	216.54 (8)	0.031 (12)	(M1+E2)	1.4 (9)	0.0130 (7)
$\gamma_{18,15}$(Pa)	226.1 (2)	0.0516 (22)	M1+(E2)	2.02 (4)	0.0171 (7)
$\gamma_{10,0}$(Pa)	237.86 (6)	0.00202 (43)	[E1]	0.0645 (13)	0.0019 (4)
$\gamma_{-1,5}$(Pa)	242.3	0.0029 (6)			0.0029 (6)
$\gamma_{12,8}$(Pa)	246.14 (6)	0.0043 (6)	[E1]	0.0596 (12)	0.0041 (6)
$\gamma_{11,1}$(Pa)	250.65 (16)	0.0062 (4)	[E2]	0.317 (6)	0.0047 (3)
$\gamma_{13,8}$(Pa)	252.78 (9)	0.0152 (21)	[M1+E2]	1.3 (3)	0.0066 (3)
$\gamma_{11,0}$(Pa)	257.30 (15)	0.09 (3)	[M1+E2]	0.8 (6)	0.0524 (12)
$\gamma_{12,7}$(Pa)	278.7 (4)	0.0047 (6)			0.0047 (6)
$\gamma_{13,7}$(Pa)	285.24 (7)	0.030 (4)	[M1+E2]	0.94 (22)	0.0154 (9)
$\gamma_{-1,6}$(Pa)	309.9	0.0032 (3)			0.0032 (3)
$\gamma_{14,10}$(Pa)	316.1	0.00383 (41)	E1	0.0340 (7)	0.0037 (4)
$\gamma_{15,10}$(Pa)	347.64 (6)	0.0234 (13)	[M1]	0.613 (12)	0.0145 (8)
$\gamma_{13,5}$(Pa)	359.74 (4)	0.1355 (21)	M1	0.559 (11)	0.0869 (12)
$\gamma_{12,4}$(Pa)	361.285 (22)	0.0224 (6)	[E1]	0.0255 (5)	0.0218 (6)
$\gamma_{13,4}$(Pa)	367.92 (7)	0.0056 (11)	[M1]	0.525 (10)	0.0037 (7)
$\gamma_{12,3}$(Pa)	377.27 (11)	0.040 (3)	[M1+E2]	0.46 (8)	0.0275 (9)
$\gamma_{-1,7}$(Pa)	383.5	0.0019 (6)			0.0019 (6)
$\gamma_{19,15}$(Pa)	398.8 (5)	0.0158 (10)	[M1]	0.422 (8)	0.0111 (7)
$\gamma_{-1,8}$(Pa)	408.8 (5)	0.0005 (4)			0.0005 (4)
$\gamma_{16,11}$(Pa)	412.5 (5)	0.0115 (10)	[M1]	0.385 (8)	0.0083 (7)
$\gamma_{-1,9}$(Pa)	418.4 (5)	0.0091 (7)			0.0091 (7)
$\gamma_{19,14}$(Pa)	430.9 (4)	0.0239 (5)	(M1)	0.342 (6)	0.0178 (4)
$\gamma_{20,15}$(Pa)	433.2 (4)	0.0117 (4)			0.0117 (4)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{12,1}$(Pa)	440.94 (4)	0.249 (10)	(M1+E2)	0.30 (5)	0.1912 (23)
$\gamma_{12,0}$(Pa)	447.762 (20)	0.134 (5)	[M1+E2]	0.29 (4)	0.1043 (14)
$\gamma_{-1,10}$(Pa)	454.2 (5)	0.04			0.04
$\gamma_{14,5}$(Pa)	459.222 (7)	1.274 (17)	M1	0.288 (6)	0.989 (12)
$\gamma_{-1,11}$(Pa)	464.8	0.0026 (3)			0.0026 (3)
$\gamma_{14,4}$(Pa)	467.40 (6)	0.0167 (17)	[M1,E2]	0.16 (11)	0.0144 (4)
$\gamma_{-1,12}$(Pa)	473.9 (5)	0.0033 (7)			0.0033 (7)
$\gamma_{15,5}$(Pa)	490.80 (6)	0.1338 (21)	M1	0.241 (5)	0.1078 (16)
$\gamma_{-1,13}$(Pa)	497.1 (4)	0.0128 (4)			0.0128 (4)
$\gamma_{15,4}$(Pa)	499.02 (4)	0.1938 (27)	M1	0.230 (5)	0.1576 (21)
$\gamma_{-1,14}$(Pa)	505.5 (6)	0.0055 (3)			0.0055 (3)
$\gamma_{-1,15}$(Pa)	513.4 (4)	0.0133 (4)			0.0133 (4)
$\gamma_{-1,16}$(Pa)	517.0 (4)	0.0046 (3)			0.0046 (3)
$\gamma_{17,10}$(Pa)	526.69 (6)	0.052 (4)	[M1,E2]	0.12 (8)	0.0463 (11)
$\gamma_{-1,17}$(Pa)	531.8 (4)	0.0070 (7)			0.0070 (7)
$\gamma_{17,9}$(Pa)	552.21 (8)	0.0194 (6)	(M1)	0.1754 (35)	0.0165 (5)
$\gamma_{-1,18}$(Pa)	553.7	0.0030 (3)			0.0030 (3)
$\gamma_{-1,19}$(Pa)	554.9	0.0031 (3)			0.0031 (3)
$\gamma_{17,8}$(Pa)	562.93 (8)	0.0636 (8)	[M1]	0.167 (3)	0.0545 (7)
$\gamma_{18,10}$(Pa)	573.7 (4)	0.0384 (12)	[M1]	0.158 (3)	0.0332 (10)
$\gamma_{-1,20}$(Pa)	578.7	0.0017 (5)			0.0017 (5)
$\gamma_{-1,21}$(Pa)	583.2	0.0016 (5)			0.0016 (5)
$\gamma_{17,7}$(Pa)	595.39 (6)	0.1346 (19)	(M1)	0.143 (3)	0.1178 (16)
$\gamma_{18,9}$(Pa)	599.3 (2)	0.0335 (6)	[M1]	0.141 (3)	0.0294 (5)
$\gamma_{18,8}$(Pa)	610.0 (3)	0.0643 (14)	[M1]	0.134 (3)	0.0567 (12)
$\gamma_{18,7}$(Pa)	642.4 (2)	0.0226 (6)	[M1]	0.1171 (23)	0.0202 (5)
$\gamma_{16,1}$(Pa)	663.3 (5)	0.0041 (6)	[M1]	0.1075 (22)	0.0037 (5)
$\gamma_{16,0}$(Pa)	669.9 (5)	0.0018			0.0018
$\gamma_{17,5}$(Pa)	669.901 (16)	0.557 (7)	[M1]	0.1047 (21)	0.504 (6)
$\gamma_{17,4}$(Pa)	678.04 (10)	0.0686 (28)	[M1,E2]	0.06 (4)	0.0647 (9)
$\gamma_{-1,22}$(Pa)	681.2 (6)	0.0143 (4)			0.0143 (4)
$\gamma_{-1,23}$(Pa)	690	0.0021 (5)			0.0021 (5)
$\gamma_{-1,24}$(Pa)	698.5 (6)	0.0106 (5)			0.0106 (5)
$\gamma_{-1,25}$(Pa)	703.7 (6)	0.0091 (5)			0.0091 (5)
$\gamma_{18,6}$(Pa)	707.8 (3)	0.0093 (5)	[E2]	0.0209 (4)	0.0091 (5)
$\gamma_{18,5}$(Pa)	717.0 (2)	0.0458 (10)	(M1)	0.0874 (17)	0.0421 (9)
$\gamma_{18,4}$(Pa)	725.1 (2)	0.0687 (11)	(M1)	0.0848 (17)	0.0633 (10)
$\gamma_{-1,26}$(Pa)	727.8	0.0029 (2)			0.0029 (2)
$\gamma_{18,3}$(Pa)	741.1 (2)	0.0237 (5)	[E1]	0.00615 (12)	0.0236 (5)
$\gamma_{-1,27}$(Pa)	744.9 (5)	0.0053 (2)			0.0053 (2)
$\gamma_{-1,28}$(Pa)	751.6 (6)	0.0023 (4)			0.0023 (4)
$\gamma_{17,1}$(Pa)	757.90 (7)	0.0324 (7)			0.0324 (7)
$\gamma_{17,0}$(Pa)	764.55 (6)	0.0891 (13)			0.0891 (13)
$\gamma_{-1,29}$(Pa)	767.5	0.0032 (2)			0.0032 (2)
$\gamma_{-1,30}$(Pa)	774.0 (4)	0.0108 (5)			0.0108 (5)
$\gamma_{19,8}$(Pa)	783.2 (5)	0.00600 (32)	[M1]	0.0692 (14)	0.0056 (3)
$\gamma_{-1,31}$(Pa)	784.2 (5)	0.0022 (2)			0.0022 (2)
$\gamma_{18,1}$(Pa)	805.0 (2)	0.0215 (6)	[E1]	0.00529 (11)	0.0214 (6)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{20,9}$(Pa)	806.4 (5)	0.0123 (5)			0.0123 (5)
$\gamma_{18,0}$(Pa)	811.6 (2)	0.0060 (2)	[E1]	0.00521 (10)	0.0060 (2)
$\gamma_{19,7}$(Pa)	815.9 (4)	0.0207 (6)	[M1]	0.0621 (12)	0.0195 (6)
$\gamma_{20,8}$(Pa)	817.0 (6)	0.0095 (5)			0.0095 (5)
$\gamma_{-1,32}$(Pa)	832.0 (3)	0.0075			0.0075
$\gamma_{-1,33}$(Pa)	846.8 (7)	0.0013			0.0013
$\gamma_{20,7}$(Pa)	849.5 (5)	0.0039 (3)			0.0039 (3)
$\gamma_{-1,34}$(Pa)	870.7 (7)	0.0031 (2)			0.0031 (2)
$\gamma_{-1,35}$(Pa)	874.0 (5)	0.00120 (4)			0.00120 (4)
$\gamma_{19,6}$(Pa)	880.9 (5)	0.0098 (4)	E2	0.0135 (3)	0.0097 (4)
$\gamma_{19,5}$(Pa)	890.1 (5)	0.1104 (15)	[M1]	0.0493 (10)	0.1052 (14)
$\gamma_{19,4}$(Pa)	898.3 (5)	0.0023 (4)	[M1]	0.0481 (10)	0.0022 (4)
$\gamma_{-1,36}$(Pa)	918.9 (5)	0.006			0.006
$\gamma_{-1,37}$(Pa)	935.2 (7)	0.0369 (7)			0.0369 (7)
$\gamma_{-1,38}$(Pa)	941.9 (8)	0.0048 (3)			0.0048 (3)
$\gamma_{-1,39}$(Pa)	942.8	0.0019 (3)			0.0019 (3)
$\gamma_{20,3}$(Pa)	948.3 (5)	0.0060 (3)			0.0060 (3)
$\gamma_{-1,40}$(Pa)	955 (1)	0.0002 (3)			0.0002 (3)
$\gamma_{-1,41}$(Pa)	960.8 (8)	0.0041 (2)			0.0041 (2)
$\gamma_{-1,42}$(Pa)	962.8 (9)	0.0015 (2)			0.0015 (2)
$\gamma_{-1,43}$(Pa)	968.2 (9)	0.0083 (3)			0.0083 (3)
$\gamma_{19,1}$(Pa)	978.2 (5)	0.00582 (30)	[E1]	0.00374 (7)	0.0058 (3)
$\gamma_{19,0}$(Pa)	984.8 (5)	0.01024 (30)	[E1]	0.00369 (7)	0.0102 (3)
$\gamma_{-1,44}$(Pa)	994 (1)	0.0006 (1)			0.0006 (1)
$\gamma_{-1,45}$(Pa)	1001 (1)	0.0008 (2)			0.0008 (2)
$\gamma_{-1,46}$(Pa)	1007 (1)	0.0014 (2)			0.0014 (2)
$\gamma_{-1,47}$(Pa)	1011 (1)	0.0019 (2)			0.0019 (2)
$\gamma_{-1,48}$(Pa)	1026.5 (10)	0.0075			0.0075
$\gamma_{-1,49}$(Pa)	1092.5 (10)	0.006			0.006
$\gamma_{-1,50}$(Pa)	1132.1	0.0006 (2)			0.0006 (2)
$\gamma_{-1,51}$(Pa)	1139.1	0.0004 (1)			0.0004 (1)
$\gamma_{-1,52}$(Pa)	1144 (1)	0.0027			0.0027
$\gamma_{-1,53}$(Pa)	1201 (1)	0.006			0.006

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	24.10	(3)	d
Q_{β^-}	:	272	(10)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100		Nature	log ft
$\beta^-_{0,7}$	85 (10)	1.6	(6)	Allowed	7
$\beta^-_{0,6}$	95 (10)	0.016	(5)	1st forbidden	9.1
$\beta^-_{0,5}$	105 (10)	6.5	(7)	Allowed	6.7
$\beta^-_{0,4}$	106 (10)	14.1	(12)	1st forbidden	6.3
$\beta^-_{0,2}$	198 (10)	77.8	(15)	1st forbidden	6.4

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Pa)	5.9 - 21.6	7.7 (6)	
e_{AK}	(Pa)		0.0014 (9)	
	KLL	70.081 - 78.822	}	
	KLX	85.989 - 95.858	}	
	KXY	101.87 - 112.59	}	
$ec_{3,2\ L}$	(Pa)	8.4 - 12.8	3.95 (45)	
$ec_{7,5\ M}$	(Pa)	14.65 - 16.57	0.63 (28)	
$ec_{7,5\ N}$	(Pa)	18.63 - 19.65	0.17 (8)	
$ec_{3,2\ M}$	(Pa)	24.1 - 26.1	1.08 (12)	
$ec_{3,2\ N}$	(Pa)	28.1 - 29.1	0.292 (34)	
$ec_{4,3\ L}$	(Pa)	41.78 - 46.15	0.31 (8)	
$ec_{5,3\ L}$	(Pa)	42.2 - 46.6	1.144 (31)	
$ec_{1,0\ L}$	(Pa)	52.82 - 57.19	0.106 (12)	
$ec_{4,3\ M}$	(Pa)	57.52 - 59.44	0.079 (20)	
$ec_{5,3\ M}$	(Pa)	57.9 - 59.9	0.281 (7)	
$ec_{4,3\ N}$	(Pa)	61.50 - 62.53	0.021 (5)	
$ec_{5,3\ N}$	(Pa)	61.9 - 62.9	0.0739 (19)	
$ec_{1,0\ M}$	(Pa)	68.56 - 70.48	0.0258 (29)	
$ec_{4,2\ L}$	(Pa)	71.27 - 75.65	8.7 (8)	
$ec_{5,2\ L}$	(Pa)	71.7 - 76.1	0.239 (21)	
$ec_{4,2\ M}$	(Pa)	87.02 - 88.94	2.09 (18)	
$ec_{5,2\ M}$	(Pa)	87.4 - 89.4	0.058 (5)	
$ec_{4,2\ N}$	(Pa)	91.00 - 92.02	0.56 (5)	
$ec_{5,2\ N}$	(Pa)	91.4 - 92.4	0.0154 (14)	
$ec_{7,2\ L}$	(Pa)	91.70 - 96.08	0.0143 (15)	
$\beta^-_{0,7}$	max:	85 (10)	1.6 (6)	avg: 22 (3)

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,6}$	max:	95	(10)	0.016 (5)	avg:	25 (3)
$\beta^-_{0,5}$	max:	105	(10)	6.5 (7)	avg:	27 (3)
$\beta^-_{0,4}$	max:	106	(10)	14.1 (12)	avg:	28 (3)
$\beta^-_{0,2}$	max:	198	(10)	77.8 (15)	avg:	53 (3)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pa)	11.3676 — 20.1126		7.1 (3)	
XKα_2	(Pa)	92.288		0.013 (9)	} Kα
XKα_1	(Pa)	95.869		0.021 (13)	}
XKβ_3	(Pa)	107.595	}		
XKβ_1	(Pa)	108.422	}	0.007 (5)	Kβ_1'
XKβ_5''	(Pa)	109.072	}		
XKβ_2	(Pa)	111.405	}		
XKβ_4	(Pa)	111.87	}	0.0025 (16)	Kβ_2'
XKO$_{2,3}$	(Pa)	112.38	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{7,5}$(Pa)	20.01 (2)	1.2 (6)	M1+E2	240 (70)	0.0051 (21)
$\gamma_{3,2}$(Pa)	29.50 (2)	5.4 (6)	E2	4390 (70)	0.00123 (14)
$\gamma_{4,3}$(Pa)	62.88 (2)	0.43 (11)	M1+E2	25 (5)	0.0164 (28)
$\gamma_{5,3}$(Pa)	63.30 (2)	5.27 (11)	E1	0.405 (6)	3.75 (8)
$\gamma_{1,0}$(Pa)	73.92 (2)	0.154 (17)	M1+E2	10.6 (4)	0.0133 (14)
$\gamma_{7,3}$(Pa)	83.31 (5)	0.073 (6)	E1	0.196 (3)	0.061 (5)
$\gamma_{4,2}$(Pa)	92.38 (1)	13.7 (12)	M1	5.27 (8)	2.18 (19)
$\gamma_{5,2}$(Pa)	92.80 (2)	2.47 (22)	E1	0.1472 (21)	2.15 (19)
$\gamma_{6,2}$(Pa)	103.35 (10)	0.0154 (48)	M1	3.81 (6)	0.0032 (10)
$\gamma_{7,2}$(Pa)	112.81 (5)	0.264 (40)	E1	0.23 (14)	0.215 (22)

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(Multipolarities, Mixing ratio, Spin and Parity, Gamma-ray emission probabilities, Gamma-ray energies, Beta emission energies)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	32670	(260)	y
Q_α	:	5149.9	(8)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,25}$	4415.6 (9)	0.0021 (5)
$\alpha_{0,24}$	4507.6 (8)	0.0036 (3)
$\alpha_{0,23}$	4533.0 (8)	0.00076 (20)
$\alpha_{0,22}$	4568.1 (9)	0.008 (4)
$\alpha_{0,21}$	4599.6 (8)	0.015 (7)
$\alpha_{0,20}$	4630.3 (8)	0.078 (21)
$\alpha_{0,19}$	4633.0 (8)	0.0504 (11)
$\alpha_{0,18}$	4642.5 (8)	0.080 (6)
$\alpha_{0,17}$	4680.1 (8)	1.8 (3)
$\alpha_{0,16}$	4712.3 (8)	1.20 (22)
$\alpha_{0,15}$	4736.3 (8)	8.4 (4)
$\alpha_{0,14}$	4761.2 (8)	0.0032 (9)
$\alpha_{0,12}$	4794.1 (8)	0.040 (15)
$\alpha_{0,11}$	4853.5 (8)	1.40 (15)
$\alpha_{0,8}$	4903.4 (22)	0.002 (1)
$\alpha_{0,7}$	4936.0 (8)	2.9 (3)
$\alpha_{0,6}$	4952.6 (8)	22.5 (5)
$\alpha_{0,5}$	4977.6 (8)	0.4 (1)
$\alpha_{0,4}$	4987.8 (8)	1.6 (2)
$\alpha_{0,3}$	5015.1 (8)	25.3 (5)
$\alpha_{0,2}$	5031.2 (8)	20 (2)
$\alpha_{0,1}$	5033.8 (8)	2.8 (3)
$\alpha_{0,0}$	5060.7 (8)	11.7 (5)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Ac)	5.87 - 19.69	52.6 (15)
e_{AK}	(Ac)		0.078 (11)
	KLL	66.769 - 74.715	}
	KLX	81.775 - 90.882	}
	KXY	96.76 - 106.75	}

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Ac)	10.8701 — 18.9228	44.3 (13)	
$XK\alpha_2$	(Ac)	87.768	0.715 (23)	} $K\alpha$
$XK\alpha_1$	(Ac)	90.885	1.16 (4)	}
$XK\beta_3$	(Ac)	102.101 }		
$XK\beta_1$	(Ac)	102.841 }	0.410 (15)	$K\beta'_1$
$XK\beta''_5$	(Ac)	103.462 }		
$XK\beta_2$	(Ac)	105.679 }		
$XK\beta_4$	(Ac)	106.098 }	0.136 (6)	$K\beta'_2$
$XKO_{2,3}$	(Ac)	106.563 }		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{3,2}$(Ac)	16.370 (14)	2.12 (9)	E1	8.58 (12)	0.221 (9)
$\gamma_{3,1}$(Ac)	18.980 (14)	42 (4)	M1	113.2 (16)	0.37 (3)
$\gamma_{11,9}$(Ac)	23.46 (6)	1.16 (15)	M1	241 (4)	0.0048 (6)
$\gamma_{16,15}$(Ac)	24.46 (4)	1.05 (21)	M1	214 (4)	0.0049 (10)
$\gamma_{6,5}$(Ac)	25.390 (22)	18.3 (14)	M1	191 (3)	0.095 (7)
$\gamma_{1,0}$(Ac)	27.37 (1)	59 (7)	E1	4.5 (6)	10.8 (4)
$\gamma_{2,0}$(Ac)	29.98 (1)	26 (3)	M1+E2	270 (30)	0.097 (4)
$\gamma_{6,4}$(Ac)	35.800 (22)	0.045 (3)	E1	1.746 (25)	0.0163 (10)
$\gamma_{5,3}$(Ac)	38.200 (14)	13 (3)	M1+E2	89 (19)	0.144 (6)
$\gamma_{4,2}$(Ac)	44.160 (14)	2.11 (16)	M1	37.4 (6)	0.055 (4)
$\gamma_{3,0}$(Ac)	46.35 (1)	0.357 (19)	E1	0.879 (13)	0.19 (1)
$\gamma_{20,17}$(Ac)	50.73 (5)	0.057 (21)	M1	24.9 (4)	0.0022 (8)
$\gamma_{7,4}$(Ac)	52.720 (22)	1.77 (10)	M1	22.2 (4)	0.076 (4)
$\gamma_{5,2}$(Ac)	54.570 (14)	0.110 (6)	E1	0.569 (8)	0.070 (4)
$\gamma_{15,13}$(Ac)	56.90 (3)	0.18 (4)	M1+E2	37 (6)	0.0047 (7)
$\gamma_{5,1}$(Ac)	57.180 (14)	4.6 (5)	E2	148.1 (21)	0.031 (3)
$\gamma_{17,15}$(Ac)	57.190 (22)	0.7 (3)	E2	148.0 (21)	0.0046 (21)
$\gamma_{9,7}$(Ac)	60.46 (4)	0.0076 (10)	E1	0.433 (7)	0.0053 (7)
$\gamma_{6,3}$(Ac)	63.590 (22)	3.99 (16)	E2	88.8 (13)	0.0446 (17)
$\gamma_{-1,1}$(Ac)	70.49 (5)	0.0051 (8)			0.0051 (8)
$\gamma_{10,7}$(Ac)	71.85 (5)	0.019 (7)	M1	8.98 (13)	0.0019 (7)
$\gamma_{12,10}$(Ac)	72.58 (7)	0.029 (7)	M1	8.71 (13)	0.0030 (7)
$\gamma_{4,0}$(Ac)	74.14 (1)	0.97 (4)	E2	42.6 (6)	0.0223 (9)
$\gamma_{9,6}$(Ac)	77.38 (4)	0.50 (4)	M1	7.23 (11)	0.061 (4)
$\gamma_{7,2}$(Ac)	96.880 (22)	1.10 (4)	E2	12.02 (17)	0.084 (3)
$\gamma_{11,6}$(Ac)	100.84 (5)	0.248 (10)	E2	9.97 (15)	0.0226 (9)
$\gamma_{9,5}$(Ac)	102.77 (3)	0.20 (4)	E2	9.12 (13)	0.019 (4)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{10,4}$(Ac)	124.57 (4)	0.0217 (20)	E2	4.04 (6)	0.0043 (4)
$\gamma_{12,7}$(Ac)	144.43 (6)	0.037 (3)	E2	2.18 (3)	0.0115 (9)
$\gamma_{13,4}$(Ac)	199.00 (3)	0.0030 (12)			0.0030 (12)
$\gamma_{14,4}$(Ac)	230.59 (5)	0.0017 (8)			0.0017 (8)
$\gamma_{-1,2}$(Ac)	242.18 (8)	0.0099 (10)			0.0099 (10)
$\gamma_{13,2}$(Ac)	243.16 (3)	0.065 (11)	M1+E2	0.80 (17)	0.036 (5)
$\gamma_{15,5}$(Ac)	245.490 (14)	0.042 (3)	M2	5.24 (8)	0.0067 (5)
$\gamma_{13,1}$(Ac)	245.77 (3)	0.013 (4)	E1	0.0570 (8)	0.012 (4)
$\gamma_{15,4}$(Ac)	255.900 (14)	0.134 (3)	E2	0.264 (4)	0.1059 (22)
$\gamma_{14,3}$(Ac)	258.38 (5)	0.0015 (4)			0.0015 (4)
$\gamma_{17,7}$(Ac)	260.37 (3)	0.282 (21)	M1+E2	0.55 (11)	0.182 (4)
$\gamma_{13,0}$(Ac)	273.14 (3)	0.101 (7)	M1+E2	0.74 (11)	0.0579 (12)
$\gamma_{17,6}$(Ac)	277.29 (3)	0.10 (6)	E1+M2	0.5 (9)	0.0680 (15)
$\gamma_{15,3}$(Ac)	283.690 (14)	1.72 (3)	E1	0.0410 (6)	1.65 (3)
$\gamma_{-1,3}$(Ac)	286.58 (10)	0.0104 (5)			0.0104 (5)
$\gamma_{15,2}$(Ac)	300.060 (14)	4.25 (10)	M1+E2	0.764 (17)	2.41 (5)
$\gamma_{15,1}$(Ac)	302.670 (14)	2.4 (3)	E1	0.0355 (5)	2.3 (3)
$\gamma_{17,5}$(Ac)	302.680 (22)	0.22 (10)	E1	0.0355 (5)	0.21 (10)
$\gamma_{-1,4}$(Ac)	310.0 (1)	0.00092 (20)			0.00092 (20)
$\gamma_{17,4}$(Ac)	313.090 (22)	0.129 (9)	M1+E2	0.31 (9)	0.0987 (20)
$\gamma_{16,1}$(Ac)	327.13 (4)	0.0372 (11)	E1	0.0298 (5)	0.0361 (11)
$\gamma_{15,0}$(Ac)	330.04 (1)	2.09 (5)	M1+E2	0.541 (19)	1.36 (3)
$\gamma_{17,3}$(Ac)	340.880 (22)	0.196 (7)	E1+M2	0.11 (3)	0.177 (4)
$\gamma_{18,4}$(Ac)	351.45 (3)	0.0029 (12)	E1	0.0255 (4)	0.0028 (12)
$\gamma_{16,0}$(Ac)	354.50 (4)	0.1094 (23)	M1+E2	0.1375 (20)	0.0962 (20)
$\gamma_{17,2}$(Ac)	357.250 (22)	0.240 (18)	M1+E2	0.43 (10)	0.168 (4)
$\gamma_{17,1}$(Ac)	359.860 (22)	0.0085 (3)			0.0085 (3)
$\gamma_{20,4}$(Ac)	363.82 (4)	0.0080 (3)			0.0080 (3)
$\gamma_{-1,5}$(Ac)	374.95 (10)	0.0045 (3)			0.0045 (3)
$\gamma_{18,3}$(Ac)	379.24 (3)	0.066 (6)	M1+E2	0.32 (11)	0.0498 (11)
$\gamma_{21,5}$(Ac)	384.69 (6)	0.00365 (22)			0.00365 (22)
$\gamma_{17,0}$(Ac)	387.23 (2)	0.00032 (11)	E2	0.0773 (11)	0.0003 (1)
$\gamma_{20,3}$(Ac)	391.61 (4)	0.00687 (22)	E1	0.0202 (3)	0.00673 (22)
$\gamma_{18,2}$(Ac)	395.61 (3)	0.00230 (22)	E1	0.0198 (3)	0.00226 (22)
$\gamma_{18,1}$(Ac)	398.22 (3)	0.0095 (3)			0.0095 (3)
$\gamma_{19,1}$(Ac)	407.820 (22)	0.0475 (11)	M1	0.334 (5)	0.0356 (8)
$\gamma_{20,1}$(Ac)	410.59 (4)	0.00183 (22)	E1	0.0183 (3)	0.00180 (22)
$\gamma_{22,4}$(Ac)	427.14 (7)	0.0007 (4)			0.0007 (4)
$\gamma_{19,0}$(Ac)	435.19 (2)	0.00294 (17)			0.00294 (17)
$\gamma_{20,0}$(Ac)	437.96 (4)	0.0045 (3)			0.0045 (3)
$\gamma_{-1,6}$(Ac)	438.72 (10)	0.0013 (4)			0.0013 (4)
$\gamma_{24,4}$(Ac)	488.66 (10)	0.00165 (17)			0.00165 (17)
$\gamma_{23,3}$(Ac)	490.65 (10)	0.0004 (1)			0.0004 (1)
$\gamma_{22,0}$(Ac)	501.28 (7)	0.00076 (18)			0.00076 (18)
$\gamma_{23,1}$(Ac)	509.63 (10)	0.00036 (17)			0.00036 (17)
$\gamma_{24,3}$(Ac)	516.45 (10)	0.00137 (15)			0.00137 (15)
$\gamma_{24,1}$(Ac)	535.43 (10)	0.00061 (12)			0.00061 (12)
$\gamma_{25,6}$(Ac)	546.5 (3)	0.00083 (13)			0.00083 (13)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{25,5}$(Ac)	571.9 (3)	0.00048 (20)			0.00048 (20)
$\gamma_{25,4}$(Ac)	582.3 (3)	0.00031 (17)			0.00031 (17)
$\gamma_{25,3}$(Ac)	610.1 (3)	0.0005 (4)			0.0005 (4)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	: 26.98	(2)	d
Q_{β^-}	: 570.1	(20)	keV
β^-	: 100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,11}$	114.1 (20)	0.0011 (2)	1st forbidden	10.6
$\beta^-_{0,10}$	154.3 (20)	25.4 (16)	1st forbidden	6.7
$\beta^-_{0,9}$	171.5 (20)	15.4 (8)	1st forbidden	7
$\beta^-_{0,8}$	189.8 (20)	0.020 (3)	1st forbidden unique	9.4
$\beta^-_{0,7}$	229.6 (20)	25.9 (32)	1st forbidden	7.2
$\beta^-_{0,6}$	249.4 (20)	0.020 (5)	2nd forbidden	10.4
$\beta^-_{0,5}$	258.2 (20)	26.6 (32)	1st forbidden	7.3
$\beta^-_{0,4}$	268.1 (20)	0.010 (2)	Allowed	11.8
$\beta^-_{0,3}$	271.3 (20)	0.12 (5)	Allowed	9.8
$\beta^-_{0,1}$	529.8 (20)	0.3 (19)	1st forbidden unique	10.2
$\beta^-_{0,0}$	570.1 (20)	6.3 (23)	1st forbidden	9.1

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(U)	5.9 - 21.6	42.2 (13)	
e_{AK}	(U)		0.95 (13)	
	KLL	71.78 - 80.95	}	
	KLX	88.15 - 98.34	}	
	KXY	104.42 - 115.40	}	
$ec_{7,5\ L}$	(U)	6.80 - 11.39	16.5 (21)	
$ec_{10,9\ M}$	(U)	11.714 - 13.710	1.53	
$ec_{1,0\ L}$	(U)	18.59 - 23.18	10.3 (15)	
$ec_{7,3\ L}$	(U)	19.9 - 24.5	0.013 (3)	
$ec_{7,5\ M}$	(U)	23.01 - 25.01	4.3 (6)	
$ec_{7,5\ N}$	(U)	27.118 - 28.180	1.14 (15)	
$ec_{2,1\ L}$	(U)	30.05 - 34.64	0.04	
$ec_{1,0\ M}$	(U)	34.8 - 36.8	2.8 (4)	
$ec_{1,0\ N}$	(U)	38.908 - 39.970	0.77 (12)	
$ec_{2,1\ M}$	(U)	46.26 - 48.26	0.011	
$ec_{10,7\ L}$	(U)	53.51 - 58.10	11.2 (12)	
$ec_{9,5\ L}$	(U)	64.84 - 69.43	10.6 (6)	
$ec_{10,7\ M}$	(U)	69.72 - 71.72	2.7 (3)	
$ec_{2,0\ L}$	(U)	70.40 - 74.99	0.034	
$ec_{10,7\ N}$	(U)	73.828 - 74.890	0.74 (9)	
$ec_{9,5\ M}$	(U)	81.05 - 83.04	2.57 (14)	

		Energy keV	Electrons per 100 disint.		Energy keV
$ec_{10,5\ L}$	(U)	82.10 - 86.69	2.70 (13)		
$ec_{9,5\ N}$	(U)	85.154 - 86.216	0.695 (38)		
$ec_{10,5\ M}$	(U)	98.31 - 100.31	0.66 (4)		
$ec_{10,5\ N}$	(U)	102.42 - 103.48	0.18 (1)		
$ec_{5,1\ K}$	(U)	155.95 (1)	0.0292 (6)		
$ec_{7,1\ K}$	(U)	184.527 (5)	4.62 (20)		
$ec_{5,0\ K}$	(U)	196.302 (5)	24.5 (8)		
$ec_{7,0\ K}$	(U)	224.874 (5)	2.24 (9)		
$ec_{7,2\ L}$	(U)	226.62 - 231.21	0.0107 (3)		
$ec_{5,1\ L}$	(U)	249.80 - 254.39	0.0396 (9)		
$ec_{10,1\ K}$	(U)	259.802 (5)	0.0336 (8)		
$ec_{5,1\ M}$	(U)	266.01 - 268.00	0.0108 (3)		
$ec_{7,1\ L}$	(U)	278.37 - 282.96	0.88 (4)		
$ec_{9,0\ K}$	(U)	282.890 (5)	0.0618 (12)		
$ec_{5,0\ L}$	(U)	290.15 - 294.74	4.83 (17)		
$ec_{7,1\ M}$	(U)	294.58 - 296.58	0.22 (1)		
$ec_{7,1\ N}$	(U)	298.688 - 299.750	0.0659 (25)		
$ec_{10,0\ K}$	(U)	300.162 (7)	0.16 (10)		
$ec_{5,0\ M}$	(U)	306.36 - 308.35	1.19 (4)		
$ec_{5,0\ N}$	(U)	310.463 - 311.525	0.343 (6)		
$ec_{7,0\ L}$	(U)	318.72 - 323.31	0.460 (14)		
$ec_{7,0\ M}$	(U)	334.93 - 336.93	0.098 (5)		
$ec_{7,0\ N}$	(U)	339.035 - 340.097	0.024 (8)		
$ec_{10,1\ L}$	(U)	353.65 - 358.24	0.0246 (5)		
$ec_{9,0\ L}$	(U)	376.73 - 381.32	0.0410 (9)		
$ec_{9,0\ M}$	(U)	392.94 - 394.94	0.01094 (25)		
$ec_{10,0\ L}$	(U)	394.01 - 398.60	0.056 (16)		
$ec_{10,0\ M}$	(U)	410.22 - 412.21	0.014 (3)		
$\beta^-_{0,11}$	max:	114.1 (20)	0.0011 (2)	avg:	29.8 (5)
$\beta^-_{0,10}$	max:	154.3 (20)	25.4 (16)	avg:	40.9 (5)
$\beta^-_{0,9}$	max:	171.5 (20)	15.4 (8)	avg:	45.7 (5)
$\beta^-_{0,8}$	max:	189.8 (20)	0.020 (3)	avg:	50.9 (6)
$\beta^-_{0,7}$	max:	229.6 (20)	25.9 (32)	avg:	62.4 (6)
$\beta^-_{0,6}$	max:	249.4 (20)	0.020 (5)	avg:	68.2 (6)
$\beta^-_{0,5}$	max:	258.2 (20)	26.6 (32)	avg:	70.8 (6)
$\beta^-_{0,4}$	max:	268.1 (20)	0.010 (2)	avg:	73.7 (6)
$\beta^-_{0,3}$	max:	271.3 (20)	0.12 (5)	avg:	74.6 (6)
$\beta^-_{0,1}$	max:	529.8 (20)	0.3 (19)	avg:	156.1 (6)
$\beta^-_{0,0}$	max:	570.1 (20)	6.3 (23)	avg:	169.6 (6)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11.619 — 20.714		40.6 (11)	
$XK\alpha_2$	(U)	94.666		9.10 (26)	} $K\alpha$
$XK\alpha_1$	(U)	98.44		14.6 (4)	}
$XK\beta_3$	(U)	110.421	}		
$XK\beta_1$	(U)	111.298	}	5.25 (18)	$K\beta_1^{'}$
$XK\beta_5^{''}$	(U)	111.964	}		
$XK\beta_2$	(U)	114.407	}		
$XK\beta_4$	(U)	115.012	}	1.80 (7)	$K\beta_2^{'}$
$XKO_{2,3}$	(U)	115.377	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{10,9}$(U)	17.262 (6)	2.07	M1+1.66%E2	503	0.0041
$\gamma_{7,5}$(U)	28.559 (10)	22.3 (28)	M1+2.44%E2	313 (18)	0.071 (8)
$\gamma_{1,0}$(U)	40.349 (5)	13.9 (19)	M1+54%E2	580 (60)	0.024 (2)
$\gamma_{7,3}$(U)	41.663 (10)	0.032 (7)	[E1]	1.253 (25)	0.014 (3)
$\gamma_{2,1}$(U)	51.81 (4)	0.055	[M1+28%E2]	108	0.0005
$\gamma_{10,7}$(U)	75.269 (10)	16.1 (16)	M1+2.2%E2	11.4 (12)	1.30 (3)
$\gamma_{9,5}$(U)	86.595 (5)	16.1 (9)	M1+0.31%E2	7.08 (14)	1.99 (10)
$\gamma_{2,0}$(U)	92.16 (4)	0.0492	[E2]	19.5	0.0024
$\gamma_{10,5}$(U)	103.86 (1)	4.44 (18)	M1+(1%E2)	4.21 (21)	0.853 (6)
$\gamma_{6,2}$(U)	228.57 (5)	0.0042 (7)			0.0042 (7)
$\gamma_{7,2}$(U)	248.38 (4)	0.082 (2)	[E2]	0.346 (7)	0.0609 (11)
$\gamma_{3,1}$(U)	258.45 (2)	0.0289 (6)	[E1]	0.0547 (11)	0.0274 (6)
$\gamma_{5,1}$(U)	271.555 (10)	0.406 (4)	E2	0.258 (5)	0.323 (3)
$\gamma_{6,1}$(U)	280.61 (5)	0.011 (2)			0.011 (2)
$\gamma_{8,2}$(U)	288.42 (10)	0.016 (3)			0.016 (3)
$\gamma_{3,0}$(U)	298.81 (2)	0.12 (5)	[E1]	0.0396 (8)	0.12 (5)
$\gamma_{7,1}$(U)	300.129 (5)	12.3 (4)	M1+0.6%E2	0.87 (2)	6.60 (21)
$\gamma_{4,0}$(U)	301.99 (10)	0.010 (2)			0.010 (2)
$\gamma_{5,0}$(U)	311.904 (5)	68.9 (12)	M1+1%E2	0.80 (2)	38.3 (5)
$\gamma_{6,0}$(U)	320.73 (10)	0.0051 (4)			0.0051 (4)
$\gamma_{7,0}$(U)	340.476 (5)	7.24 (10)	M1+5%E2	0.62 (2)	4.47 (3)
$\gamma_{10,1}$(U)	375.404 (5)	0.751 (7)	E2	0.0981 (20)	0.684 (7)
$\gamma_{8,0}$(U)	380.28 (10)	0.0037 (9)			0.0037 (9)
$\gamma_{9,0}$(U)	398.492 (5)	1.526 (15)	E2	0.0835 (17)	1.408 (14)
$\gamma_{10,0}$(U)	415.764 (5)	1.97 (12)	M1+83%E2	0.13 (8)	1.747 (7)
$\gamma_{11,0}$(U)	455.96 (10)	0.0011 (2)			0.0011 (2)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	6.70	(5)	h
Q_{β^-}	:	2195	(4)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,77}$	51 (4)	0.42 (5)		4.98
$\beta^-_{0,76}$	79 (4)	0.21 (3)		5.87
$\beta^-_{0,75}$	94 (4)	0.064 (11)		6.6
$\beta^-_{0,74}$	126 (4)	0.40 (7)		6.21
$\beta^-_{0,73}$	129 (4)	0.140 (24)		6.69
$\beta^-_{0,72}$	158 (4)	0.055 (8)		7.37
$\beta^-_{0,71}$	161 (4)	0.90 (15)		6.19
$\beta^-_{0,70}$	175 (4)	0.112 (16)		7.2
$\beta^-_{0,69}$	195 (4)	0.122 (16)		7.31
$\beta^-_{0,68}$	214 (4)	0.59 (8)		6.75
$\beta^-_{0,67}$	226 (4)	0.044 (12)		7.95
$\beta^-_{0,66}$	236 (4)	0.44 (19)		7.01
$\beta^-_{0,65}$	254 (4)	0.35 (5)		7.22
$\beta^-_{0,64}$	267 (4)	0.22 (4)		7.49
$\beta^-_{0,63}$	279 (4)	0.21 (3)		7.56
$\beta^-_{0,62}$	313 (4)	0.25 (3)		7.65
$\beta^-_{0,61}$	332 (4)	0.029 (7)		8.66
$\beta^-_{0,60}$	351 (4)	0.17 (3)		7.97
$\beta^-_{0,59}$	383 (4)	1.43 (15)		7.17
$\beta^-_{0,58}$	402 (4)	0.41 (8)		7.78
$\beta^-_{0,57}$	411 (4)	0.061 (11)		8.64
$\beta^-_{0,56}$	412 (4)	8 (3)		6.53
$\beta^-_{0,55}$	424 (4)	0.129 (17)		8.36
$\beta^-_{0,54}$	433 (4)	2.8 (4)		7.05
$\beta^-_{0,53}$	457 (4)	0.78 (19)		7.68
$\beta^-_{0,52}$	458 (4)	1.16 (14)		7.51
$\beta^-_{0,50}$	472 (4)	8.4 (9)	1st forbidden	6.7
$\beta^-_{0,51}$	472 (4)	36 (5)	Allowed	6.06
$\beta^-_{0,49}$	502 (4)	6.9 (8)	1st forbidden	6.87
$\beta^-_{0,48}$	542 (4)	0.95 (13)		7.84
$\beta^-_{0,47}$	545 (4)	0.18 (4)		8.64
$\beta^-_{0,46}$	576 (4)	0.035 (20)		9.36
$\beta^-_{0,45}$	606 (4)	<0.7		>8.1
$\beta^-_{0,44}$	613 (4)	0.05 (3)		9.3
$\beta^-_{0,43}$	642 (4)	19.6 (18)	Allowed	6.77
$\beta^-_{0,42}$	647 (4)	0.078 (20)		9.18
$\beta^-_{0,41}$	651 (4)	0.10 (9)		9.1
$\beta^-_{0,40}$	658 (4)	<0.9		>8.1
$\beta^-_{0,39}$	662 (4)	0.21 (4)		8.79

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,38}$	693 (4)	0.25 (4)		8.78
$\beta^-_{0,37}$	699 (4)	<2.7		>7.8
$\beta^-_{0,36}$	709 (4)	0.12 (3)		9.14
$\beta^-_{0,34}$	747 (4)	0.11 (3)		9.25
$\beta^-_{0,31}$	883 (4)	0.109 (18)		9.5
$\beta^-_{0,26}$	980 (4)	0.30 (12)		9.22
$\beta^-_{0,25}$	1000 (4)	<1.5		>8.5
$\beta^-_{0,22}$	1067 (4)	1.9 (10)		8.54
$\beta^-_{0,18}$	1104 (4)	0.69 (20)		9.04
$\beta^-_{0,16}$	1126 (4)	<8	1st forbidden	>8
$\beta^-_{0,15}$	1171 (4)	1.5 (13)		8.8
$\beta^-_{0,14}$	1171 (4)	<5	1st forbidden	>8.3
$\beta^-_{0,13}$	1206 (4)	<3.1	1st forbidden unique	>8.5
$\beta^-_{0,12}$	1227 (4)	<2.5	Allowed	>8.6
$\beta^-_{0,11}$	1232 (4)	<0.4		>9.4
$\beta^-_{0,10}$	1247 (4)	<0.8	Allowed	>9.2
$\beta^-_{0,7}$	1346 (4)	<0.8	1st forbidden	>9.3
$\beta^-_{0,2}$	2052 (4)	<5	Allowed	>9.2

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(U)	5.9 - 21.6	77 (10)	
e_{AK}	(U)		1.08 (6)	
	KLL	71.776 - 80.954	}	
	KLX	88.153 - 98.429	}	
	KXY	104.51 - 115.59	}	
$ec_{25,16\ K}$	(U)	9.86 (1)	0.171 (26)	
$ec_{14,13\ L}$	(U)	12.5 - 17.1	6.1 (7)	
$ec_{43,33\ K}$	(U)	15.70 (1)	3.71 (33)	
$ec_{51,45\ K}$	(U)	19.01 (2)	0.86 (17)	
$ec_{1,0\ L}$	(U)	21.73 - 26.32	62 (16)	
$ec_{16,14\ L}$	(U)	23.69 - 28.28	5.1 (32)	
$ec_{13,7\ K}$	(U)	24.55 (2)	1.5 (11)	
$ec_{49,43\ K}$	(U)	25.31 (3)	0.054 (9)	
$ec_{33,30\ K}$	(U)	28.18 (2)	1.04 (16)	
$ec_{14,13\ M}$	(U)	28.8 - 30.7	1.69 (18)	
$ec_{14,13\ N}$	(U)	32.9 - 33.9	0.46 (5)	
$ec_{15,12\ L}$	(U)	33.20 - 37.79	0.8 (8)	
$ec_{45,39\ L}$	(U)	33.69 - 38.28	0.012 (4)	
$ec_{30,22\ K}$	(U)	34.28 (3)	0.0161 (48)	
$ec_{22,16\ L}$	(U)	36.4 - 41.0	0.34 (11)	
$ec_{3,2\ K}$	(U)	37.11 (2)	1.30 (15)	
$ec_{56,51\ L}$	(U)	37.43 - 42.02	2.2 (18)	

		Energy keV			Electrons per 100 disint.	Energy keV
$ec_{1,0\ M}$	(U)	37.94	-	39.94	17.2 (43)	
$ec_{16,14\ M}$	(U)	39.9	-	41.9	1.4 (9)	
$ec_{13,9\ L}$	(U)	40.9	-	45.5	0.51 (16)	
$ec_{1,0\ N}$	(U)	42.05	-	43.11	4.7 (12)	
$ec_{33,28\ K}$	(U)	43.88		(2)	0.086 (13)	
$ec_{16,14\ N}$	(U)	44.01	-	45.07	0.38 (25)	
$ec_{25,22\ L}$	(U)	45.49	-	50.08	1.5 (5)	
$ec_{25,20\ L}$	(U)	47.70	-	52.29	0.58 (49)	
$ec_{22,11\ K}$	(U)	49.34		(5)	0.11 (12)	
$ec_{15,12\ M}$	(U)	49.41	-	51.41	0.24 (20)	
$ec_{22,16\ M}$	(U)	52.7	-	54.6	0.095 (32)	
$ec_{15,12\ N}$	(U)	53.52	-	54.58	0.07 (6)	
$ec_{56,51\ M}$	(U)	53.64	-	55.64	0.6 (5)	
$ec_{51,43\ K}$	(U)	55.25		(2)	1.96 (27)	
$ec_{22,16\ N}$	(U)	56.8	-	57.8	0.026 (9)	
$ec_{13,9\ M}$	(U)	57.2	-	59.2	0.127 (40)	
$ec_{56,51\ N}$	(U)	57.75	-	58.81	0.16 (14)	
$ec_{16,13\ L}$	(U)	58.08	-	62.67	1.7 (6)	
$ec_{14,7\ K}$	(U)	58.95		(3)	0.32 (31)	
$ec_{13,9\ N}$	(U)	61.3	-	62.3	0.033 (10)	
$ec_{25,22\ M}$	(U)	61.7	-	63.7	0.41 (15)	
$ec_{25,20\ M}$	(U)	63.91	-	65.91	0.16 (15)	
$ec_{51,41\ K}$	(U)	64.20		(8)	0.15 (5)	
$ec_{25,22\ N}$	(U)	65.81	-	66.87	0.112 (40)	
$ec_{25,20\ N}$	(U)	68.02	-	69.08	0.043 (38)	
$ec_{51,40\ K}$	(U)	70.55		(2)	5.4 (6)	
$ec_{16,13\ M}$	(U)	74.29	-	76.29	0.48 (17)	
$ec_{14,9\ L}$	(U)	75.41	-	80.00	0.024 (9)	
$ec_{2,1\ L}$	(U)	78.10	-	82.69	31 (6)	
$ec_{56,45\ K}$	(U)	78.13		(3)	0.7 (7)	
$ec_{16,13\ N}$	(U)	78.40	-	79.46	0.131 (46)	
$ec_{16,12\ L}$	(U)	79.13	-	83.72	0.0115 (22)	
$ec_{23,12\ K}$	(U)	81.20		(5)	0.1 (1)	
$ec_{22,14\ L}$	(U)	82.01	-	86.60	1.96 (33)	
$ec_{21,9\ K}$	(U)	84.35		(5)	0.1 (1)	
$ec_{16,11\ L}$	(U)	84.92	-	89.51	0.104 (32)	
$ec_{4,3\ K}$	(U)	85.37		(3)	0.138 (20)	
$ec_{13,5\ K}$	(U)	87.52		(3)	1.0 (5)	
$ec_{2,1\ M}$	(U)	94.31	-	96.31	8.7 (16)	
$ec_{22,14\ M}$	(U)	98.22	-	100.22	0.54 (9)	
$ec_{2,1\ N}$	(U)	98.42	-	99.48	2.36 (44)	
$ec_{16,11\ M}$	(U)	101.13	-	103.13	0.025 (8)	
$ec_{22,14\ N}$	(U)	102.33	-	103.39	0.148 (25)	
$ec_{25,16\ L}$	(U)	103.70	-	108.29	2.69 (41)	
$ec_{16,7\ K}$	(U)	104.40		(8)	0.276 (47)	
$ec_{43,33\ L}$	(U)	109.5	-	114.1	0.84 (8)	
$ec_{33,25\ K}$	(U)	110.90		(3)	4.4 (16)	
$ec_{51,37\ K}$	(U)	111.65		(3)	10 (1)	

		Energy keV	Electrons per 100 disint.	Energy keV
$ec_{51,45\ L}$	(U)	112.85 - 117.44	0.169 (34)	
$ec_{25,11\ K}$	(U)	116.61 (3)	0.16 (15)	
$ec_{13,7\ L}$	(U)	118.39 - 122.98	0.90 (18)	
$ec_{49,43\ L}$	(U)	119.15 - 123.74	0.0120 (19)	
$ec_{25,16\ M}$	(U)	119.91 - 121.91	0.75 (11)	
$ec_{33,30\ L}$	(U)	122.02 - 126.61	0.49 (8)	
$ec_{25,16\ N}$	(U)	124.02 - 125.08	0.203 (31)	
$ec_{58,43\ K}$	(U)	124.6 (1)	0.042 (40)	
$ec_{43,33\ M}$	(U)	125.8 - 127.8	0.205 (18)	
$ec_{30,22\ L}$	(U)	128.12 - 132.71	0.111 (34)	
$ec_{51,45\ M}$	(U)	129.06 - 131.06	0.041 (8)	
$ec_{56,40\ K}$	(U)	129.77 (2)	1.06 (15)	
$ec_{43,33\ N}$	(U)	129.9 - 130.9	0.0546 (49)	
$ec_{3,2\ L}$	(U)	130.95 - 135.54	8.4 (10)	
$ec_{51,45\ N}$	(U)	133.17 - 134.23	0.0110 (22)	
$ec_{33,24\ K}$	(U)	133.62 (1)	0.118 (19)	
$ec_{13,7\ M}$	(U)	134.6 - 136.6	0.24 (6)	
$ec_{33,28\ L}$	(U)	137.72 - 142.31	0.0186 (28)	
$ec_{33,30\ M}$	(U)	138.23 - 140.23	0.129 (20)	
$ec_{13,7\ N}$	(U)	138.71 - 139.77	0.065 (15)	
$ec_{68,51\ K}$	(U)	141.6 (1)	0.036 (35)	
$ec_{33,30\ N}$	(U)	142.34 - 143.40	0.035 (5)	
$ec_{22,11\ L}$	(U)	143.18 - 147.77	0.047 (21)	
$ec_{30,22\ M}$	(U)	144.33 - 146.33	0.031 (9)	
$ec_{3,2\ M}$	(U)	147.16 - 149.16	2.33 (27)	
$ec_{51,43\ L}$	(U)	149.09 - 153.68	0.38 (5)	
$ec_{3,2\ N}$	(U)	151.27 - 152.33	0.63 (7)	
$ec_{26,10\ K}$	(U)	151.52 (5)	0.11 (9)	
$ec_{14,7\ L}$	(U)	152.79 - 157.38	0.126 (23)	
$ec_{49,33\ K}$	(U)	156.68 (5)	0.83 (11)	
$ec_{51,41\ L}$	(U)	158.0 - 162.6	0.029 (10)	
$ec_{22,11\ M}$	(U)	159.39 - 161.39	0.012 (6)	
$ec_{21,8\ K}$	(U)	159.4 (1)	0.056 (49)	
$ec_{51,40\ L}$	(U)	164.39 - 168.98	1.04 (11)	
$ec_{51,43\ M}$	(U)	165.3 - 167.3	0.092 (13)	
$ec_{14,7\ M}$	(U)	169 - 171	0.033 (7)	
$ec_{51,43\ N}$	(U)	169.41 - 170.47	0.0249 (34)	
$ec_{56,45\ L}$	(U)	171.97 - 176.56	0.255 (42)	
$ec_{23,12\ L}$	(U)	175.0 - 179.6	0.035 (11)	
$ec_{33,22\ K}$	(U)	178.19 (5)	0.84 (29)	
$ec_{21,9\ L}$	(U)	178.19 - 182.78	0.035 (11)	
$ec_{4,3\ L}$	(U)	179.21 - 183.80	0.38 (6)	
$ec_{33,20\ K}$	(U)	180.31 (8)	0.07 (6)	
$ec_{51,40\ M}$	(U)	180.6 - 182.6	0.253 (27)	
$ec_{13,5\ L}$	(U)	181.36 - 185.95	0.52 (6)	
$ec_{51,40\ N}$	(U)	184.71 - 185.77	0.068 (7)	
$ec_{56,45\ M}$	(U)	188.18 - 190.18	0.066 (11)	
$ec_{56,45\ N}$	(U)	192.29 - 193.35	0.0178 (30)	

		Energy keV	Electrons per 100 disint.	Energy keV
$ec_{71,51\ K}$	(U)	194.6 (1)	0.029 (30)	
$ec_{4,3\ M}$	(U)	195.42 - 197.42	0.105 (15)	
$ec_{13,5\ M}$	(U)	197.57 - 199.57	0.138 (17)	
$ec_{23,8\ K}$	(U)	197.9 (1)	0.042 (42)	
$ec_{16,7\ L}$	(U)	198.242 - 202.832	0.053 (9)	
$ec_{4,3\ N}$	(U)	199.53 - 200.59	0.0285 (41)	
$ec_{37,29\ L}$	(U)	200.07 - 204.66	0.020 (6)	
$ec_{13,5\ N}$	(U)	201.68 - 202.74	0.0373 (46)	
$ec_{33,25\ L}$	(U)	204.7 - 209.3	1.46 (19)	
$ec_{34,22\ K}$	(U)	204.8 (1)	0.021 (16)	
$ec_{51,37\ L}$	(U)	205.49 - 210.08	1.94 (20)	
$ec_{25,11\ L}$	(U)	210.45 - 215.04	0.049 (12)	
$ec_{16,7\ M}$	(U)	214.452 - 216.450	0.0129 (22)	
$ec_{33,18\ K}$	(U)	214.80 (5)	0.0198 (23)	
$ec_{58,43\ L}$	(U)	218.4 - 223.0	0.012 (6)	
$ec_{33,25\ M}$	(U)	221 - 223	0.372 (47)	
$ec_{51,37\ M}$	(U)	221.7 - 223.7	0.469 (49)	
$ec_{56,40\ L}$	(U)	223.61 - 228.20	0.205 (30)	
$ec_{33,25\ N}$	(U)	225.1 - 226.1	0.100 (13)	
$ec_{51,37\ N}$	(U)	225.81 - 226.87	0.126 (13)	
$ec_{25,11\ M}$	(U)	226.66 - 228.66	0.0126 (24)	
$ec_{33,24\ L}$	(U)	227.46 - 232.05	0.0234 (38)	
$ec_{33,16\ K}$	(U)	236.3 (1)	0.0233 (28)	
$ec_{56,40\ M}$	(U)	239.82 - 241.82	0.050 (7)	
$ec_{46,28\ K}$	(U)	242.3 (1)	0.010 (8)	
$ec_{56,40\ N}$	(U)	243.93 - 244.99	0.0134 (19)	
$ec_{26,10\ L}$	(U)	245.36 - 249.95	0.031 (10)	
$ec_{49,33\ L}$	(U)	250.52 - 255.11	0.194 (25)	
$ec_{21,8\ L}$	(U)	253.28 - 257.87	0.015 (5)	
$ec_{37,21\ K}$	(U)	253.90 (5)	1.12 (14)	
$ec_{40,23\ K}$	(U)	256.4 (1)	0.50 (6)	
$ec_{49,33\ M}$	(U)	266.73 - 268.73	0.048 (6)	
$ec_{49,33\ N}$	(U)	270.84 - 271.90	0.0130 (17)	
$ec_{33,22\ L}$	(U)	272.03 - 276.62	0.33 (5)	
$ec_{33,20\ L}$	(U)	274.15 - 278.74	0.018 (7)	
$ec_{33,15\ K}$	(U)	282.1 (3)	0.027 (7)	
$ec_{33,22\ M}$	(U)	288.24 - 290.24	0.085 (13)	
$ec_{23,8\ L}$	(U)	291.7 - 296.3	0.0104 (44)	
$ec_{33,22\ N}$	(U)	292.35 - 293.41	0.0228 (34)	
$ec_{33,16\ L}$	(U)	330.1 - 334.7	0.0191 (23)	
$ec_{40,18\ K}$	(U)	331.0 (1)	0.0307 (41)	
$ec_{33,11\ K}$	(U)	343.08 (5)	0.125 (47)	
$ec_{37,21\ L}$	(U)	347.7 - 352.3	0.216 (26)	
$ec_{40,23\ L}$	(U)	350.242 - 354.832	0.100 (11)	
$ec_{37,15\ K}$	(U)	356.7 (1)	0.083 (9)	
$ec_{37,21\ M}$	(U)	364 - 366	0.052 (6)	
$ec_{71,43\ K}$	(U)	365.4 (1)	0.040 (31)	
$ec_{40,23\ M}$	(U)	366.452 - 368.450	0.0242 (28)	

		Energy keV		Electrons per 100 disint.	Energy keV
$ec_{37,21\ N}$	(U)	368.1 - 369.1		0.0141 (17)	
$ec_{45,18\ K}$	(U)	382.4	(1)	0.0125 (24)	
$ec_{37,13\ K}$	(U)	391.16	(5)	0.0138 (15)	
$ec_{40,15\ K}$	(U)	397.8	(1)	0.0703 (11)	
$ec_{37,12\ K}$	(U)	412.4	(1)	0.069 (9)	
$ec_{33,11\ L}$	(U)	436.92 - 441.51		0.032 (7)	
$ec_{45,15\ K}$	(U)	449.8	(1)	0.149 (16)	
$ec_{37,15\ L}$	(U)	450.5 - 455.1		0.0159 (18)	
$ec_{40,12\ K}$	(U)	453.5	(2)	0.51 (8)	
$ec_{37,9\ K}$	(U)	454.1	(1)	1.30 (17)	
$ec_{59,26\ K}$	(U)	481.5	(1)	0.0247 (37)	
$ec_{40,15\ L}$	(U)	491.6 - 496.2		0.01341 (19)	
$ec_{53,21\ K}$	(U)	496.6	(1)	0.044 (6)	
$ec_{37,12\ L}$	(U)	506.23 - 510.82		0.0131 (17)	
$ec_{49,16\ K}$	(U)	508.8	(1)	0.028 (4)	
$ec_{48,15\ K}$	(U)	514.0	(1)	0.038 (6)	
$ec_{54,22\ K}$	(U)	518.9	(2)	0.0142 (25)	
$ec_{50,16\ K}$	(U)	538.3	(1)	0.046 (8)	
$ec_{45,15\ L}$	(U)	543.6 - 548.2		0.0283 (30)	
$ec_{40,12\ L}$	(U)	547.3 - 551.9		0.096 (16)	
$ec_{37,9\ L}$	(U)	547.9 - 552.5		0.248 (32)	
$ec_{40,12\ M}$	(U)	563.6 - 565.6		0.0232 (39)	
$ec_{37,9\ M}$	(U)	564.2 - 566.2		0.060 (8)	
$ec_{37,9\ N}$	(U)	568.3 - 569.3		0.0161 (21)	
$ec_{54,16\ K}$	(U)	577.2	(1)	0.104 (11)	
$ec_{7,2\ K}$	(U)	590.6	(1)	0.0130 (13)	
$ec_{49,11\ K}$	(U)	615.6	(2)	0.025 (19)	
$ec_{50,13\ K}$	(U)	617.96	(5)	0.50 (6)	
$ec_{54,14\ K}$	(U)	622.7	(1)	0.081 (9)	
$ec_{5,1\ K}$	(U)	627.482	(5)	0.0108 (11)	
$ec_{51,12\ K}$	(U)	639.7	(1)	0.049 (37)	
$ec_{56,15\ K}$	(U)	643.6	(1)	0.010 (8)	
$ec_{54,16\ L}$	(U)	671.0 - 675.6		0.0197 (21)	
$ec_{51,9\ K}$	(U)	680.8	(1)	0.0325 (38)	
$ec_{10,2\ K}$	(U)	688.9	(1)	0.097 (34)	
$ec_{7,1\ K}$	(U)	690.60	(5)	0.0112 (14)	
$ec_{12,2\ K}$	(U)	709.9	(2)	0.0223 (24)	
$ec_{50,13\ L}$	(U)	711.80 - 716.39		0.095 (11)	
$ec_{22,3\ K}$	(U)	716.3	(1)	0.0178 (21)	
$ec_{54,14\ L}$	(U)	716.5 - 721.1		0.0154 (17)	
$ec_{50,13\ M}$	(U)	728.01 - 730.01		0.0228 (26)	
$ec_{51,12\ L}$	(U)	733.5 - 738.1		0.010 (6)	
$ec_{24,3\ K}$	(U)	760.8	(1)	0.0269 (25)	
$ec_{15,2\ K}$	(U)	765.32	(4)	0.065 (8)	
$ec_{14,2\ K}$	(U)	765.32	(4)	0.0164 (23)	
$ec_{9,1\ K}$	(U)	768.06	(4)	0.101 (12)	
$ec_{10,2\ L}$	(U)	782.7 - 787.3		0.069 (24)	
$ec_{25,3\ K}$	(U)	783.46	(5)	0.0122 (15)	

		Energy keV		Electrons per 100 disint.		Energy keV
$ec_{10,2\ M}$	(U)	799 -	801	0.064 (23)		
$ec_{12,1\ K}$	(U)	809.8	(1)	0.076 (9)		
$ec_{9,0\ K}$	(U)	811.5	(1)	0.070 (12)		
$ec_{13,1\ K}$	(U)	830.79	(3)	0.045 (5)		
$ec_{18,2\ K}$	(U)	832.5	(2)	0.0150 (19)		
$ec_{28,3\ K}$	(U)	850.6	(1)	0.011 (6)		
$ec_{15,2\ L}$	(U)	859.16 -	863.75	0.0172 (22)		
$ec_{9,1\ L}$	(U)	861.90 -	866.49	0.0268 (31)		
$ec_{15,1\ K}$	(U)	865.1	(1)	0.01533 (23)		
$ec_{12,1\ L}$	(U)	903.6 -	908.2	0.0194 (22)		
$ec_{9,0\ L}$	(U)	905.3 -	909.9	0.0179 (30)		
$ec_{21,1\ K}$	(U)	968.2	(1)	0.0130 (15)		
$ec_{37,2\ K}$	(U)	1238.3	(1)	0.0164 (17)		
$ec_{40,2\ K}$	(U)	1279.3	(1)	0.0271 (28)		
$\beta^-_{0,77}$	max:	51	(4)	0.42 (5)	avg:	13.0 (11)
$\beta^-_{0,76}$	max:	79	(4)	0.21 (3)	avg:	20.4 (11)
$\beta^-_{0,75}$	max:	94	(4)	0.064 (11)	avg:	24.2 (11)
$\beta^-_{0,74}$	max:	126	(4)	0.40 (7)	avg:	33.1 (11)
$\beta^-_{0,73}$	max:	129	(4)	0.140 (24)	avg:	33.8 (11)
$\beta^-_{0,72}$	max:	158	(4)	0.055 (8)	avg:	41.9 (12)
$\beta^-_{0,71}$	max:	161	(4)	0.90 (15)	avg:	42.9 (12)
$\beta^-_{0,70}$	max:	175	(4)	0.112 (16)	avg:	46.7 (12)
$\beta^-_{0,69}$	max:	195	(4)	0.122 (16)	avg:	52.2 (12)
$\beta^-_{0,68}$	max:	214	(4)	0.59 (8)	avg:	57.8 (12)
$\beta^-_{0,67}$	max:	226	(4)	0.044 (12)	avg:	61.3 (12)
$\beta^-_{0,66}$	max:	236	(4)	0.44 (19)	avg:	64.3 (12)
$\beta^-_{0,65}$	max:	254	(4)	0.35 (5)	avg:	69.7 (12)
$\beta^-_{0,64}$	max:	267	(4)	0.22 (4)	avg:	73.5 (12)
$\beta^-_{0,63}$	max:	279	(4)	0.21 (3)	avg:	76.9 (12)
$\beta^-_{0,62}$	max:	313	(4)	0.25 (3)	avg:	87.3 (13)
$\beta^-_{0,61}$	max:	332	(4)	0.029 (7)	avg:	93.0 (13)
$\beta^-_{0,60}$	max:	351	(4)	0.17 (3)	avg:	98.9 (13)
$\beta^-_{0,59}$	max:	383	(4)	1.43 (15)	avg:	108.9 (13)
$\beta^-_{0,58}$	max:	402	(4)	0.41 (8)	avg:	114.8 (13)
$\beta^-_{0,57}$	max:	411	(4)	0.061 (11)	avg:	117.6 (13)
$\beta^-_{0,56}$	max:	412	(4)	8 (3)	avg:	118.1 (13)
$\beta^-_{0,55}$	max:	424	(4)	0.129 (17)	avg:	121.8 (13)
$\beta^-_{0,54}$	max:	433	(4)	2.8 (4)	avg:	124.7 (13)
$\beta^-_{0,53}$	max:	457	(4)	0.78 (19)	avg:	132.3 (14)
$\beta^-_{0,52}$	max:	458	(4)	1.16 (14)	avg:	132.5 (14)
$\beta^-_{0,50}$	max:	472	(4)	8.4 (9)	avg:	137.2 (13)
$\beta^-_{0,51}$	max:	472	(4)	36 (5)	avg:	137.1 (13)
$\beta^-_{0,49}$	max:	502	(4)	6.9 (8)	avg:	146.8 (14)
$\beta^-_{0,48}$	max:	542	(4)	0.95 (13)	avg:	160.1 (14)
$\beta^-_{0,47}$	max:	545	(4)	0.18 (4)	avg:	164.6 (13)
$\beta^-_{0,46}$	max:	576	(4)	0.035 (20)	avg:	171.4 (14)
$\beta^-_{0,45}$	max:	606	(4)	<0.7	avg:	181.7 (14)

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,44}$	max:	613	(4)	0.05 (3)	avg:	184.1 (14)
$\beta^-_{0,43}$	max:	642	(4)	19.6 (18)	avg:	194.0 (14)
$\beta^-_{0,42}$	max:	647	(4)	0.078 (20)	avg:	195.6 (14)
$\beta^-_{0,41}$	max:	651	(4)	0.10 (9)	avg:	197.1 (14)
$\beta^-_{0,40}$	max:	658	(4)	<0.9	avg:	199.3 (14)
$\beta^-_{0,39}$	max:	662	(4)	0.21 (4)	avg:	200.6 (14)
$\beta^-_{0,38}$	max:	693	(4)	0.25 (4)	avg:	211.3 (14)
$\beta^-_{0,37}$	max:	699	(4)	<2.7	avg:	213.5 (14)
$\beta^-_{0,36}$	max:	709	(4)	0.12 (3)	avg:	216.9 (14)
$\beta^-_{0,34}$	max:	747	(4)	0.11 (3)	avg:	230.3 (14)
$\beta^-_{0,31}$	max:	883	(4)	0.109 (18)	avg:	278.7 (15)
$\beta^-_{0,26}$	max:	980	(4)	0.30 (12)	avg:	314.2 (15)
$\beta^-_{0,25}$	max:	1000	(4)	<1.5	avg:	312.6 (14)
$\beta^-_{0,22}$	max:	1067	(4)	1.9 (10)	avg:	346.5 (15)
$\beta^-_{0,18}$	max:	1104	(4)	0.69 (20)	avg:	360.2 (15)
$\beta^-_{0,16}$	max:	1126	(4)	<8	avg:	368.3 (15)
$\beta^-_{0,15}$	max:	1171	(4)	1.5 (13)	avg:	385.4 (16)
$\beta^-_{0,14}$	max:	1171.2	(40)	<5	avg:	385.4 (16)
$\beta^-_{0,13}$	max:	1206	(4)	<3.1	avg:	398.5 (16)
$\beta^-_{0,12}$	max:	1227	(4)	<2.5	avg:	406.4 (16)
$\beta^-_{0,11}$	max:	1232	(4)	<0.4	avg:	408.7 (16)
$\beta^-_{0,10}$	max:	1247	(4)	<0.8	avg:	414.4 (16)
$\beta^-_{0,7}$	max:	1346	(4)	<0.8	avg:	452.1 (16)
$\beta^-_{0,2}$	max:	2052	(4)	<5	avg:	732.2 (17)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11.6185 — 20.7141		77 (10)	
XKα_2	(U)	94.666		10.5 (6)	} Kα
XKα_1	(U)	98.44		16.8 (9)	}
XKβ_3	(U)	110.421	}		
XKβ_1	(U)	111.298	}	6.1 (4)	Kβ_1'
XKβ_5''	(U)	111.964	}		
XKβ_2	(U)	114.407	}		
XKβ_4	(U)	115.012	}	2.0 (1)	Kβ_2'
XKO$_{2,3}$	(U)	115.377	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{14,13}$(U)	34.30 (4)	8.4 (9)	(E2)	2270 (40)	0.0037 (4)
$\gamma_{1,0}$(U)	43.49 (2)	86 (23)	E2	713 (11)	0.12 (3)
$\gamma_{16,14}$(U)	45.45 (5)	6.8 (44)	M1+E2	250 (140)	0.027 (9)
$\gamma_{15,12}$(U)	54.96 (10)	~1.23	[M1+E2]	130 (110)	~0.0094
$\gamma_{14,12}$(U)	54.96 (10)	~0.0094	[E1]	0.603 (9)	~0.0094
$\gamma_{45,39}$(U)	55.45 (5)	0.043 (14)	(E1)	0.589 (9)	0.027 (9)
$\gamma_{22,16}$(U)	58.20 (6)	0.47 (16)	(E2)	174 (3)	0.0027 (9)
$\gamma_{56,51}$(U)	59.19 (5)	2.9 (25)	[M1+E2]	90 (70)	0.032 (11)
$\gamma_{13,9}$(U)	62.70 (1)	2.3 (7)	E1	0.426 (6)	1.6 (5)
$\gamma_{25,22}$(U)	67.25 (10)	2.1 (8)	M1+E2	57 (11)	0.036 (11)
$\gamma_{25,20}$(U)	69.46 (5)	0.7 (6)	[E2,M1]	40 (30)	0.018 (8)
$\gamma_{16,13}$(U)	79.84 (2)	2.4 (9)	E2	38.4 (6)	0.062 (22)
$\gamma_{14,9}$(U)	97.17 (10)	0.27 (10)	[E1]	0.1343 (20)	0.24 (9)
$\gamma_{2,1}$(U)	99.86 (2)	46 (9)	E2	13.42 (19)	3.2 (6)
$\gamma_{16,12}$(U)	100.89 (2)	0.140 (27)	[E1]	0.1218 (17)	0.125 (24)
$\gamma_{22,14}$(U)	103.77 (2)	2.93 (49)	(E2)	11.22 (16)	0.24 (4)
$\gamma_{16,11}$(U)	106.68 (5)	0.17 (5)	[M1]	3.83 (6)	0.036 (11)
$\gamma_{25,16}$(U)	125.46 (1)	4.7 (7)	E2	4.89 (7)	0.79 (12)
$\gamma_{43,33}$(U)	131.30 (1)	23 (2)	E1	0.265 (4)	18.2 (16)
$\gamma_{51,45}$(U)	134.61 (2)	1.20 (24)	M1	9.50 (14)	0.114 (23)
$\gamma_{21,13}$(U)	137.23 (5)	0.033 (11)	[E1]	0.239 (4)	0.027 (9)
$\gamma_{13,7}$(U)	140.15 (2)	3.2 (10)	M1+E2	5.3 (18)	0.51 (7)
$\gamma_{49,43}$(U)	140.91 (3)	0.38 (6)	[E1]	0.224 (4)	0.31 (5)
$\gamma_{33,30}$(U)	143.78 (2)	2.02 (32)	(M1+E2)	5.31	0.32 (5)
$\gamma_{30,22}$(U)	149.88 (3)	0.24 (7)	[E2]	2.31 (4)	0.073 (22)
$\gamma_{3,2}$(U)	152.71 (2)	18.8 (22)	E2	2.14 (3)	6.0 (7)
$\gamma_{33,28}$(U)	159.48 (2)	0.77 (12)	[E1]	0.1676 (24)	0.66 (10)
$\gamma_{22,11}$(U)	164.94 (5)	0.23 (14)	[E2,M1]	3.5 (19)	0.052 (22)
$\gamma_{64,54}$(U)	165.61 (5)	0.084 (25)	[E1]	0.1533 (22)	0.073 (22)
$\gamma_{51,43}$(U)	170.85 (2)	2.97 (41)	M1	4.83 (7)	0.51 (7)
$\gamma_{14,7}$(U)	174.55 (3)	0.66 (31)	[M1+E2]	2.9 (17)	0.17 (3)
$\gamma_{51,41}$(U)	179.80 (8)	0.23 (8)	[M1]	4.19 (6)	0.045 (16)
$\gamma_{51,40}$(U)	186.15 (2)	8.5 (9)	M1	3.79 (6)	1.78 (19)
$\gamma_{56,45}$(U)	193.73 (3)	1.6 (7)	[M1+E2]	2.1 (13)	0.50 (8)
$\gamma_{23,12}$(U)	196.80 (5)	0.22 (12)	E0+E2+M1	2.0 (13)	0.073 (22)
$\gamma_{21,9}$(U)	199.95 (5)	0.22 (12)	(E0+E2+M1)	2.0 (13)	0.073 (22)
$\gamma_{4,3}$(U)	200.97 (3)	1.56 (23)	E2	0.734 (11)	0.90 (13)
$\gamma_{13,5}$(U)	203.12 (3)	3.0 (6)	M1+E2	1.4 (4)	1.24 (15)
$\gamma_{16,7}$(U)	220.00 (8)	0.49 (8)	(M1)	2.37 (4)	0.146 (25)
$\gamma_{66,53}$(U)	221.15 (10)	0.056 (24)	[E1]	0.0780 (11)	0.052 (22)
$\gamma_{37,29}$(U)	221.83 (10)	0.110 (33)	[E2]	0.513 (8)	0.073 (22)
$\gamma_{33,25}$(U)	226.50 (3)	11.3 (20)	M1+E2	1.3 (3)	4.9 (6)
$\gamma_{51,37}$(U)	227.25 (3)	18.4 (19)	M1	2.17 (3)	5.8 (6)
$\gamma_{25,11}$(U)	232.21 (3)	0.40 (16)	[E2,M1]	1.2 (8)	0.18 (3)
$\gamma_{66,51}$(U)	235.11 (3)	0.122 (25)	[E1]	0.0678 (10)	0.114 (23)
$\gamma_{17,7}$(U)	235.9 (30)	0.005 (3)			0.005 (3)
$\gamma_{58,43}$(U)	240.2 (1)	0.11 (6)	[M1,E2]	1.1 (8)	0.052 (22)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{56,40}$(U)	245.37 (2)	2.09 (30)	M1	1.749 (25)	0.76 (11)
$\gamma_{27,13}$(U)	247.79 (7)	0.00037 (4)			0.00037 (4)
$\gamma_{33,24}$(U)	249.22 (1)	2.65 (42)	E1	0.0594 (9)	2.5 (4)
$\gamma_{68,51}$(U)	257.2 (1)	0.10 (6)	[M1,E2]	0.9 (7)	0.052 (22)
$\gamma_{26,10}$(U)	267.12 (5)	0.32 (12)	[E2,M1]	0.8 (6)	0.18 (3)
$\gamma_{49,33}$(U)	272.28 (5)	2.18 (28)	M1+E2	1.004 (14)	1.09 (14)
$\gamma_{21,8}$(U)	275.04 (10)	0.17 (7)	[M1,E2]	0.8 (6)	0.094 (23)
$\gamma_{22,7}$(U)	278.3 (1)	0.052 (14)	[E2]	0.238 (4)	0.042 (11)
$\gamma_{33,22}$(U)	293.79 (5)	4.3 (6)	M1+E2	0.42 (10)	3.0 (4)
$\gamma_{33,20}$(U)	295.91 (8)	0.23 (8)	[M1+E2]	0.6 (5)	0.146 (25)
$\gamma_{17,5}$(U)	298.7 (2)	0.015 (6)	[E1]	0.0396 (6)	0.014 (6)
$\gamma_{64,46}$(U)	308.6 (2)	0.025 (7)	[E2]	0.1726 (25)	0.021 (6)
$\gamma_{71,51}$(U)	310.2 (1)	0.109 (35)	[M1,E2]	0.5 (4)	0.073 (13)
$\gamma_{27,9}$(U)	310.52 (10)	0.000135 (15)			0.000135 (15)
$\gamma_{23,8}$(U)	313.5 (1)	0.156 (47)	[E2,M1]	0.5 (4)	0.104 (14)
$\gamma_{21,6}$(U)	316.7 (1)	0.121 (16)	[E2]	0.1597 (23)	0.104 (14)
$\gamma_{34,22}$(U)	320.4 (1)	0.078 (24)	[E2,M1]	0.5 (4)	0.052 (8)
$\gamma_{33,18}$(U)	330.40 (5)	0.80 (9)	[E1]	0.0318 (5)	0.78 (9)
$\gamma_{74,52}$(U)	331.4 (1)	0.073 (13)			0.073 (13)
$\gamma_{21,5}$(U)	340.2 (1)	0.042 (9)	[E1]	0.0298 (5)	0.041 (9)
$\gamma_{31,12}$(U)	343.8 (2)	0.035 (8)	[E1]	0.0292 (5)	0.034 (8)
$\gamma_{33,16}$(U)	351.9 (1)	0.47 (6)	E2	0.1175 (17)	0.42 (5)
$\gamma_{46,28}$(U)	357.9 (1)	0.050 (19)	[M1,E2]	0.4 (3)	0.036 (11)
$\gamma_{56,33}$(U)	360.6 (3)	0.018 (7)	[E1]	0.0264 (4)	0.018 (7)
$\gamma_{26,7}$(U)	365.0 (3)	0.018 (7)	[E1]	0.0257 (4)	0.018 (7)
$\gamma_{37,21}$(U)	369.50 (5)	3.91 (47)	M1	0.565 (8)	2.5 (3)
$\gamma_{40,23}$(U)	372.0 (1)	1.87 (21)	M1(+E2)	0.517 (8)	1.23 (14)
$\gamma_{32,11}$(U)	379.1 (1)	0.043 (11)	[E1]	0.0237 (4)	0.042 (11)
$\gamma_{31,9}$(U)	385.4 (1)	0.043 (11)	[E1]	0.0229 (4)	0.042 (11)
$\gamma_{27,7}$(U)	387.94 (6)	0.00072 (6)			0.00072 (6)
$\gamma_{45,25}$(U)	394.1 (1)	0.096 (14)	[E1]	0.0219 (3)	0.094 (14)
$\gamma_{33,15}$(U)	397.7 (3)	0.063 (16)	[M2]	1.349 (20)	0.027 (7)
$\gamma_{-1,2}$(U)	401.8 (2)				0.036 (11)
$\gamma_{40,22}$(U)	409.8 (1)	0.35 (5)	[E1]	0.0202 (3)	0.34 (5)
$\gamma_{49,30}$(U)	416.1 (1)	0.039 (12)	[E2]	0.0746 (11)	0.036 (11)
$\gamma_{-1,3}$(U)	425.3 (2)				0.036 (11)
$\gamma_{37,16}$(U)	426.95 (5)	0.47 (5)	[E1]	0.0185 (3)	0.46 (5)
$\gamma_{27,6}$(U)	427.4 (4)	0.000031 (10)			0.000031 (10)
$\gamma_{68,42}$(U)	433.1 (1)	0.094 (14)			0.094 (14)
$\gamma_{40,18}$(U)	446.6 (1)	0.153 (20)	[M1]	0.338 (5)	0.114 (15)
$\gamma_{27,5}$(U)	450.93 (4)	0.0050 (24)	M1+E2	0.241 (4)	0.0040 (19)
$\gamma_{42,19}$(U)	452.4 (3)	0.027 (9)			0.027 (9)
$\gamma_{33,11}$(U)	458.68 (5)	1.30 (15)	M1+E2	0.14 (5)	1.14 (12)
$\gamma_{45,22}$(U)	461.5 (1)	0.045 (14)	[M1]	0.309 (5)	0.034 (11)
$\gamma_{39,16}$(U)	464.2 (1)	0.040 (14)	[M1]	0.304 (5)	0.031 (11)
$\gamma_{40,16}$(U)	468.0 (1)	0.223 (30)	[E1]	0.01539 (22)	0.22 (3)
$\gamma_{37,15}$(U)	472.3 (1)	0.46 (5)	[M1]	0.290 (4)	0.36 (4)
$\gamma_{41,16}$(U)	474.2 (2)	0.037 (11)	[E1]	0.01499 (21)	0.036 (11)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{42,16}$(U)	478.6 (1)	0.127 (15)	[E1]	0.01472 (21)	0.125 (15)
$\gamma_{71,43}$(U)	481.0 (1)	0.36 (6)	[M1,E2]	0.16 (12)	0.31 (4)
$\gamma_{45,18}$(U)	498.0 (1)	0.078 (15)	[M1]	0.252 (4)	0.062 (12)
$\gamma_{66,35}$(U)	502.0 (1)	0.03 (10)	[E2,M1]	0.15 (10)	0.027 (90)
$\gamma_{37,13}$(U)	506.75 (5)	1.32 (14)	[E1]	0.01314 (19)	1.30 (14)
$\gamma_{40,15}$(U)	513.4 (1)	~0.468	[M1]	0.232 (4)	~0.38
$\gamma_{40,14}$(U)	513.5 (1)	~0.77	[E1]	0.01280 (18)	~0.76
$\gamma_{45,16}$(U)	519.6 (1)	0.41 (5)	[E1]	0.01251 (18)	0.40 (5)
$\gamma_{49,24}$(U)	521.4 (1)	0.76 (9)	[E1]	0.01242 (18)	0.75 (9)
$\gamma_{37,12}$(U)	527.9 (1)	0.49 (6)	(M1)	0.215 (3)	0.40 (5)
$\gamma_{43,15}$(U)	529.1 (3)	0.102 (46)	[E2,M1]	0.13 (9)	0.09 (4)
$\gamma_{76,44}$(U)	534.1 (1)	0.084 (13)	[E1]	0.01185 (17)	0.083 (13)
$\gamma_{71,37}$(U)	537.2 (1)	0.093 (16)	[M1,E2]	0.12 (9)	0.083 (13)
$\gamma_{39,13}$(U)	543.8 (1)	0.140 (25)	[E2]	0.0389 (6)	0.135 (24)
$\gamma_{47,19}$(U)	553.7 (1)	0.045 (16)	[E1]	0.01105 (16)	0.045 (16)
$\gamma_{44,14}$(U)	558.0 (2)	0.097 (24)	[E2]	0.0367 (6)	0.094 (23)
$\gamma_{36,9}$(U)	559.2 (2)	0.074 (22)	[E1]	0.01084 (16)	0.073 (22)
$\gamma_{76,43}$(U)	562.8 (3)	0.040 (13)	[M1,E2]	0.11 (8)	0.036 (11)
$\gamma_{45,15}$(U)	565.2 (1)	1.23 (13)	(M1)	0.179 (3)	1.04 (11)
$\gamma_{40,12}$(U)	568.9 (2)	4.2 (7)	M1	0.1759 (25)	3.6 (6)
$\gamma_{37,9}$(U)	569.5 (1)	10.9 (14)	M1	0.1754 (25)	9.3 (12)
$\gamma_{41,12}$(U)	575.5 (1)	0.03 (1)	[E2,M1]	0.10 (7)	0.027 (9)
$\gamma_{43,12}$(U)	584.1 (1)	0.19 (31)	[E2]	0.0331 (5)	0.18 (30)
$\gamma_{64,32}$(U)	586.3 (1)	0.075 (13)	[E2]	0.0328 (5)	0.073 (13)
$\gamma_{40,10}$(U)	590.3 (10)	0.040 (12)	[E2,M1]	0.10 (7)	0.036 (11)
$\gamma_{50,22}$(U)	595.4 (2)	0.097 (24)	[E2]	0.0317 (5)	0.094 (23)
$\gamma_{59,26}$(U)	596.9 (1)	0.231 (35)	[M1]	0.1547 (22)	0.20 (3)
$\gamma_{49,18}$(U)	602.6 (1)	0.55 (6)	[E1]	0.00939 (14)	0.54 (6)
$\gamma_{43,10}$(U)	604.6 (3)	0.057 (24)	[E2,M1]	0.09 (6)	0.052 (22)
$\gamma_{53,21}$(U)	612.0 (1)	0.43 (6)	(M1)	0.1447 (21)	0.38 (5)
$\gamma_{41,9}$(U)	617.0 (2)	0.054 (23)	[E2]	0.0294 (5)	0.052 (22)
$\gamma_{44,11}$(U)	619.0 (2)	0.039 (12)	[M1+E2]	0.08 (6)	0.036 (11)
$\gamma_{49,16}$(U)	624.2 (1)	0.39 (6)	(M1+E2)	0.1015 (15)	0.35 (5)
$\gamma_{20,4}$(U)	628.1 (1)	0.24 (5)	[E1]	0.00868 (13)	0.24 (5)
$\gamma_{48,15}$(U)	629.4 (1)	0.40 (7)	(M1)	0.1342 (19)	0.35 (6)
$\gamma_{51,18}$(U)	632.6 (2)	0.039 (12)	[E2,M1]	0.08 (6)	0.036 (11)
$\gamma_{54,22}$(U)	634.3 (2)	0.153 (27)	[M1]	0.1315 (19)	0.135 (24)
$\gamma_{-1,4}$(U)	643.2 (2)				0.027 (9)
$\gamma_{37,7}$(U)	646.5 (1)	0.115 (15)	[E1]	0.00822 (12)	0.114 (15)
$\gamma_{50,16}$(U)	653.7 (1)	0.53 (9)	M1	0.1213 (17)	0.47 (8)
$\gamma_{56,22}$(U)	655.2 (2)	0.136 (24)	[E1]	0.00802 (12)	0.135 (24)
$\gamma_{46,11}$(U)	657.4 (1)	0.40 (5)			0.40 (5)
$\gamma_{-1,5}$(U)	659.8 (1)				0.27 (4)
$\gamma_{48,13}$(U)	663.9 (1)	0.54 (9)	[E1]	0.00782 (11)	0.54 (9)
$\gamma_{11,3}$(U)	666.5 (1)	1.19 (13)	[E1]	0.00777 (11)	1.18 (13)
$\gamma_{35,5}$(U)	669.7 (1)	<0.0006			<0.0006
$\gamma_{49,15}$(U)	669.7 (1)	1.01 (10)	[E1]	0.00770 (11)	1.0 (1)
$\gamma_{24,4}$(U)	675.1 (1)	0.103 (14)	[E2]	0.0242 (4)	0.101 (14)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{59,22}$(U)	683.9 (2)	0.161 (40)	[E1]	0.00740 (11)	0.16 (4)
$\gamma_{40,8}$(U)	685.1 (2)	0.15 (4)			0.15 (4)
$\gamma_{54,16}$(U)	692.6 (1)	1.38 (14)	(M1)	0.1040 (15)	1.25 (13)
$\gamma_{51,15}$(U)	699.03 (5)	3.6 (4)			3.6 (4)
$\gamma_{7,2}$(U)	705.9 (1)	2.31 (23)	[E1]	0.00698 (10)	2.29 (23)
$\gamma_{8,2}$(U)	708.3 (2)	0.024 (9)	[E2]	0.0219 (3)	0.023 (9)
$\gamma_{-1,6}$(U)	711.5 (1)				0.156 (25)
$\gamma_{52,14}$(U)	713.7 (1)	0.147 (25)	[E1]	0.00684 (10)	0.146 (25)
$\gamma_{62,23}$(U)	716.5 (2)	0.033 (10)	[M1,E2]	0.06 (4)	0.031 (9)
$\gamma_{15,3}$(U)	727.8 (2)	0.116 (15)	[E2]	0.0207 (3)	0.114 (15)
$\gamma_{49,11}$(U)	730.9 (2)	0.67 (11)	[M1,E2]	0.06 (4)	0.63 (10)
$\gamma_{50,13}$(U)	733.39 (5)	7.6 (9)	M1	0.0893 (13)	7.0 (8)
$\gamma_{54,14}$(U)	738.0 (1)	1.26 (14)	(M1)	0.0878 (13)	1.16 (13)
$\gamma_{5,1}$(U)	742.813 (5)	2.09 (21)	E1	0.00636 (9)	2.08 (21)
$\gamma_{49,10}$(U)	745.9 (1)	0.32 (5)	[E1]	0.00631 (9)	0.32 (5)
$\gamma_{52,13}$(U)	748.1 (3)	0.105 (23)	[E1]	0.00628 (9)	0.104 (23)
$\gamma_{51,12}$(U)	755.0 (1)	1.29 (15)	(E2,M1)	0.05 (4)	1.23 (13)
$\gamma_{56,15}$(U)	758.9 (1)	0.262 (33)	[M1,E2]	0.05 (4)	0.25 (3)
$\gamma_{50,11}$(U)	761.0 (2)	0.074 (22)	[E2]	0.0189 (3)	0.073 (22)
$\gamma_{28,4}$(U)	764.8 (2)	0.21 (5)	[M1,E2]	0.05 (3)	0.20 (5)
$\gamma_{6,1}$(U)	766.4 (2)	0.26 (5)	(E2)	0.0187 (3)	0.26 (5)
$\gamma_{58,15}$(U)	769.1 (1)	0.196 (22)	[M1,E2]	0.05 (3)	0.187 (20)
$\gamma_{54,13}$(U)	772.4 (2)	0.074 (22)	[E2]	0.0184 (3)	0.073 (22)
$\gamma_{-1,7}$(U)	778.6 (2)				0.046 (10)
$\gamma_{30,4}$(U)	780.4 (2)	0.91 (9)	[E1]	0.00581 (9)	0.90 (9)
$\gamma_{9,2}$(U)	783.4 (1)	0.305 (41)	[E2]	0.0179 (3)	0.30 (4)
$\gamma_{5,0}$(U)	786.272 (22)	1.22 (13)	(E1)	0.00573 (8)	1.21 (13)
$\gamma_{54,12}$(U)	792.8 (3)	0.045 (11)	[E1]	0.00565 (8)	0.045 (11)
$\gamma_{18,3}$(U)	794.9 (2)	0.69 (11)	[E2]	0.01735 (25)	0.68 (11)
$\gamma_{51,9}$(U)	796.1 (1)	2.64 (31)	[E2]	0.01730 (25)	2.6 (3)
$\gamma_{55,12}$(U)	802.3 (2)	0.033 (10)	[M1]	0.0703 (10)	0.031 (9)
$\gamma_{10,2}$(U)	804.1 (1)	0.85 (30)	E0+E2	0.37	0.62 (22)
$\gamma_{7,1}$(U)	805.80 (5)	2.51 (30)	[E1]	0.00549 (8)	2.5 (3)
$\gamma_{8,1}$(U)	808.4 (3)	0.19 (6)	E0+E2	4.2	0.036 (11)
$\gamma_{53,9}$(U)	811.5 (1)	0.130 (16)	[M1,E2]	0.04 (3)	0.125 (15)
$\gamma_{56,12}$(U)	814.2 (1)	0.315 (41)	[E2]	0.01654 (24)	0.31 (4)
$\gamma_{11,2}$(U)	819.2 (1)	1.91 (20)	[E1]	0.00533 (8)	1.9 (2)
$\gamma_{-1,8}$(U)	824.2 (2)				1.25 (15)
$\gamma_{12,2}$(U)	825.1 (2)	1.93 (20)	[E2]	0.01611 (23)	1.9 (2)
$\gamma_{20,3}$(U)	829.3 (2)	0.36 (11)	[E1]	0.00521 (8)	0.36 (11)
$\gamma_{22,3}$(U)	831.5 (1)	4.2 (5)	[E1]	0.00518 (8)	4.2 (5)
$\gamma_{75,28}$(U)	839.5 (1)	0.031 (8)			0.031 (8)
$\gamma_{49,7}$(U)	844.1 (1)	0.44 (5)	[E2]	0.01540 (22)	0.43 (5)
$\gamma_{-1,9}$(U)	846.1 (2)				0.052 (12)
$\gamma_{59,11}$(U)	848.9 (2)	0.027 (8)	[E1]	0.00500 (7)	0.027 (8)
$\gamma_{8,0}$(U)	851.8 (1)	0.074 (22)	[E2]	0.01513 (22)	0.073 (22)
$\gamma_{57,9}$(U)	857.7 (2)	0.037 (8)	[E2]	0.01493 (21)	0.036 (8)
$\gamma_{59,10}$(U)	863.2 (2)	0.076 (23)	[E2,M1]	0.036 (22)	0.073 (22)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{77,29}$(U)	869.7 (1)	0.20 (3)			0.20 (3)
$\gamma_{50,7}$(U)	874.0 (3)	0.037 (8)	[E2,M1]	0.035 (21)	0.036 (8)
$\gamma_{24,3}$(U)	876.0 (1)	2.59 (23)	(E2)	0.01432 (20)	2.55 (23)
$\gamma_{15,2}$(U)	880.52 (4)	6.3 (8)	[E2]	0.01418 (20)	6.2 (8)
$\gamma_{14,2}$(U)	880.52 (4)	4.3 (6)	[E1]	0.00468 (7)	4.3 (6)
$\gamma_{9,1}$(U)	883.24 (4)	9.8 (11)	E2	0.01409 (20)	9.7 (11)
$\gamma_{66,16}$(U)	890.1 (4)	0.027 (8)			0.027 (8)
$\gamma_{25,3}$(U)	898.67 (5)	3.31 (40)	[E1]	0.00451 (7)	3.3 (4)
$\gamma_{10,1}$(U)	904.2 (1)	0.345 (41)	[E2]	0.01346 (19)	0.34 (4)
$\gamma_{65,15}$(U)	916.5 (2)	0.024 (7)			0.024 (7)
$\gamma_{26,3}$(U)	918.4 (1)	0.101 (14)	[E2]	0.01306 (19)	0.100 (14)
$\gamma_{-1,10}$(U)	920.5 (2)				0.029 (8)
$\gamma_{12,1}$(U)	925.0 (1)	8.0 (9)	(E2)	0.01288 (18)	7.9 (9)
$\gamma_{16,2}$(U)	926.0 (2)	1.8 (13)	[E1]	0.00428 (6)	1.8 (13)
$\gamma_{9,0}$(U)	926.7 (1)	7.4 (12)	(E2)	0.01284 (18)	7.3 (12)
$\gamma_{66,15}$(U)	935.8 (2)	0.067 (10)			0.067 (10)
$\gamma_{17,2}$(U)	942.0 (3)	0.047 (9)	[E2]	0.01244 (18)	0.046 (9)
$\gamma_{13,1}$(U)	946.00 (3)	13.6 (15)	(E1)	0.00412 (6)	13.5 (15)
$\gamma_{18,2}$(U)	947.7 (2)	1.65 (21)	[E2]	0.01230 (18)	1.63 (21)
$\gamma_{19,2}$(U)	952.7 (1)	0.083 (13)			0.083 (13)
$\gamma_{59,8}$(U)	960.0 (1)	0.074 (13)	[E2]	0.01199 (17)	0.073 (13)
$\gamma_{28,3}$(U)	965.8 (1)	0.49 (6)	[M1,E2]	0.027 (16)	0.48 (6)
$\gamma_{73,18}$(U)	975.1 (1)	0.027 (8)			0.027 (8)
$\gamma_{29,3}$(U)	978.2 (3)	0.090 (23)			0.090 (23)
$\gamma_{14,1}$(U)	980.3 (1)	∼2.71	[E1]	0.00387 (6)	∼2.7
$\gamma_{15,1}$(U)	980.3 (1)	∼1.79	[E2]	0.01152 (17)	∼1.77
$\gamma_{30,3}$(U)	981.6 (3)	0.73 (22)	[E1]	0.00387 (6)	0.73 (22)
$\gamma_{22,2}$(U)	984.2 (1)	1.64 (21)	[E1]	0.00385 (6)	1.63 (21)
$\gamma_{63,9}$(U)	989.5 (1)	0.104 (14)			0.104 (14)
$\gamma_{-1,11}$(U)	992.0 (2)				0.083 (22)
$\gamma_{60,7}$(U)	994.6 (3)	0.062 (22)			0.062 (22)
$\gamma_{73,16}$(U)	997.7 (3)	0.046 (12)			0.046 (12)
$\gamma_{71,15}$(U)	1009.9 (3)	0.067 (12)			0.067 (12)
$\gamma_{76,19}$(U)	1019.5 (4)	0.027 (8)			0.027 (8)
$\gamma_{23,2}$(U)	1021.8 (2)	0.156 (41)	[M1]	0.0370 (6)	0.15 (4)
$\gamma_{-1,12}$(U)	1023.6 (2)				0.062 (22)
$\gamma_{-1,13}$(U)	1025.3 (2)				0.052 (22)
$\gamma_{24,2}$(U)	1028.7 (1)	0.58 (6)	[E2]	0.01051 (15)	0.57 (6)
$\gamma_{75,16}$(U)	1032.8 (2)	0.018 (5)			0.018 (5)
$\gamma_{-1,14}$(U)	1035.9 (2)				0.026 (10)
$\gamma_{69,11}$(U)	1037.9 (2)	0.018 (7)			0.018 (7)
$\gamma_{17,1}$(U)	1041.1 (2)	0.033 (11)	[E2,M1]	0.023 (13)	0.032 (11)
$\gamma_{32,3}$(U)	1044.4 (2)	0.031 (3)			0.031 (3)
$\gamma_{70,12}$(U)	1051.4 (2)	0.062 (12)			0.062 (12)
$\gamma_{70,11}$(U)	1057.8 (3)	0.0177 (16)			0.0177 (16)
$\gamma_{71,12}$(U)	1065.1 (1)	0.027 (8)			0.027 (8)
$\gamma_{69,9}$(U)	1073.6 (2)	0.104 (14)			0.104 (14)
$\gamma_{21,1}$(U)	1083.2 (1)	0.53 (6)	(M1)	0.0317 (5)	0.51 (6)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{17,0}$(U)	1085.3 (3)	0.027 (8)	[E2]	0.00950 (14)	0.027 (8)
$\gamma_{71,9}$(U)	1106.9 (2)	0.083 (13)			0.083 (13)
$\gamma_{66,7}$(U)	1110.6 (1)	0.062 (12)			0.062 (12)
$\gamma_{23,1}$(U)	1121.7 (1)	0.257 (41)	M1	0.0289 (4)	0.25 (4)
$\gamma_{33,3}$(U)	1125.2 (1)	0.36 (8)	[E1]	0.00305 (5)	0.36 (8)
$\gamma_{21,0}$(U)	1126.8 (1)	0.303 (40)	[E2]	0.00885 (13)	0.30 (4)
$\gamma_{34,3}$(U)	1151.4 (3)	0.032 (10)	[E1]	0.00294 (5)	0.032 (10)
$\gamma_{76,11}$(U)	1153.5 (3)	0.046 (9)			0.046 (9)
$\gamma_{26,1}$(U)	1171.3 (1)	0.091 (13)	[E2]	0.00824 (12)	0.090 (13)
$\gamma_{66,5}$(U)	1173.1 (1)	0.046 (9)			0.046 (9)
$\gamma_{71,8}$(U)	1182.1 (2)	∼0.0094			∼0.0094
$\gamma_{27,1}$(U)	1193.77 (2)	0.021 (6)	E1	0.00277 (4)	0.021 (6)
$\gamma_{77,9}$(U)	1217.3 (1)	0.22 (3)			0.22 (3)
$\gamma_{-1,15}$(U)	1220.4 (2)				0.062 (12)
$\gamma_{27,0}$(U)	1237.3 (3)	<0.0094	E1	0.00262 (4)	<0.0094
$\gamma_{40,3}$(U)	1241.2 (1)	0.232 (30)	(E2)	0.00740 (11)	0.23 (3)
$\gamma_{41,3}$(U)	1247.8 (2)	0.022 (6)	[E2]	0.00733 (11)	0.022 (6)
$\gamma_{42,3}$(U)	1252.6 (2)	0.018 (8)			0.018 (8)
$\gamma_{43,3}$(U)	1256.5 (1)	0.060 (8)	[M1,E2]	0.014 (8)	0.059 (8)
$\gamma_{33,2}$(U)	1277.7 (2)	0.047 (9)	[M2]	0.0473 (7)	0.045 (9)
$\gamma_{45,3}$(U)	1292.8 (1)	0.48 (6)	M1	0.0199 (3)	0.47 (6)
$\gamma_{-1,16}$(U)	1296.4 (2)				0.029 (7)
$\gamma_{-1,17}$(U)	1301.2 (2)				0.018 (5)
$\gamma_{-1,18}$(U)	1327.0 (2)				0.018 (5)
$\gamma_{36,2}$(U)	1342.9 (2)	0.012 (5)	[E1]	0.00232 (4)	0.012 (5)
$\gamma_{37,2}$(U)	1352.9 (1)	1.18 (12)	M1	0.01766 (25)	1.16 (12)
$\gamma_{47,3}$(U)	1354.6 (2)	0.14 (4)	[E1]	0.00229 (4)	0.14 (4)
$\gamma_{38,2}$(U)	1359.0 (1)	0.156 (25)			0.156 (25)
$\gamma_{39,2}$(U)	1389.6 (2)	0.073 (22)	[E1]	0.00222 (4)	0.073 (22)
$\gamma_{40,2}$(U)	1393.9 (1)	2.11 (21)	M1	0.01634 (23)	2.08 (21)
$\gamma_{49,3}$(U)	1397.5 (2)	0.083 (22)	[E1]	0.00220 (3)	0.083 (22)
$\gamma_{41,2}$(U)	1400.3 (1)	0.182 (30)	[E2,M1]	0.011 (6)	0.18 (3)
$\gamma_{43,2}$(U)	1409.1 (2)	0.045 (10)			0.045 (10)
$\gamma_{35,1}$(U)	1414.4 (2)	<0.0028			<0.0028
$\gamma_{51,3}$(U)	1426.9 (1)	0.17 (3)			0.17 (3)
$\gamma_{36,1}$(U)	1442.8 (2)	0.031 (7)	[E1]	0.00212 (3)	0.031 (7)
$\gamma_{45,2}$(U)	1445.4 (1)	0.32 (5)	[M1]	0.01488 (21)	0.32 (5)
$\gamma_{37,1}$(U)	1452.7 (1)	0.82 (9)	[M1]	0.01468 (21)	0.81 (9)
$\gamma_{38,1}$(U)	1458.9 (1)	0.094 (23)			0.094 (23)
$\gamma_{46,2}$(U)	1475.8 (2)	0.008 (4)			0.008 (4)
$\gamma_{56,3}$(U)	1485.4 (2)	0.030 (7)	[M1]	0.01387 (20)	0.030 (7)
$\gamma_{57,3}$(U)	1488.0 (2)	0.014 (6)			0.014 (6)
$\gamma_{40,1}$(U)	1493.6 (1)	0.105 (14)	[E2]	0.00531 (8)	0.104 (14)
$\gamma_{58,3}$(U)	1496.0 (2)	0.036 (9)			0.036 (9)
$\gamma_{41,1}$(U)	1500.0 (2)	0.0111 (40)	[E2]	0.00528 (8)	0.011 (4)
$\gamma_{-1,19}$(U)	1507.3 (2)				0.020 (5)
$\gamma_{48,2}$(U)	1510.1 (2)	<0.0094			<0.0094
$\gamma_{59,3}$(U)	1515.6 (2)	0.073 (13)			0.073 (13)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{-1,20}$(U)	1520.7 (2)				0.0094 (9)
$\gamma_{-1,21}$(U)	1538.8 (2)				0.014 (4)
$\gamma_{49,2}$(U)	1550.1 (1)	0.073 (13)	[E1]	0.00196 (3)	0.073 (13)
$\gamma_{61,3}$(U)	1567.0 (2)	0.0114 (23)			0.0114 (23)
$\gamma_{51,2}$(U)	1579.9 (1)	0.073 (22)			0.073 (22)
$\gamma_{62,3}$(U)	1585.9 (1)	0.146 (17)			0.146 (17)
$\gamma_{52,2}$(U)	1594.0 (1)	0.312 (40)	M1,E2	0.008 (4)	0.31 (4)
$\gamma_{54,2}$(U)	1618.3 (2)	0.009 (4)			0.009 (4)
$\gamma_{55,2}$(U)	1627.3 (1)	0.076 (11)			0.076 (11)
$\gamma_{56,2}$(U)	1638.1 (1)	0.210 (21)	(M1)	0.01083 (16)	0.208 (21)
$\gamma_{57,2}$(U)	1640.5 (3)	0.010 (4)			0.010 (4)
$\gamma_{65,3}$(U)	1644.9 (2)	0.010 (4)			0.010 (4)
$\gamma_{58,2}$(U)	1650.2 (2)	<0.006			<0.006
$\gamma_{-1,22}$(U)	1655.7 (1)				0.026 (4)
$\gamma_{-1,23}$(U)	1664.8 (3)				0.018 (7)
$\gamma_{59,2}$(U)	1668.4 (1)	0.78 (9)	(M1)	0.01035 (15)	0.77 (9)
$\gamma_{67,3}$(U)	1672.8 (1)	0.034 (11)			0.034 (11)
$\gamma_{50,1}$(U)	1679.5 (1)	0.077 (18)			0.077 (18)
$\gamma_{68,3}$(U)	1685.7 (1)	0.31 (4)			0.31 (4)
$\gamma_{52,1}$(U)	1693.8 (2)	0.7 (1)			0.7 (1)
$\gamma_{53,1}$(U)	1695.0 (3)	0.27 (7)			0.27 (7)
$\gamma_{60,2}$(U)	1700.5 (2)	0.104 (14)			0.104 (14)
$\gamma_{61,2}$(U)	1719.7 (2)	0.018 (6)			0.018 (6)
$\gamma_{70,3}$(U)	1723.2 (2)	0.016 (4)			0.016 (4)
$\gamma_{55,1}$(U)	1727.8 (2)	0.020 (5)			0.020 (5)
$\gamma_{62,2}$(U)	1737.7 (2)	0.075 (11)			0.075 (11)
$\gamma_{72,3}$(U)	1741.1 (2)	0.049 (8)			0.049 (8)
$\gamma_{-1,24}$(U)	1743.2 (2)				0.033 (8)
$\gamma_{58,1}$(U)	1750.0 (1)	0.064 (10)			0.064 (10)
$\gamma_{-1,25}$(U)	1757.5 (1)				0.024 (6)
$\gamma_{59,1}$(U)	1768.0 (3)	0.020 (5)			0.020 (5)
$\gamma_{73,3}$(U)	1770.8 (2)	0.068 (17)			0.068 (17)
$\gamma_{63,2}$(U)	1773.0 (2)	0.068 (17)			0.068 (17)
$\gamma_{64,2}$(U)	1783.7 (2)	0.025 (7)			0.025 (7)
$\gamma_{65,2}$(U)	1797.1 (1)	0.24 (3)			0.24 (3)
$\gamma_{75,3}$(U)	1805.8 (3)	0.0052 (22)			0.0052 (22)
$\gamma_{66,2}$(U)	1815.3 (3)	0.009 (4)			0.009 (4)
$\gamma_{76,3}$(U)	1819.8 (3)	0.0042 (11)			0.0042 (11)
$\gamma_{67,2}$(U)	1825.1 (3)	0.009 (4)			0.009 (4)
$\gamma_{-1,26}$(U)	1830.8 (3)				0.0042 (11)
$\gamma_{68,2}$(U)	1838.0 (2)	0.0042 (11)			0.0042 (11)
$\gamma_{-1,27}$(U)	1849.8 (2)				0.028 (7)
$\gamma_{63,1}$(U)	1872.8 (2)	0.035 (9)			0.035 (9)
$\gamma_{64,1}$(U)	1884.1 (3)	0.016 (5)			0.016 (5)
$\gamma_{71,2}$(U)	1890.1 (2)	0.146 (17)			0.146 (17)
$\gamma_{72,2}$(U)	1893.4 (3)	∼0.0062			∼0.0062
$\gamma_{65,1}$(U)	1896.7 (2)	0.104 (23)			0.104 (23)
$\gamma_{66,1}$(U)	1915.5 (3)	0.020 (5)			0.020 (5)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{74,2}$(U)	1925.4 (2)	0.30 (5)			0.30 (5)
$\gamma_{-1,28}$(U)	1927.9 (4)				0.054 (12)
$\gamma_{-1,29}$(U)	1935.2 (4)				∼0.0094
$\gamma_{68,1}$(U)	1937.7 (3)	0.042 (11)			0.042 (11)
$\gamma_{75,2}$(U)	1958.0 (4)	0.010 (3)			0.010 (3)
$\gamma_{76,2}$(U)	1971.2 (4)	∼0.0027			∼0.0027
$\gamma_{70,1}$(U)	1977.4 (4)	0.017 (5)			0.017 (5)
$\gamma_{71,1}$(U)	1989.6 (4)	0.007 (4)			0.007 (4)
$\gamma_{76,1}$(U)	2072.2 (4)	0.0042 (22)			0.0042 (22)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	1.159	(11)	min
Q_{β^-}	:	2269	(4)	keV
Q_{IT}	:	73.92	(2)	keV
β^-	:	99.85	(1)	%
IT	:	0.15	(1)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,30}$	299 (4)	0.00389 (22)		6.8
$\beta^-_{0,29}$	332 (4)	0.0108 (3)		6.6
$\beta^-_{0,28}$	358 (4)	0.0452 (8)		6
$\beta^-_{0,27}$	394 (4)	0.0258 (3)		6.4
$\beta^-_{0,26}$	406 (4)	0.00311 (19)		7.4
$\beta^-_{0,25}$	460 (4)	0.0146 (7)		6.9
$\beta^-_{0,24}$	473 (4)	0.0021 (3)		7.7
$\beta^-_{0,23}$	488 (4)	0.0357 (18)		6.6
$\beta^-_{0,22}$	575 (4)	0.0024 (3)		8
$\beta^-_{0,21}$	602 (4)	0.0061 (3)		7.6
$\beta^-_{0,20}$	667 (4)	0.00127 (23)		8.5
$\beta^-_{0,19}$	677 (4)	0.0249 (5)		7.2
$\beta^-_{0,18}$	698 (4)	0.00231 (19)		8.4
$\beta^-_{0,17}$	715 (4)	0.0320 (6)		7.2
$\beta^-_{0,16}$	768 (4)	0.0131 (6)		7.7
$\beta^-_{0,14}$	834 (4)	0.0092 (11)		7.9
$\beta^-_{0,13}$	1032 (4)	0.0121 (11)		8.2
$\beta^-_{0,12}$	1095 (4)	0.0046 (3)		8.7
$\beta^-_{0,9}$	1224 (4)	1.006 (13)		6.5
$\beta^-_{0,4}$	1459 (4)	0.945 (12)		6.8
$\beta^-_{0,3}$	1483 (4)	0.049 (3)		8
$\beta^-_{0,0}$	2269 (4)	97.599 (24)	Allowed	5.5

3 Electron Emissions

		Energy keV		Electrons per 100 disint.	Energy keV
e_{AL}	(U)	5.9 - 21.6		0.856 (19)	
e_{AK}	(U)			0.0203 (3)	
	KLL	71.776 - 80.954	}		
	KLX	88.153 - 98.429	}		
	KXY	104.51 - 115.59	}		
e_{AL}	(Pa)	5.9 - 20.9		0.048 (4)	
$ec_{1,0\ L}$	(U)	21.73 - 26.32		1.030 (19)	

		Energy keV	Electrons per 100 disint.	Energy keV
$ec_{1,0\ M}$	(U)	37.94 - 39.94	0.285 (5)	
$ec_{1,0\ N}$	(U)	42.05 - 43.11	0.0770 (14)	
$ec_{1,0\ L}$	(Pa)	52.82 - 57.19	0.103 (8)	
$ec_{1,0\ M}$	(Pa)	68.56 - 70.48	0.025 (2)	
$\beta^-_{0,30}$	max:	299 (4)	0.00389 (22)	avg: 83.0 (13)
$\beta^-_{0,29}$	max:	332 (4)	0.0108 (3)	avg: 93.0 (13)
$\beta^-_{0,28}$	max:	358 (4)	0.0452 (8)	avg: 101.0 (13)
$\beta^-_{0,27}$	max:	394 (4)	0.0258 (3)	avg: 112.3 (13)
$\beta^-_{0,26}$	max:	406 (4)	0.00311 (19)	avg: 116.0 (13)
$\beta^-_{0,25}$	max:	460 (4)	0.0146 (7)	avg: 133.3 (13)
$\beta^-_{0,24}$	max:	473 (4)	0.0021 (3)	avg: 137.4 (14)
$\beta^-_{0,23}$	max:	488 (4)	0.0357 (18)	avg: 142.3 (14)
$\beta^-_{0,22}$	max:	575 (4)	0.0024 (3)	avg: 171.2 (14)
$\beta^-_{0,21}$	max:	602 (4)	0.0061 (3)	avg: 180.1 (14)
$\beta^-_{0,20}$	max:	667 (4)	0.00127 (23)	avg: 202.5 (14)
$\beta^-_{0,19}$	max:	677 (4)	0.0249 (5)	avg: 205.8 (14)
$\beta^-_{0,18}$	max:	698 (4)	0.00231 (19)	avg: 213.3 (14)
$\beta^-_{0,17}$	max:	715 (4)	0.0320 (6)	avg: 219.2 (14)
$\beta^-_{0,16}$	max:	768 (4)	0.0131 (6)	avg: 237.6 (15)
$\beta^-_{0,14}$	max:	834 (4)	0.0092 (11)	avg: 261.1 (15)
$\beta^-_{0,13}$	max:	1032 (4)	0.0121 (11)	avg: 333.1 (15)
$\beta^-_{0,12}$	max:	1095 (4)	0.0046 (3)	avg: 356.7 (15)
$\beta^-_{0,9}$	max:	1224 (4)	1.006 (13)	avg: 405.6 (16)
$\beta^-_{0,4}$	max:	1459 (4)	0.945 (12)	avg: 496.0 (16)
$\beta^-_{0,3}$	max:	1483 (4)	0.049 (3)	avg: 505.3 (16)
$\beta^-_{0,0}$	max:	2269 (4)	97.599 (24)	avg: 820.5 (17)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11.6185 — 20.7141		0.856 (19)	
$XK\alpha_2$	(U)	94.666		0.1973 (25)	} Kα
$XK\alpha_1$	(U)	98.44		0.316 (4)	}
$XK\beta_3$	(U)	110.421	}		
$XK\beta_1$	(U)	111.298	}	0.115 (2)	$K\beta'_1$
$XK\beta''_5$	(U)	111.964	}		
$XK\beta_2$	(U)	114.407	}		
$XK\beta_4$	(U)	115.012	}	0.0382 (5)	$K\beta'_2$
$XKO_{2,3}$	(U)	115.377	}		
XL	(Pa)	11.3676 — 20.1126		0.046 (4)	

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(U)	43.49 (2)	1.414 (26)	E2	713 (11)	0.00198 (2)
$\gamma_{8,7}$(U)	62.70 (1)	0.0019 (6)	E1	0.426 (6)	0.0013 (4)
$\gamma_{1,0}$(Pa)	73.92 (2)	0.15 (1)	(M1+E2)	10.6 (4)	0.0129 (9)
$\gamma_{2,1}$(U)	99.86 (2)	0.0082 (7)	E2	13.42 (19)	0.00057 (5)
$\gamma_{18,14}$(U)	135.32 (8)	0.0000052 (6)	[E1]	0.247 (4)	0.0000042 (5)
$\gamma_{11,8}$(U)	137.23 (5)	0.000059 (21)	[E1]	0.239 (4)	0.000048 (17)
$\gamma_{8,5}$(U)	140.1 (10)	<0.008	M1+E2	5.3 (18)	<0.00127
$\gamma_{20,14}$(U)	166.5 (1)	0.000000273 (6)	[E1]	0.1514 (22)	0.000000237 (5)
$\gamma_{12,8}$(U)	185.0 (4)	0.00172 (15)			0.00172 (15)
$\gamma_{9,6}$(U)	193.4 (8)	0.00133 (28)	[E2]	0.847 (18)	0.00072 (15)
$\gamma_{14,13}$(U)	197.91 (15)	0.000081 (39)	[M1,E2]	2.0 (12)	0.000027 (7)
$\gamma_{11,7}$(U)	199.9 (10)	0.0017 (8)	(E0+E2+M1)	1.9 (12)	0.00058 (12)
$\gamma_{8,3}$(U)	203.3 (8)	0.0029 (5)	M1+E2	1.4 (4)	0.00119 (9)
$\gamma_{23,18}$(U)	209.9 (4)	0.00132 (15)			0.00132 (15)
$\gamma_{10,5}$(U)	235.9 (3)	0.000096 (43)	[E1]	0.0673 (10)	0.00009 (4)
$\gamma_{-1,1}$(U)	243.5 (8)				0.00050 (9)
$\gamma_{13,8}$(U)	247.7 (8)	0.0019 (8)	[M1,E2]	1.0 (7)	0.00097 (22)
$\gamma_{9,3}$(U)	258.227 (3)	0.0778 (8)	(E1)	0.0548 (8)	0.0738 (8)
$\gamma_{11,6}$(U)	275.5 (8)	0.00056 (22)	[M1,E2]	0.8 (6)	0.00031 (6)
$\gamma_{10,3}$(U)	299 (1)	0.00067 (14)	[E1]	0.0395 (7)	0.00064 (13)
$\gamma_{13,7}$(U)	311 (1)	0.00054 (11)	[E1]	0.0363 (6)	0.00052 (11)
$\gamma_{11,4}$(U)	316.7 (1)	0.00022 (6)	[E2]	0.1597 (23)	0.00019 (5)
$\gamma_{24,15}$(U)	338.1 (8)	0.00113 (23)			0.00113 (23)
$\gamma_{11,3}$(U)	340.2 (1)	0.000074 (22)	[E1]	0.0298 (5)	0.000072 (21)
$\gamma_{28,17}$(U)	357.5 (10)	0.00080 (17)			0.00080 (17)
$\gamma_{24,14}$(U)	362.8 (10)	0.00069 (15)			0.00069 (15)
$\gamma_{13,5}$(U)	387.6 (8)	0.000512 (44)	[E2]	0.0899 (14)	0.00047 (4)
$\gamma_{12,3}$(U)	387.6 (8)	0.00097 (15)			0.00097 (15)
$\gamma_{13,4}$(U)	427.4 (2)	0.000020 (5)	[E1]	0.0185 (3)	0.000020 (5)
$\gamma_{14,8}$(U)	445.91 (10)	0.000037 (9)	[M1,E2]	0.20 (14)	0.000031 (7)
$\gamma_{13,3}$(U)	450.98 (10)	0.00385 (16)	M1+E2	0.241 (4)	0.00310 (13)
$\gamma_{28,15}$(U)	453.58 (10)	0.00282 (16)	[M1]	0.324 (5)	0.00213 (12)
$\gamma_{22,13}$(U)	456.7 (10)	0.00095 (20)	[M1]	0.318 (5)	0.00072 (15)
$\gamma_{17,10}$(U)	468.43 (10)	0.00206 (12)			0.00206 (12)
$\gamma_{28,14}$(U)	475.74 (10)	0.00305 (17)	[M1]	0.285 (4)	0.00237 (13)
$\gamma_{18,10}$(U)	485.44 (7)	0.0000217 (28)	[M1,E2]	0.16 (11)	0.0000187 (17)
$\gamma_{19,10}$(U)	507.5 (10)	0.00158 (15)			0.00158 (15)
$\gamma_{17,9}$(U)	509.2 (8)	0.0022 (3)			0.0022 (3)
$\gamma_{20,10}$(U)	516.60 (6)	0.000015 (2)	(M1)	0.228 (4)	0.0000122 (16)
$\gamma_{18,9}$(U)	526.02 (10)	0.0000110 (12)	[M1]	0.217 (3)	0.000009 (1)
$\gamma_{23,13}$(U)	543.98 (10)	0.00349 (15)			0.00349 (15)
$\gamma_{20,9}$(U)	557.24 (6)	0.0000098 (13)	(M1)	0.186 (3)	0.0000083 (11)
$\gamma_{-1,2}$(U)	557.3 (10)				0.00072 (17)
$\gamma_{25,13}$(U)	572 (1)	0.00102 (20)	[M1]	0.173 (3)	0.00087 (17)
$\gamma_{18,8}$(U)	581.19 (10)	0.000081 (9)	[E1]	0.01006 (14)	0.000080 (9)
$\gamma_{14,4}$(U)	624.6 (10)	0.000117 (12)	[E1]	0.00877 (13)	0.000116 (12)
$\gamma_{-1,3}$(U)	647.7 (8)				0.00158 (15)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{14,3}$(U)	649 (1)	0.000064 (9)	[M1,E2]	0.08 (5)	0.000059 (8)
$\gamma_{16,6}$(U)	649 (1)	0.0010 (3)			0.0010 (3)
$\gamma_{23,11}$(U)	655.3 (10)	0.00139 (15)			0.00139 (15)
$\gamma_{15,3}$(U)	670.8 (10)	0.0004 (1)	[M1,E2]	0.07 (5)	0.00037 (9)
$\gamma_{28,13}$(U)	673.9 (10)	0.00071 (14)	[M1]	0.1118 (17)	0.00064 (13)
$\gamma_{25,11}$(U)	683.4 (10)	0.00058 (12)	[E1]	0.00741 (11)	0.00058 (12)
$\gamma_{16,4}$(U)	691.0 (3)	0.00898 (19)			0.00898 (19)
$\gamma_{23,10}$(U)	695.5 (10)	0.00164 (14)			0.00164 (14)
$\gamma_{29,13}$(U)	699.02 (10)	0.0058 (3)			0.0058 (3)
$\gamma_{17,6}$(U)	702.0 (1)	0.00721 (16)			0.00721 (16)
$\gamma_{5,2}$(U)	705.94 (12)	0.0052 (6)	[E1]	0.00698 (10)	0.0052 (6)
$\gamma_{6,2}$(U)	708.2 (10)	<0.00072	[E2]	0.0219 (4)	<0.0007
$\gamma_{18,6}$(U)	719.01 (7)	0.0000271 (24)	[M1+E2]	0.06 (4)	0.0000256 (20)
$\gamma_{30,13}$(U)	732.5 (10)	0.00130 (15)			0.00130 (15)
$\gamma_{19,6}$(U)	740.10 (8)	0.0118 (3)			0.0118 (3)
$\gamma_{3,1}$(U)	742.813 (5)	0.0946 (30)	E1	0.00636 (9)	0.094 (3)
$\gamma_{20,6}$(U)	750.12 (6)	0.0000184 (22)	(M1)	0.0841 (12)	0.000017 (2)
$\gamma_{-1,4}$(U)	760.3 (10)				0.00158 (15)
$\gamma_{18,4}$(U)	760.53 (15)	0.0000046 (10)	[M1]	0.0811 (12)	0.0000043 (9)
$\gamma_{4,1}$(U)	766.361 (20)	0.3290 (41)	(E2)	0.0187 (3)	0.323 (4)
$\gamma_{19,4}$(U)	781.75 (10)	0.00782 (18)			0.00782 (18)
$\gamma_{7,2}$(U)	783.4 (1)	0.000040 (7)	[E2]	0.0179 (3)	0.000039 (7)
$\gamma_{3,0}$(U)	786.272 (22)	0.0539 (7)	E1+M2	0.00573 (8)	0.0536 (7)
$\gamma_{20,4}$(U)	791.94 (5)	0.0000106 (14)	[M1]	0.0728 (11)	0.0000099 (13)
$\gamma_{5,1}$(U)	805.75 (10)	0.0062 (8)	[E1]	0.00549 (8)	0.0062 (8)
$\gamma_{6,1}$(U)	808.2 (1)	0.00281 (17)			0.00281 (17)
$\gamma_{21,5}$(U)	818.2 (5)	0.0010 (3)			0.0010 (3)
$\gamma_{28,10}$(U)	825.5 (2)	0.0014 (4)			0.0014 (4)
$\gamma_{22,5}$(U)	844.1 (8)	0.00109 (23)			0.00109 (23)
$\gamma_{6,0}$(U)	851.6 (1)	0.00707 (15)	[E2]	0.01514 (22)	0.00696 (15)
$\gamma_{28,9}$(U)	866.8 (10)	0.00116 (16)			0.00116 (16)
$\gamma_{21,3}$(U)	880.52 (4)	0.00392 (5)			0.00392 (5)
$\gamma_{7,1}$(U)	883.24 (3)	0.00386 (5)	E2	0.01409 (20)	0.00381 (5)
$\gamma_{-1,5}$(U)	887.29 (100)				0.00708 (14)
$\gamma_{28,8}$(U)	921.72 (10)	0.01275 (20)			0.01275 (20)
$\gamma_{7,0}$(U)	926.61 (10)	0.00127 (13)	(E2)	0.01284 (18)	0.00125 (13)
$\gamma_{26,7}$(U)	936.3 (10)	0.00102 (17)			0.00102 (17)
$\gamma_{10,2}$(U)	941.96 (10)	0.00253 (9)	[E2]	0.01244 (18)	0.00250 (9)
$\gamma_{8,1}$(U)	945.961 (16)	0.01064 (14)	(E1)	0.00412 (6)	0.01060 (14)
$\gamma_{25,5}$(U)	960 (1)	0.0009 (3)			0.0009 (3)
$\gamma_{23,3}$(U)	996.1 (20)	0.0059 (17)			0.0059 (17)
$\gamma_{9,1}$(U)	1001.026 (18)	0.856 (8)	E2	0.01107 (16)	0.847 (8)
$\gamma_{10,1}$(U)	1041.7 (1)	0.00122 (8)	[E2,M1]	0.023 (13)	0.00119 (8)
$\gamma_{28,6}$(U)	1059.4 (8)	0.00111 (22)			0.00111 (22)
$\gamma_{28,5}$(U)	1061.86 (10)	0.00224 (9)			0.00224 (9)
$\gamma_{11,1}$(U)	1081.9 (10)	0.00094 (20)	(M1)	0.0318 (5)	0.00091 (19)
$\gamma_{10,0}$(U)	1084.25 (10)	0.00081 (40)	[E2]	0.00952 (14)	0.0008 (4)
$\gamma_{30,5}$(U)	1120.6 (8)	0.00173 (15)			0.00173 (15)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{28,3}$(U)	1124.93 (10)	0.00347 (9)			0.00347 (9)
$\gamma_{11,0}$(U)	1124.93 (10)	0.00039 (9)	[E2]	0.00888 (13)	0.00039 (9)
$\gamma_{12,0}$(U)	1174.2 (10)	0.00192 (19)			0.00192 (19)
$\gamma_{13,1}$(U)	1193.77 (3)	0.01363 (18)	E1	0.00277 (4)	0.01359 (18)
$\gamma_{-1,6}$(U)	1220.37 (10)				0.00091 (9)
$\gamma_{13,0}$(U)	1237.28 (10)	0.00529 (11)	E1	0.00262 (4)	0.00528 (11)
$\gamma_{-1,7}$(U)	1353.0 (15)				0.0015 (5)
$\gamma_{14,1}$(U)	1392.6 (9)	0.0029 (11)	E1	0.00221 (4)	0.0029 (11)
$\gamma_{15,1}$(U)	1413.89 (10)	0.00229 (8)	[E1]	0.00217 (3)	0.00229 (8)
$\gamma_{14,0}$(U)	1434.16 (10)	0.00975 (16)	E1	0.00213 (3)	0.00973 (16)
$\gamma_{16,1}$(U)	1458.5 (15)	0.0019 (5)			0.0019 (5)
$\gamma_{16,0}$(U)	1501 (2)	0.0013			0.0013
$\gamma_{17,1}$(U)	1510.22 (10)	0.01308 (19)			0.01308 (19)
$\gamma_{18,1}$(U)	1527.28 (10)	0.00237 (8)	M1+E2	0.009 (4)	0.00235 (8)
$\gamma_{19,1}$(U)	1550.1 (10)	0.00137 (15)			0.00137 (15)
$\gamma_{17,0}$(U)	1553.77 (10)	0.00826 (14)			0.00826 (14)
$\gamma_{20,1}$(U)	1558.4 (10)	0.00074 (9)	M1	0.01228 (18)	0.00073 (9)
$\gamma_{18,0}$(U)	1570.67 (10)	0.00111 (8)	M1	0.01204 (17)	0.00110 (8)
$\gamma_{19,0}$(U)	1593.5 (6)	0.00235 (12)			0.00235 (12)
$\gamma_{20,0}$(U)	1601.8 (15)	0.00048 (22)	(M1)	0.01146 (17)	0.00047 (22)
$\gamma_{21,0}$(U)	1667.6 (10)	0.00118 (6)			0.00118 (6)
$\gamma_{22,0}$(U)	1694.1 (10)	0.00038 (2)			0.00038 (2)
$\gamma_{-1,8}$(U)	1720.5 (15)				0.00033 (15)
$\gamma_{-1,9}$(U)	1732.2 (15)				0.0019 (3)
$\gamma_{23,1}$(U)	1737.77 (10)	0.0214 (3)			0.0214 (3)
$\gamma_{-1,10}$(U)	1759.81 (10)				0.00146 (5)
$\gamma_{25,1}$(U)	1765.44 (10)	0.0084 (6)			0.0084 (6)
$\gamma_{24,0}$(U)	1796.3 (9)	0.00031 (5)			0.00031 (5)
$\gamma_{25,0}$(U)	1809.05 (10)	0.00376 (7)			0.00376 (7)
$\gamma_{26,1}$(U)	1819.69 (10)	0.00089 (5)			0.00089 (5)
$\gamma_{27,1}$(U)	1831.37 (10)	0.01759 (23)			0.01759 (23)
$\gamma_{26,0}$(U)	1863.09 (10)	0.00120 (5)			0.00120 (5)
$\gamma_{28,1}$(U)	1867.7 (1)	0.00932 (12)			0.00932 (12)
$\gamma_{27,0}$(U)	1874.9 (1)	0.00819 (14)			0.00819 (14)
$\gamma_{29,1}$(U)	1893.51 (11)	0.00218 (6)			0.00218 (6)
$\gamma_{28,0}$(U)	1911.20 (11)	0.00628 (9)			0.00628 (9)
$\gamma_{30,1}$(U)	1926.5 (10)	0.00045 (4)			0.00045 (4)
$\gamma_{29,0}$(U)	1937.01 (13)	0.00285 (5)			0.00285 (5)
$\gamma_{30,0}$(U)	1970.3 (8)	0.00041 (4)			0.00041 (4)
$\gamma_{-1,11}$(U)	2022.24 (12)				0.000186 (3)
$\gamma_{-1,12}$(U)	2041.23 (13)				0.00011 (1)
$\gamma_{-1,13}$(U)	2065.80 (13)				0.00007
$\gamma_{-1,14}$(U)	2093.19 (38)				0.00002
$\gamma_{-1,15}$(U)	2102.14 (15)				0.00006
$\gamma_{-1,16}$(U)	2136.69 (14)				0.00007

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	70.6	(11)	y
Q_α	:	5413.63	(9)	keV
α	:	100		%
SF	:	2.8	(6)	$\times 10^{-12}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,8}$	4460.86 (9)	0.0000033 (9)
$\alpha_{0,7}$	4502.77 (9)	0.0000214 (16)
$\alpha_{0,6}$	4810.01 (9)	0.000054 (4)
$\alpha_{0,5}$	4931.00 (9)	0.000048 (4)
$\alpha_{0,4}$	4948.59 (9)	0.000051 (6)
$\alpha_{0,3}$	4997.90 (9)	0.00622 (9)
$\alpha_{0,2}$	5136.64 (9)	0.325 (6)
$\alpha_{0,1}$	5263.48 (9)	30.6 (6)
$\alpha_{0,0}$	5320.24 (9)	69.1 (6)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Th)	5.8 - 20.3		11.62 (22)
e_{AK}	(Th)			0.00057 (8)
	KLL	68.406 - 76.745	}	
	KLX	83.857 - 93.345	}	
	KXY	99.29 - 109.64	}	
$ec_{2,1\ K}$	(Th)	19.414 (6)		0.01811 (33)
$ec_{2,1\ L}$	(Th)	108.592 - 112.800		0.1742 (33)
$ec_{2,1\ M}$	(Th)	123.882 - 125.732		0.0478 (8)
$ec_{2,1\ N}$	(Th)	127.730 - 128.729		0.01283 (24)
$ec_{1,0\ L}$	(Th)	37.28 - 41.50		22.4 (6)
$ec_{1,0\ M}$	(Th)	52.57 - 54.42		6.14 (16)
$ec_{1,0\ N}$	(Th)	56.420 - 57.417		1.646 (41)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Th)	11.1177 — 19.5043		11.00 (24)	
$XK\alpha_2$	(Th)	89.954		0.00524 (11)	} $K\alpha$
$XK\alpha_1$	(Th)	93.351		0.00847 (16)	}
$XK\beta_3$	(Th)	104.819	}		
$XK\beta_1$	(Th)	105.604	}	0.00301 (7)	$K\beta_1'$
$XK\beta_5''$	(Th)	106.239	}		
$XK\beta_2$	(Th)	108.509	}		
$XK\beta_4$	(Th)	108.955	}	0.001016 (29)	$K\beta_2'$
$XKO_{2,3}$	(Th)	109.442	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Th)	57.752 (13)	30.8 (8)	E2	153.2 (22)	0.200 (4)
$\gamma_{2,1}$(Th)	129.065 (3)	0.325 (5)	E2	3.74 (6)	0.0686 (7)
$\gamma_{6,4}$(Th)	140.999 (20)	0.0000038 (16)	E1	0.217 (3)	0.0000031 (13)
$\gamma_{4,2}$(Th)	191.351 (11)	0.000055 (5)	E2	0.776 (11)	0.000031 (3)
$\gamma_{5,2}$(Th)	209.252 (6)	0.0000119 (33)	E1	0.0848 (12)	0.000011 (3)
$\gamma_{3,1}$(Th)	270.245 (7)	0.00332 (7)	E1	0.0470 (7)	0.00317 (7)
$\gamma_{3,0}$(Th)	328.004 (7)	0.00292 (7)	E1	0.0305 (5)	0.00283 (7)
$\gamma_{6,2}$(Th)	332.371 (6)	0.0000505 (31)	E1	0.0297 (5)	0.000049 (3)
$\gamma_{5,1}$(Th)	338.320 (5)	0.0000381 (19)	E1	0.0285 (4)	0.0000370 (18)
$\gamma_{8,5}$(Th)	478.41 (5)	0.0000014 (6)	E1	0.01379 (20)	0.0000014 (6)
$\gamma_{7,3}$(Th)	503.819 (23)	0.0000147 (9)	E1	0.01243 (18)	0.0000145 (9)
$\gamma_{8,3}$(Th)	546.454 (21)	0.0000010 (6)	E1	0.01058 (15)	0.0000010 (6)
$\gamma_{7,1}$(Th)	774.05 (9)	0.0000048 (8)	E2	0.01649 (23)	0.0000047 (8)
$\gamma_{8,1}$(Th)	816.62 (700)	0.00000083 (31)	M1+E2	0.0359 (5)	0.0000008 (3)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	159.1	(2)	$\times 10^3$ y
Q_α	:	4908.5	(12)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,52}$	4087.3 (12)	0.0000144 (21)
$\alpha_{0,43}$	4309 (2)	0.0009
$\alpha_{0,38}$	4404 (2)	0.0003
$\alpha_{0,37}$	4411 (2)	0.0004
$\alpha_{0,35}$	4457 (2)	0.0028
$\alpha_{0,34}$	4465 (2)	0.003
$\alpha_{0,32}$	4483 (2)	0.0014
$\alpha_{0,31}$	4503 (2)	0.001
$\alpha_{0,30}$	4507 (2)	0.012
$\alpha_{0,29}$	4513 (2)	0.018
$\alpha_{0,26}$	4538 (2)	0.004
$\alpha_{0,24}$	4565 (2)	0.0023
$\alpha_{0,21}$	4590 (2)	0.007
$\alpha_{0,19}$	4611 (2)	0.006
$\alpha_{0,18}$	4615 (2)	0.004
$\alpha_{0,17}$	4634 (2)	0.01
$\alpha_{0,16}$	4641 (2)	0.003
$\alpha_{0,15}$	4656 (2)	0.005
$\alpha_{0,13}$	4664 (2)	0.042
$\alpha_{0,11}$	4681 (2)	0.01
$\alpha_{0,10}$	4687 (2)	0.0028
$\alpha_{0,9}$	4701 (2)	0.06
$\alpha_{0,8}$	4729 (2)	1.61
$\alpha_{0,7}$	4751 (2)	0.01
$\alpha_{0,6}$	4754 (2)	0.163
$\alpha_{0,5}$	4758 (2)	0.016
$\alpha_{0,4}$	4783.5 (12)	13.2 (2)
$\alpha_{0,3}$	4796 (2)	0.28
$\alpha_{0,0}$	4824.2 (12)	84.3 (6)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Th)	5.8 - 20.3		0.01066 (20)
e_{AK}	(Th)			0.00076 (10)
	KLL	68.406 - 76.745	}	
	KLX	83.857 - 93.345	}	
	KXY	99.29 - 109.64	}	

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		Energy keV	Electrons per 100 disint.
$ec_{8,6\ L}$	(Th)	4.839 - 9.000	0.339 (20)
$ec_{4,3\ M}$	(Th)	8.062 - 9.912	0.64 (32)
$ec_{3,1\ L}$	(Th)	8.713 - 12.900	1.31 (17)
$ec_{3,0\ L}$	(Th)	8.718 - 12.900	0.29 (5)
$ec_{6,4\ L}$	(Th)	8.919 - 13.100	0.083 (15)
$ec_{4,3\ N}$	(Th)	11.910 - 12.909	0.17 (9)
$ec_{13,9\ L}$	(Th)	17.352 - 21.500	0.0123 (20)
$ec_{8,6\ M}$	(Th)	20.129 - 21.979	0.0821 (48)
$ec_{4,1\ L}$	(Th)	21.955 - 26.100	0.090 (25)
$ec_{4,0\ L}$	(Th)	21.963 - 26.100	19 (17)
$ec_{6,3\ L}$	(Th)	22.161 - 26.300	0.457 (25)
$ec_{3,1\ M}$	(Th)	24.003 - 25.853	0.332 (43)
$ec_{3,0\ M}$	(Th)	24.008 - 25.858	0.069 (13)
$ec_{6,4\ M}$	(Th)	24.209 - 26.059	0.0200 (35)
$ec_{3,0\ N}$	(Th)	27.860 - 28.855	0.0184 (34)
$ec_{9,6\ L}$	(Th)	33.14 - 37.30	0.0612 (33)
$ec_{8,4\ L}$	(Th)	34.229 - 38.400	1.3 (12)
$ec_{4,1\ M}$	(Th)	37.245 - 39.095	0.025 (7)
$ec_{4,0\ M}$	(Th)	37.253 - 39.103	5 (5)
$ec_{6,3\ M}$	(Th)	37.451 - 39.301	0.110 (6)
$ec_{6,3\ N}$	(Th)	41.300 - 42.298	0.0293 (16)
$ec_{13,8\ L}$	(Th)	45.646 - 49.800	0.036 (27)
$ec_{8,3\ L}$	(Th)	47.474 - 51.600	0.0164 (12)
$ec_{9,6\ M}$	(Th)	48.43 - 50.28	0.0147 (8)
$ec_{8,4\ M}$	(Th)	49.519 - 51.369	0.37 (30)
$ec_{6,1\ L}$	(Th)	51.346 - 55.500	0.071 (6)
$ec_{6,0\ L}$	(Th)	51.354 - 55.500	0.0109 (11)
$ec_{8,4\ N}$	(Th)	53.370 - 54.366	0.10 (8)
$ec_{13,8\ M}$	(Th)	60.936 - 62.786	0.010 (7)
$ec_{6,1\ M}$	(Th)	66.636 - 68.486	0.0196 (15)
$ec_{8,0\ L}$	(Th)	76.664 - 80.800	0.192 (10)
$ec_{8,0\ M}$	(Th)	91.954 - 93.804	0.0526 (27)
$ec_{8,0\ N}$	(Th)	95.810 - 96.801	0.0141 (7)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Th)	11.1177 — 19.5043		0.00936 (21)	
XKα_2	(Th)	89.954		0.00700 (18)	} Kα
XKα_1	(Th)	93.351		0.01133 (28)	}
XKβ_3	(Th)	104.819	}		
XKβ_1	(Th)	105.604	}	0.00403 (12)	Kβ_1'
XKβ_5''	(Th)	106.239	}		

		Energy keV		Photons per 100 disint.	
$XK\beta_2$	(Th)	108.509	}		
$XK\beta_4$	(Th)	108.955	}	0.00136 (5)	$K\beta_2'$
$XKO_{2,3}$	(Th)	109.442	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Th)	0.0076	2.1			2.1
$\gamma_{4,3}$(Th)	13.244	0.86 (25)	(M1)	358 (5)	0.0024 (7)
$\gamma_{21,18}$(Th)	25.02 (5)	0.00056 (22)	(E1)	4.57 (7)	0.00010 (4)
$\gamma_{8,6}$(Th)	25.3106 (8)	0.452 (26)		213 (3)	0.00211 (12)
$\gamma_{15,12}$(Th)	25.3106 (8)	0.0009	(M1)	213 (3)	0.000004
$\gamma_{15,11}$(Th)	27.119	0.0123	(E2)	6130 (90)	0.000002
$\gamma_{9,8}$(Th)	28.288	0.0056 (14)	(M1)	153.4 (22)	0.000036 (9)
$\gamma_{3,1}$(Th)	29.1851 (4)	1.76 (24)		225 (12)	0.0078 (10)
$\gamma_{3,0}$(Th)	29.19	0.38 (7)	M1	139.8 (20)	0.0027 (5)
$\gamma_{6,4}$(Th)	29.3911 (4)	0.110 (19)	(M1)	137 (2)	0.00080 (14)
$\gamma_{17,13}$(Th)	32.453	0.00165 (31)	(M1)	102.3 (15)	0.000016 (3)
$\gamma_{27,23}$(Th)	32.52 (2)	0.0018 (6)	(M1)	101.7 (15)	0.000018 (6)
$\gamma_{30,26}$(Th)	32.73 (5)	0.00316 (39)	(E1)	2.26 (4)	0.00097 (12)
$\gamma_{13,9}$(Th)	37.80 (3)	0.0166 (26)	(M1)	65.2 (10)	0.00025 (4)
$\gamma_{4,1}$(Th)	42.431	0.123 (34)	(E2)	684 (10)	0.00018 (5)
$\gamma_{4,0}$(Th)	42.4349 (2)	9.4 (29)	M1+E2	400 (400)	0.072 (4)
$\gamma_{6,3}$(Th)	42.6333 (2)	0.618 (33)	(M1)	45.8 (7)	0.0132 (7)
$\gamma_{23,18}$(Th)	43.69 (3)	0.0018 (6)	(M1)	42.6 (6)	0.000042 (14)
$\gamma_{32,28}$(Th)	44.80 (2)	0.00113 (36)	(M1)	39.5 (6)	0.000028 (9)
$\gamma_{22,17}$(Th)	45.855	0.00034 (6)	(M1)	36.9 (6)	0.0000091 (16)
$\gamma_{26,21}$(Th)	51.0 (3)	0.0045 (42)	(M1+E2)	150 (130)	0.00003 (1)
$\gamma_{19,14}$(Th)	52.60 (3)	0.0026 (8)	(M1)	24.7 (4)	0.00010 (3)
$\gamma_{9,6}$(Th)	53.6106 (11)	0.0843 (44)	(M1)	23.3 (4)	0.00347 (18)
$\gamma_{8,4}$(Th)	54.7039 (11)	0.91 (8)	M1+E2	110 (90)	0.0168 (8)
$\gamma_{21,15}$(Th)	63.79 (6)	0.00044 (17)	(M1)	14.02 (20)	0.000029 (11)
$\gamma_{28,21}$(Th)	65.62 (5)	0.000068 (14)	(E1)	0.358 (5)	0.00005 (1)
$\gamma_{13,8}$(Th)	66.1183 (6)	0.032 (10)	(M1+E2)	50 (40)	0.00106 (6)
$\gamma_{8,3}$(Th)	67.9460 (5)	0.0228 (16)	E2	70.2 (10)	0.000320 (23)
$\gamma_{19,12}$(Th)	68.81 (3)	0.00122 (28)	(M1)	11.23 (16)	0.000100 (23)
$\gamma_{17,9}$(Th)	70.2813 (13)	0.0074 (5)	(M1+E2)	11.74 (17)	0.00058 (4)
$\gamma_{6,1}$(Th)	71.812 (8)	0.099 (8)	E2	53.8 (8)	0.00181 (14)
$\gamma_{6,0}$(Th)	71.8159 (20)	0.0156 (16)	(M1+E2)	12.49 (18)	0.00116 (12)
$\gamma_{21,14}$(Th)	72.825	0.0206 (15)	(E2)	50.4 (7)	0.00040 (3)
$\gamma_{11,6}$(Th)	74.542 (5)	0.00187 (10)	(E1)	0.255 (4)	0.00149 (8)
$\gamma_{12,6}$(Th)	76.350 (4)	0.000372 (37)	(E1)	0.240 (4)	0.00030 (3)
$\gamma_{15,8}$(Th)	76.350 (4)	0.000025	(E1)	0.240 (4)	0.00002
$\gamma_{39,33}$(Th)	77.12 (3)	0.000530 (49)	(E1)	0.233 (4)	0.00043 (4)
$\gamma_{22,13}$(Th)	78.21 (5)	0.00068 (11)	(M1+E2)	14.45 (21)	0.000044 (7)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{9,4}$(Th)	83.0125 (20)	0.00256 (35)	M1+E2	12.20 (17)	0.000197 (22)
$\gamma_{30,20}$(Th)	85.4221 (9)	0.000141 (47)	(E1)	0.1779 (25)	0.00012 (4)
$\gamma_{31,22}$(Th)	86.3 (3)	0.000362 (29)	(M1+E2)	8.52 (17)	0.000038 (3)
$\gamma_{35,27}$(Th)	86.3 (3)	0.0023 (7)	(E2)	22.5 (5)	0.000099 (23)
$\gamma_{18,9}$(Th)	87.25 (4)	0.00197 (49)	(E2)	21.4 (3)	0.000088 (22)
$\gamma_{21,12}$(Th)	89.39 (7)	0.00162 (19)	(M1)	5.24 (8)	0.00026 (3)
$\gamma_{20,11}$(Th)	89.9568 (24)	0.00146 (15)	(M1)	5.36 (9)	0.000229 (23)
$\gamma_{21,11}$(Th)	90.99 (1)	0.00185 (24)	(M1)	4.98 (7)	0.00031 (4)
$\gamma_{13,6}$(Th)	91.433	0.00074 (13)	(E2)	17.14 (24)	0.000041 (7)
$\gamma_{32,23}$(Th)	92.23 (12)	0.00019 (7)	(M1)	4.79 (7)	0.000033 (12)
$\gamma_{16,8}$(Th)	92.85 (3)	0.00026 (3)			0.00026 (3)
$\gamma_{9,3}$(Th)	96.22 (3)	0.0246 (13)	E(2)	13.49 (19)	0.00170 (9)
$\gamma_{8,0}$(Th)	97.1346 (3)	0.282 (14)	E2	12.91 (18)	0.0203 (10)
$\gamma_{24,14}$(Th)	97.37 (4)	0.0023 (7)	(E1)	0.1259 (18)	0.0020 (6)
$\gamma_{17,8}$(Th)	98.565	0.00053 (9)	(M1+E2)	4.50 (7)	0.000097 (16)
$\gamma_{29,19}$(Th)	99.95 (15)	0.000021 (7)	(E1)	0.1176 (18)	0.000019 (6)
$\gamma_{15,6}$(Th)	101.70 (5)	0.000077 (17)	(E1)	0.1123 (16)	0.000069 (15)
$\gamma_{30,19}$(Th)	103.73 (10)	0.000070 (21)	(E1)	0.1066 (16)	0.000063 (19)
$\gamma_{21,9}$(Th)	111.93 (1)	0.000549 (41)	(E1)	0.372 (6)	0.00040 (3)
$\gamma_{26,15}$(Th)	114.2 (2)	0.00250 (31)	(M1)	12.68 (19)	0.000183 (23)
$\gamma_{39,30}$(Th)	116.3 (2)	0.000162 (31)	(E1)	0.342 (5)	0.000121 (23)
$\gamma_{22,9}$(Th)	116.3 (2)	0.000032 (6)	(E2)	5.84 (10)	0.0000047 (9)
$\gamma_{11,3}$(Th)	117.162 (2)	0.00383 (19)	E1	0.336 (5)	0.00287 (14)
$\gamma_{12,3}$(Th)	118.968 (5)	0.00481 (24)	(E1)	0.325 (5)	0.00363 (18)
$\gamma_{13,4}$(Th)	120.819 (2)	0.0168 (9)	E2	4.95 (7)	0.00282 (15)
$\gamma_{17,6}$(Th)	123.886 (7)	0.00392 (27)	(E2)	4.45 (7)	0.00072 (5)
$\gamma_{38,28}$(Th)	125.04 (23)	0.000108 (32)	(M1)	9.83 (15)	0.000010 (3)
$\gamma_{9,0}$(Th)	125.43 (4)	0.00027 (5)	E2	4.22 (6)	0.000051 (10)
$\gamma_{28,15}$(Th)	129.514	0.00007596	(E1)	0.266 (4)	0.00006
$\gamma_{15,4}$(Th)	131.22 (8)	0.0000219 (28)	(E1)	0.257 (4)	0.0000174 (22)
$\gamma_{31,17}$(Th)	132.1	0.0000154 (31)	(E2)	3.39 (6)	0.0000035 (7)
$\gamma_{14,3}$(Th)	135.3390 (5)	0.00244 (12)	E1	0.239 (4)	0.00197 (10)
$\gamma_{38,27}$(Th)	139.3 (3)	0.000170 (19)	(M1)	7.24 (11)	0.0000206 (23)
$\gamma_{35,20}$(Th)	139.3 (3)	0.000014676	(E1)	0.223 (4)	0.000012
$\gamma_{26,12}$(Th)	139.722 (3)	0.00074 (15)	(M1)	7.17 (10)	0.000090 (18)
$\gamma_{27,11}$(Th)	141.95 (10)	0.0000109 (18)	(E1)	0.213 (3)	0.0000090 (15)
$\gamma_{33,19}$(Th)	142.69 (1)	0.000041 (6)	(E1)	0.211 (3)	0.000034 (5)
$\gamma_{22,8}$(Th)	144.42 (2)	0.0010 (1)	E2	2.34 (4)	0.00030 (3)
$\gamma_{19,6}$(Th)	145.35 (2)	0.00208 (8)	(E1)	0.202 (3)	0.00173 (7)
$\gamma_{11,1}$(Th)	146.3462 (6)	0.00779 (36)	(E1)	0.198 (3)	0.0065 (3)
$\gamma_{25,9}$(Th)	146.9 (5)	0.000116 (10)			0.000116 (10)
$\gamma_{12,0}$(Th)	148.20 (2)	0.000474 (24)	(E1)	0.193 (3)	0.000397 (20)
$\gamma_{29,14}$(Th)	152.62 (10)	0.0000130 (35)	(E1)	0.179 (3)	0.000011 (3)
$\gamma_{17,4}$(Th)	153.17 (4)	0.000105 (9)	(E2)	1.84 (3)	0.000037 (3)
$\gamma_{28,12}$(Th)	154.90 (3)	0.000168 (9)	(E1)	0.1732 (25)	0.000143 (8)
$\gamma_{30,14}$(Th)	156.19 (5)	0.0000421 (35)	(E1)	0.1698 (24)	0.000036 (3)
$\gamma_{26,9}$(Th)	162.45 (4)	0.000062 (6)	(E1)	0.1546 (22)	0.000054 (5)
$\gamma_{31,13}$(Th)	164.5	0.000622 (12)	(E2)	1.385 (22)	0.000261 (5)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{14,1}$(Th)	164.5240 (5)	0.00690 (34)	(E1)	0.1500 (21)	0.0060 (3)
$\gamma_{21,6}$(Th)	165.61 (3)	0.000467 (26)	(E1)	0.1476 (21)	0.000407 (23)
$\gamma_{43,33}$(Th)	167.10 (7)	0.0000165 (14)			0.0000165 (14)
$\gamma_{29,12}$(Th)	169.002 (5)	0.000047 (7)	(E1)	0.1407 (20)	0.000041 (6)
$\gamma_{29,11}$(Th)	170.809 (24)	0.000114 (7)	(E1)	0.1371 (20)	0.000100 (6)
$\gamma_{30,12}$(Th)	172.39 (10)	0.0000259 (25)	(E1)	0.1342 (19)	0.0000228 (22)
$\gamma_{30,11}$(Th)	174.192 (2)	0.000192 (10)	(E1)	0.1309 (19)	0.000170 (9)
$\gamma_{28,9}$(Th)	177.91 (16)	0.000030 (6)	(M1)	3.62 (6)	0.0000066 (13)
$\gamma_{37,22}$(Th)	184.1 (3)	0.000042 (9)	(E2)	0.897 (14)	0.000022 (5)
$\gamma_{33,15}$(Th)	185.76 (9)	0.0000087 (23)	(E1)	0.1124 (16)	0.0000078 (21)
$\gamma_{19,3}$(Th)	187.9670 (3)	0.00207 (10)	(E1)	0.1093 (16)	0.00187 (9)
$\gamma_{37,21}$(Th)	188.65 (6)	0.0000277 (44)	(E1)	0.1083 (16)	0.000025 (4)
$\gamma_{34,15}$(Th)	192.26 (4)	0.0000397 (44)	(E1)	0.1036 (15)	0.000036 (4)
$\gamma_{28,8}$(Th)	205.75 (6)	0.000078 (8)	(M1)	2.40 (4)	0.0000228 (24)
$\gamma_{21,3}$(Th)	208.179 (7)	0.00249 (12)	(E1)	0.0859 (12)	0.00229 (11)
$\gamma_{36,15}$(Th)	209.08 (8)	0.000019 (3)			0.000019 (3)
$\gamma_{38,19}$(Th)	210.90 (8)	0.0000148 (26)	(E1)	0.0833 (12)	0.0000137 (24)
$\gamma_{18,0}$(Th)	212.36 (3)	0.000416 (22)	(M1)	2.20 (3)	0.000130 (7)
$\gamma_{26,6}$(Th)	216.07 (1)	0.000669 (32)	(E1)	0.0787 (11)	0.00062 (3)
$\gamma_{19,1}$(Th)	217.151 (4)	0.00354 (17)	(E1)	0.0778 (11)	0.00328 (16)
$\gamma_{34,12}$(Th)	217.8 (2)	0.000003	(E1)	0.0773 (11)	0.000003
$\gamma_{34,11}$(Th)	219.43 (2)	0.000127 (6)	(E1)	0.0759 (11)	0.000118 (6)
$\gamma_{30,8}$(Th)	223.37 (3)	0.0000346 (43)	(E2)	0.443 (7)	0.000024 (3)
$\gamma_{39,18}$(Th)	224.33 (19)	0.00000139 (43)	(E1)	0.0721 (11)	0.0000013 (4)
$\gamma_{23,3}$(Th)	226.2 (2)	0.00020 (7)	(M1)	1.84 (3)	0.000070 (23)
$\gamma_{37,17}$(Th)	230.17 (2)	0.00015 (5)	(M1+E2)	1.1 (7)	0.000071 (5)
$\gamma_{34,9}$(Th)	240.373 (3)	0.00086 (5)	M1+E2	1.09 (6)	0.000413 (22)
$\gamma_{29,6}$(Th)	245.350 (1)	0.00732 (40)	M1+E2	1.05 (4)	0.00357 (18)
$\gamma_{30,6}$(Th)	248.724 (1)	0.00338 (17)	(M1)	1.415 (20)	0.00140 (7)
$\gamma_{23,0}$(Th)	255.91 (2)	0.000091 (6)	(M1)	1.307 (19)	0.0000393 (25)
$\gamma_{27,3}$(Th)	259.31 (2)	0.000350 (18)	(M1)	1.260 (18)	0.000155 (8)
$\gamma_{28,4}$(Th)	260.53 (2)	0.000229 (13)	(M1)	1.244 (18)	0.000102 (6)
$\gamma_{24,1}$(Th)	261.957 (4)	0.000495 (27)	M1+E2	0.78 (4)	0.000278 (14)
$\gamma_{34,8}$(Th)	268.675 (2)	0.000448 (25)	M1+E2	0.82 (5)	0.000246 (12)
$\gamma_{39,14}$(Th)	272.39 (2)	0.0000872 (49)	(E2)	0.228 (4)	0.000071 (4)
$\gamma_{28,3}$(Th)	273.74 (5)	0.0000323 (35)	(M1)	1.085 (16)	0.0000155 (17)
$\gamma_{29,4}$(Th)	274.735 (1)	0.000680 (41)	M1+E2	0.62 (5)	0.000420 (22)
$\gamma_{30,4}$(Th)	278.108 (2)	0.00177 (10)	M1+E2	0.57 (4)	0.00113 (6)
$\gamma_{33,7}$(Th)	284.29 (11)	0.0000093 (17)	(E1)	0.0419 (6)	0.0000089 (16)
$\gamma_{29,3}$(Th)	288.0290 (9)	0.00146 (37)	(M1+E2)	0.6 (4)	0.00091 (5)
$\gamma_{27,1}$(Th)	288.50 (3)	0.000227 (27)	(M1)	0.938 (14)	0.000117 (14)
$\gamma_{43,20}$(Th)	291.355 (9)	0.00062 (25)			0.00062 (25)
$\gamma_{30,3}$(Th)	291.355 (9)	0.00755 (43)	M1+E2	0.63 (3)	0.00463 (25)
$\gamma_{40,15}$(Th)	291.93 (4)	0.000102 (15)			0.000102 (15)
$\gamma_{34,6}$(Th)	293.996 (9)	0.000231 (13)	M1	0.890 (13)	0.000122 (7)
$\gamma_{28,0}$(Th)	302.989 (4)	0.000142 (7)	(M1)	0.820 (12)	0.000078 (4)
$\gamma_{45,24}$(Th)	307.45 (19)	0.0000075 (29)	(M1,E2)	0.5 (4)	0.0000050 (14)
$\gamma_{43,19}$(Th)	309.49 (3)	0.000083 (5)			0.000083 (5)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{36,6}$(Th)	310.71 (5)	0.000038 (3)			0.000038 (3)
$\gamma_{39,9}$(Th)	311.76 (3)	0.0000651 (41)	(E1)	0.0341 (5)	0.000063 (4)
$\gamma_{45,23}$(Th)	313.45 (18)	0.0000056 (11)			0.0000056 (11)
$\gamma_{41,13}$(Th)	315.39 (13)	0.0000173 (26)	(M1)	0.734 (11)	0.0000100 (15)
$\gamma_{29,0}$(Th)	317.169 (2)	0.0097 (6)	M1+E2	0.371 (22)	0.0071 (4)
$\gamma_{33,4}$(Th)	317.169 (2)	0.00047 (19)	(M1)	0.723 (11)	0.00027 (11)
$\gamma_{30,0}$(Th)	320.547 (1)	0.00371 (20)	M1+E2	0.334 (25)	0.00278 (14)
$\gamma_{34,4}$(Th)	323.381 (14)	0.00099 (5)	M1+E2	0.280 (17)	0.00077 (4)
$\gamma_{37,8}$(Th)	328.758 (19)	0.000112 (25)	(M1+E2)	0.4 (3)	0.000080 (4)
$\gamma_{34,3}$(Th)	336.63 (1)	0.000731 (44)	M1+E2	0.26 (4)	0.00058 (3)
$\gamma_{39,8}$(Th)	340.19 (8)	0.0000026 (16)	(E1)	0.0284 (4)	0.0000025 (16)
$\gamma_{37,6}$(Th)	354.04 (2)	0.000079 (14)	(M1+E2)	0.32 (22)	0.000060 (4)
$\gamma_{33,0}$(Th)	359.38 (4)	0.0000074 (23)	(M1)	0.513 (8)	0.0000049 (15)
$\gamma_{47,22}$(Th)	364.01 (12)	0.0000064 (16)			0.0000064 (16)
$\gamma_{34,0}$(Th)	365.820 (3)	0.00115 (6)	(M1)	0.489 (7)	0.00077 (4)
$\gamma_{44,14}$(Th)	371.34 (9)	0.0000021 (10)	(M1)	0.469 (7)	0.0000014 (7)
$\gamma_{35,0}$(Th)	374.71 (20)	0.0000055 (29)	(M1)	0.458 (7)	0.0000038 (20)
$\gamma_{41,8}$(Th)	381.35 (8)	0.0000056 (19)	(M1)	0.437 (7)	0.0000039 (13)
$\gamma_{37,4}$(Th)	383.43 (3)	0.000123 (18)	(M1+E2)	0.26 (18)	0.000096 (5)
$\gamma_{42,9}$(Th)	387.86 (12)	0.0000012 (3)			0.0000012 (3)
$\gamma_{40,6}$(Th)	393.60 (1)	0.0000130 (12)			0.0000130 (12)
$\gamma_{37,3}$(Th)	396.62 (3)	0.0000047 (11)	(E2)	0.0762 (11)	0.0000044 (10)
$\gamma_{49,20}$(Th)	402.22 (2)	0.0000072 (14)			0.0000072 (14)
$\gamma_{45,14}$(Th)	404.39 (5)	0.00000133 (41)	(E1)	0.0195 (3)	0.0000013 (4)
$\gamma_{41,6}$(Th)	406.58 (5)	0.0000021 (5)	(M1)	0.367 (6)	0.0000015 (4)
$\gamma_{42,8}$(Th)	416.31 (3)	0.000012 (1)			0.000012 (1)
$\gamma_{40,4}$(Th)	423.09 (14)	0.00000052 (14)			0.00000052 (14)
$\gamma_{49,18}$(Th)	425.46 (10)	0.00000080 (14)			0.00000080 (14)
$\gamma_{40,3}$(Th)	436.23 (2)	0.0000035 (9)			0.0000035 (9)
$\gamma_{42,6}$(Th)	441.53 (17)	0.00000073 (22)			0.00000073 (22)
$\gamma_{41,3}$(Th)	449.520 (2)	0.0000082 (10)	(M1)	0.280 (4)	0.0000064 (8)
$\gamma_{43,6}$(Th)	455.48 (25)	0.00000117 (21)			0.00000117 (21)
$\gamma_{47,12}$(Th)	456.87 (16)	0.00000044 (21)			0.00000044 (21)
$\gamma_{46,9}$(Th)	459.81 (1)	0.0000076 (11)			0.0000076 (11)
$\gamma_{40,0}$(Th)	465.37 (12)	0.00000047 (23)			0.00000047 (23)
$\gamma_{42,4}$(Th)	471.06 (1)	0.0000185 (18)			0.0000185 (18)
$\gamma_{48,11}$(Th)	474.41 (8)	0.00000077 (11)			0.00000077 (11)
$\gamma_{41,0}$(Th)	478.64 (1)	0.00001829 (16)	(M1)	0.236 (4)	0.00001480 (12)
$\gamma_{43,4}$(Th)	484.34 (3)	0.0000028 (12)	[M1]	0.228 (4)	0.0000023 (10)
$\gamma_{51,14}$(Th)	500.40 (9)	0.00000070 (23)			0.00000070 (23)
$\gamma_{42,0}$(Th)	513.20 (5)	0.0000165 (21)			0.0000165 (21)
$\gamma_{52,20}$(Th)	514.81 (11)	0.0000112 (18)			0.0000112 (18)
$\gamma_{48,8}$(Th)	523.68 (6)	0.00000094 (24)			0.00000094 (24)
$\gamma_{50,9}$(Th)	531.54 (8)	0.00000070 (23)			0.00000070 (23)
$\gamma_{47,6}$(Th)	533.53 (5)	0.00000128 (25)	M1+E2	0.098 (14)	0.00000117 (23)
$\gamma_{44,1}$(Th)	536.44 (12)	0.00000048 (23)	(E1)	0.01098 (16)	0.00000047 (23)
$\gamma_{49,8}$(Th)	540.52 (6)	0.00000164 (23)			0.00000164 (23)
$\gamma_{46,4}$(Th)	542.41 (13)	0.00000047 (23)			0.00000047 (23)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{50,8}$(Th)	559.87 (18)	0.00000023			0.00000023
$\gamma_{47,4}$(Th)	562.61 (6)	0.0000015 (8)	M1+E2	0.075 (8)	0.0000014 (7)
$\gamma_{45,0}$(Th)	569.19 (2)	0.0000041 (16)	M1+E2	0.063 (4)	0.0000039 (15)
$\gamma_{47,3}$(Th)	576.00 (7)	0.00000096 (43)	M1+E2	0.064 (8)	0.0000009 (4)
$\gamma_{48,4}$(Th)	578.42 (2)	0.0000034 (11)			0.0000034 (11)
$\gamma_{46,0}$(Th)	584.94 (16)	0.00000023			0.00000023
$\gamma_{48,3}$(Th)	591.64 (7)	0.00000070 (23)			0.00000070 (23)
$\gamma_{47,0}$(Th)	605.16 (1)	0.0000051 (10)	M1+E2	0.072 (7)	0.0000048 (9)
$\gamma_{49,3}$(Th)	608.15 (5)	0.00000047 (23)			0.00000047 (23)
$\gamma_{50,4}$(Th)	614.45 (7)	0.00000070 (23)			0.00000070 (23)
$\gamma_{48,0}$(Th)	620.81 (3)	0.0000015 (6)			0.0000015 (6)
$\gamma_{50,3}$(Th)	627.70 (8)	0.00000047 (23)			0.00000047 (23)
$\gamma_{49,0}$(Th)	637.25 (10)	0.00000023			0.00000023
$\gamma_{52,8}$(Th)	652.79 (19)	0.00000023			0.00000023
$\gamma_{50,0}$(Th)	656.89 (5)	0.000004 (1)			0.000004 (1)
$\gamma_{51,0}$(Th)	665.03 (10)	0.00000023	M1+E2	0.06 (4)	0.00000023
$\gamma_{52,4}$(Th)	707.41 (2)	0.0000020 (9)			0.0000020 (9)
$\gamma_{52,3}$(Th)	720.62 (11)	0.00000047 (23)			0.00000047 (23)
$\gamma_{52,0}$(Th)	749.8 (9)	0.00000047 (23)			0.00000047 (23)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	2.455	(6)	$\times 10^5$ y
Q_α	:	4857.7	(7)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,5}$	4108.6 (7)	0.000007
$\alpha_{0,4}$	4150.6 (7)	0.000026
$\alpha_{0,3}$	4275.2 (7)	0.00004 (1)
$\alpha_{0,2}$	4603.5 (7)	0.210 (2)
$\alpha_{0,1}$	4722.4 (7)	28.42 (2)
$\alpha_{0,0}$	4774.6 (7)	71.37 (2)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Th)	5.8 - 20.3		10.8 (4)
e_{AK}	(Th)			0.00029 (5)
	KLL	68.406 - 76.745	}	
	KLX	83.857 - 93.345	}	
	KXY	99.29 - 109.64	}	
$ec_{1,0\ L}$	(Th)	32.7 - 36.9		20.9 (12)
$ec_{1,0\ M}$	(Th)	48.0 - 49.9		5.70 (32)
$ec_{1,0\ N}$	(Th)	51.9 - 52.9		1.53 (9)
$ec_{2,1\ L}$	(Th)	100.4 - 104.6		0.132 (12)
$ec_{2,1\ M}$	(Th)	115.7 - 117.6		0.0363 (34)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Th)	11.118 — 19.504		10.2 (4)	
$XK\alpha_2$	(Th)	89.954		0.00269 (25)	} $K\alpha$
$XK\alpha_1$	(Th)	93.351		0.0044 (4)	}
$XK\beta_3$	(Th)	104.819	}		
$XK\beta_1$	(Th)	105.604	}	0.00155 (15)	$K\beta_1^{'}$
$XK\beta_5^{''}$	(Th)	106.239	}		

		Energy keV		Photons per 100 disint.	
$XK\beta_2$	(Th)	108.509	}		
$XK\beta_4$	(Th)	108.955	}	0.00052 (5)	$K\beta_2'$
$XKO_{2,3}$	(Th)	109.442	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Th)	53.20 (2)	28.7 (13)	E2+M3	228 (7)	0.1253 (40)
$\gamma_{2,1}$(Th)	120.90 (4)	0.228 (48)	E2	4.92 (15)	0.0386 (32)
$\gamma_{3,1}$(Th)	454.96 (5)	0.000025 (6)	E1	0.01526 (46)	0.000025 (6)
$\gamma_{5,2}$(Th)	503.5 (1)	0.00000095	[E2]	0.0418 (13)	0.00000095
$\gamma_{3,0}$(Th)	508.16 (5)	0.0000152 (39)	E1	0.01221 (37)	0.0000150 (39)
$\gamma_{4,1}$(Th)	581.7 (1)	0.000012 (5)	E2	0.0300 (9)	0.000012 (5)
$\gamma_{5,1}$(Th)	624.4 (1)	0.00005	E0+E2+M1	5.1 (20)	0.00000082
$\gamma_{5,0}$(Th)	677.6 (1)	0.000001	[E2]	0.0216 (6)	0.000001

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	704	(1)	$\times 10^6$ y
Q_α	:	4678.3	(7)	keV
α	:	100		%
SF	:	7	(2)	$\times 10^{-9}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,22}$	3976 (5)	≈0.0011
$\alpha_{0,21}$	4013.2 (8)	0.0396 (10)
$\alpha_{0,20}$	4077.5 (7)	0.016 (12)
$\alpha_{0,19}$	4152 (5)	0.294 (13)
$\alpha_{0,18}$	4214.7 (19)	5.95 (12)
$\alpha_{0,17}$	4219.5 (7)	0.01732 (12)
$\alpha_{0,16}$	4227.6 (7)	0.122 (6)
$\alpha_{0,15}$	4248 (5)	0.069 (10)
$\alpha_{0,14}$	4266 (5)	0.22 (3)
$\alpha_{0,13}$	4279.3 (7)	0.0329 (5)
$\alpha_{0,12}$	4286.9 (7)	0.065 (13)
$\alpha_{0,11}$	4302.1 (7)	0.00959 (13)
$\alpha_{0,10}$	4322 (4)	3.33 (6)
$\alpha_{0,9}$	4327.9 (7)	0.405 (13)
$\alpha_{0,8}$	4361.9 (7)	0.206 (21)
$\alpha_{0,7}$	4366.1 (20)	18.80 (13)
$\alpha_{0,6}$	4381.1 (7)	0.106 (16)
$\alpha_{0,5}$	4397.8 (13)	57.19 (20)
$\alpha_{0,4}$	4414.9 (5)	3.01 (16)
$\alpha_{0,3}$	4437.9 (40)	0.236 (25)
$\alpha_{0,2}$	4502.4 (7)	1.28 (5)
$\alpha_{0,1}$	4556.0 (4)	3.79 (6)
$\alpha_{0,0}$	4596.4 (13)	4.74 (6)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Th)	5.8 - 20.3		24 (3)
e_{AK}	(Th)			0.381 (9)
	KLL	68.406 - 76.745	}	
	KLX	83.857 - 93.345	}	
	KXY	99.29 - 109.64	}	
$ec_{7,5\ L}$	(Th)	11.117 - 15.300		8.3 (29)
$ec_{10,7\ L}$	(Th)	20.6 - 24.8		1.09 (42)
$ec_{1,0\ L}$	(Th)	21.484 - 25.700		18.2 (32)

		Energy keV	Electrons per 100 disint.
$ec_{7,5\ M}$	(Th)	26.407 - 28.257	2.2 (8)
$ec_{7,5\ N}$	(Th)	30.260 - 31.254	0.60 (23)
$ec_{7,4\ L}$	(Th)	30.709 - 34.900	6.8 (14)
$ec_{9,6\ L}$	(Th)	33.602 - 37.800	0.1771 (34)
$ec_{10,7\ M}$	(Th)	35.9 - 37.8	0.26 (10)
$ec_{1,0\ M}$	(Th)	36.774 - 38.624	4.9 (9)
$ec_{10,7\ N}$	(Th)	39.8 - 40.8	0.070 (27)
$ec_{1,0\ N}$	(Th)	40.630 - 41.621	1.32 (23)
$ec_{19,18\ L}$	(Th)	43.87 - 48.00	0.1850 (27)
$ec_{7,4\ M}$	(Th)	45.999 - 47.849	1.87 (39)
$ec_{9,6\ M}$	(Th)	48.892 - 50.742	0.0484 (8)
$ec_{7,4\ N}$	(Th)	49.850 - 50.846	0.5 (1)
$ec_{9,6\ N}$	(Th)	52.740 - 53.739	0.01296 (22)
$ec_{19,18\ M}$	(Th)	59.16 - 61.01	0.0445 (7)
$ec_{19,18\ N}$	(Th)	63.01 - 64.01	0.01188 (18)
$ec_{2,0\ L}$	(Th)	75.66 - 79.80	0.90 (11)
$ec_{4,0\ K}$	(Th)	76.072 (4)	5.06 (8)
$ec_{2,0\ M}$	(Th)	90.95 - 92.80	0.248 (30)
$ec_{2,0\ N}$	(Th)	94.8 - 95.8	0.067 (8)
$ec_{4,0\ L}$	(Th)	165.25 - 169.40	1.020 (18)
$ec_{4,0\ M}$	(Th)	180.54 - 182.39	0.2468 (37)
$ec_{4,0\ N}$	(Th)	184.390 - 185.387	0.0651 (10)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Th)	11.1177 — 19.5043		22 (3)	
$XK\alpha_2$	(Th)	89.954		3.56 (9)	} $K\alpha$
$XK\alpha_1$	(Th)	93.351		5.76 (14)	}
$XK\beta_3$	(Th)	104.819	}		
$XK\beta_1$	(Th)	105.604	}	2.06 (5)	$K\beta_1'$
$XK\beta_5''$	(Th)	106.239	}		
$XK\beta_2$	(Th)	108.509	}		
$XK\beta_4$	(Th)	108.955	}	0.685 (18)	$K\beta_2'$
$XKO_{2,3}$	(Th)	109.442	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{7,5}$(Th)	31.60 (5)	11.4 (40)	M1+E2	667	0.017 (6)
$\gamma_{10,7}$(Th)	41.4 (3)	1.5 (6)	[M1]	49.9 (13)	0.029 (11)
$\gamma_{1,0}$(Th)	42.01 (6)	24.7 (43)	M1+E2	440 (30)	0.056 (9)
$\gamma_{7,4}$(Th)	51.21 (4)	9.4 (19)	[E2]	274 (4)	0.034 (7)
$\gamma_{9,6}$(Th)	54.1 (1)	0.24	[E2]	210 (4)	0.00115
$\gamma_{2,1}$(Th)	54.25 (5)	2.1	[M1+E2]	71 (3)	0.0285
$\gamma_{19,18}$(Th)	64.45 (5)	0.26	[M1]	13.6 (2)	0.018
$\gamma_{10,5}$(Th)	72.7 (2)	1.86	M1+E2	15 (3)	0.116
$\gamma_{7,3}$(Th)	74.94 (3)	0.064 (8)	[E1]	0.252 (4)	0.051 (6)
$\gamma_{2,0}$(Th)	96.09 (2)	1.33 (16)	[E2]	13.58 (19)	0.091 (11)
$\gamma_{14,7}$(Th)	97 (4)	0.22 (7)	[E2]	13 (3)	0.016 (4)
$\gamma_{5,2}$(Th)	109.19 (7)	1.81 (14)	[E1]	0.0932 (14)	1.66 (13)
$\gamma_{10,3}$(Th)	115.45 (5)	0.040 (13)	[E1]	0.348 (5)	0.03 (1)
$\gamma_{3,1}$(Th)	120.35 (5)	0.31	[M1]	10.95 (16)	0.026
$\gamma_{16,8}$(Th)	136.55 (5)	0.103	[M1]	7.66 (11)	0.012
$\gamma_{7,2}$(Th)	140.76 (2)	0.244 (12)	[E1]	0.218 (3)	0.20 (1)
$\gamma_{20,18}$(Th)	142.40 (5)	0.018	[E2]	2.48 (4)	0.0051
$\gamma_{4,1}$(Th)	143.767 (3)	13.20 (8)	E1	0.207 (3)	10.94 (6)
$\gamma_{18,7}$(Th)	150.936 (15)	0.61 (20)	[M1]	5.76 (8)	0.09 (3)
$\gamma_{5,1}$(Th)	163.356 (3)	5.855 (36)	(E1)	0.1526 (22)	5.08 (3)
$\gamma_{16,5}$(Th)	173 (1)	0.007 (6)	[E1]	0.133 (3)	0.006 (5)
$\gamma_{18,5}$(Th)	182.62 (5)	1.70 (22)	[M1]	3.36 (5)	0.39 (5)
$\gamma_{4,0}$(Th)	185.720 (4)	63.41 (35)	E1	0.1124 (16)	57.0 (3)
$\gamma_{7,1}$(Th)	194.940 (6)	0.693 (11)	[E1]	0.1002 (14)	0.63 (1)
$\gamma_{8,1}$(Th)	198.894 (14)	0.131 (7)	M1	2.64 (4)	0.036 (2)
$\gamma_{18,4}$(Th)	202.12 (1)	3.81 (8)	[M1]	2.53 (4)	1.08 (2)
$\gamma_{5,0}$(Th)	205.316 (4)	5.465 (33)	(E1)	0.0887 (13)	5.02 (3)
$\gamma_{19,7}$(Th)	215.28 (4)	0.090 (9)	[M1]	2.12 (3)	0.029 (3)
$\gamma_{6,0}$(Th)	221.386 (14)	0.349 (15)	M1	1.96 (3)	0.118 (5)
$\gamma_{13,2}$(Th)	228.76 (5)	0.021	M1	1.79 (3)	0.0074
$\gamma_{9,1}$(Th)	233.50 (2)	0.102 (11)	M1	1.687 (24)	0.038 (4)
$\gamma_{8,0}$(Th)	240.88 (4)	0.181 (19)	M1(+E2)	1.45 (22)	0.074 (4)
$\gamma_{19,5}$(Th)	246.83 (2)	0.134 (7)	[M1]	1.445 (21)	0.055 (3)
$\gamma_{15,2}$(Th)	255.365 (10)	0.017	M1	1.315 (19)	0.0074
$\gamma_{19,4}$(Th)	266.47 (4)	0.0097 (7)	[E2]	0.245 (4)	0.0078 (6)
$\gamma_{12,1}$(Th)	275.35 (15)	0.094 (11)	M1+E2	0.84 (6)	0.051 (6)
$\gamma_{9,0}$(Th)	275.49 (6)	0.065	M1(+E2)	1.02 (12)	0.032
$\gamma_{16,2}$(Th)	281.42 (5)	0.013	M1	1.005 (14)	0.0063
$\gamma_{13,1}$(Th)	282.94 (5)	0.013	[M1]	0.990 (14)	0.0063
$\gamma_{17,2}$(Th)	289.56 (4)	0.0142	[M1]	0.929 (13)	0.0074
$\gamma_{18,2}$(Th)	291.65 (3)	0.042 (6)	[E1]	0.0396 (6)	0.040 (6)
$\gamma_{11,0}$(Th)	301.7 (1)	0.01	M1	0.829 (12)	0.0053
$\gamma_{15,1}$(Th)	310.69 (6)	0.011	(E2)	0.1517 (22)	0.0094
$\gamma_{12,0}$(Th)	317.10 (8)	0.0019	M1	0.723 (11)	0.0011
$\gamma_{17,1}$(Th)	343.5 (2)	0.0032			0.0032
$\gamma_{18,1}$(Th)	345.92 (3)	0.041 (6)	[E1]	0.0272 (4)	0.040 (6)
$\gamma_{15,0}$(Th)	350 (5)	0.009	M1	0.552 (24)	0.006

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{19,2}$(Th)	356.03 (5)	0.0054	[E1]	0.0255 (4)	0.0053
$\gamma_{18,0}$(Th)	387.84 (3)	0.041 (6)	[E1]	0.0213 (3)	0.040 (6)
$\gamma_{21,5}$(Th)	390.27 (20)	0.040 (1)			0.040 (1)
$\gamma_{19,1}$(Th)	410.29 (4)	0.0033	[E1]	0.0189 (3)	0.0032
$\gamma_{22,4}$(Th)	448.40 (6)	0.0011			0.0011

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	23.43	(6)	$\times 10^{6}$ y
Q_{α}	:	4573.1	(9)	keV
α	:	100		%
SF	:	~9		$\times 10^{-8}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,3}$	4168	0.00014 (5)
$\alpha_{0,2}$	4332 (8)	0.149 (22)
$\alpha_{0,1}$	4445 (5)	26.1 (40)
$\alpha_{0,0}$	4494 (3)	73.8 (40)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Th)	5.8 - 20.3		10.1 (12)
e_{AK}	(Th)			0.000139 (30)
	KLL	68.406 - 76.745	}	
	KLX	83.857 - 93.345	}	
	KXY	99.29 - 109.64	}	
$ec_{1,0\ L}$	(Th)	28.99 - 33.20		19.2 (29)
$ec_{1,0\ M}$	(Th)	44.28 - 46.13		5.3 (8)
$ec_{1,0\ N}$	(Th)	48.13 - 49.12		1.41 (21)
$ec_{2,1\ L}$	(Th)	92.32 - 96.50		0.092 (15)
$ec_{2,1\ M}$	(Th)	107.61 - 109.46		0.0253 (41)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Th)	11.118 — 19.599		9.4 (10)	
$XK\alpha_2$	(Th)	89.954		0.00128 (22)	} $K\alpha$
$XK\alpha_1$	(Th)	93.351		0.0021 (4)	}
$XK\beta_3$	(Th)	104.819	}		
$XK\beta_1$	(Th)	105.604	}	0.00074 (13)	$K\beta_1'$
$XK\beta_5''$	(Th)	106.239	}		

		Energy keV	Photons per 100 disint.	
$XK\beta_2$	(Th)	108.509	}	
$XK\beta_4$	(Th)	108.955	} 0.00025 (5)	$K\beta_2'$
$XKO_{2,3}$	(Th)	109.442	}	

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Th)	49.46 (10)	26.3 (40)	E2	324 (10)	0.081 (12)
$\gamma_{2,1}$(Th)	112.79 (10)	0.150 (24)	E2	6.67 (20)	0.0195 (31)
$\gamma_{3,2}$(Th)	171.15 (20)	0.000142 (48)	E2	1.186 (36)	0.000065 (22)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	6.749	(16)	d
Q_{β^-}	:	518.6	(6)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100		Nature	log ft
$\beta^-_{0,9}$	147.7 (6)	1.3	(9)	Allowed	7.32
$\beta^-_{0,7}$	186.2 (6)	2.9	(9)	Super-allowed	7.28
$\beta^-_{0,6}$	237.2 (6)	48.2	(25)	1st forbidden	6.39
$\beta^-_{0,5}$	251.1 (6)	40.9	(31)	1st forbidden	6.54
$\beta^-_{0,2}$	459.1 (6)	7	(4)	1st forbidden unique	8.1

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Np)	5.04 - 13.52	58.5 (21)	
e_{AK}	(Np)		1.49 (21)	
	KLL	73.50 - 83.13	}	
	KLX	90.36 - 97.28	}	
	KXY	107.10 - 114.58	}	
$ec_{2,1}$ L	(Np)	3.918 - 8.731	14.6 (50)	
$ec_{6,5}$ M	(Np)	8.07 - 10.15	36.0 (19)	
$ec_{1,0}$ L	(Np)	10.769 - 15.586	17.0 (23)	
$ec_{6,5}$ N	(Np)	12.31 - 13.41	9.79 (43)	
$ec_{9,7}$ L	(Np)	16.11 - 20.93	0.7 (7)	
$ec_{3,1}$ L	(Np)	20.277 - 25.094	0.47	
$ec_{2,1}$ M	(Np)	20.606 - 22.681	3.9 (5)	
$ec_{4,2}$ L	(Np)	20.996 - 25.813	3.2 (5)	
$ec_{1,0}$ M	(Np)	27.457 - 29.532	4.3 (7)	
$ec_{7,6}$ L	(Np)	28.58 - 33.40	0.19 (8)	
$ec_{1,0}$ N	(Np)	31.695 - 32.793	1.16 (17)	
$ec_{9,7}$ M	(Np)	32.80 - 34.88	0.2 (2)	
$ec_{3,1}$ M	(Np)	36.965 - 39.040	0.12	
$ec_{9,7}$ N	(Np)	37.04 - 38.14	0.05 (5)	
$ec_{2,0}$ L	(Np)	37.114 - 41.931	28.6 (22)	
$ec_{4,2}$ M	(Np)	37.684 - 39.759	0.84 (14)	
$ec_{3,1}$ N	(Np)	41.203 - 42.301	0.032	
$ec_{4,2}$ N	(Np)	41.92 - 43.02	0.233 (37)	
$ec_{7,5}$ L	(Np)	42.40 - 47.22	0.387 (9)	
$ec_{7,6}$ M	(Np)	45.27 - 47.35	0.0479 (21)	
$ec_{5,4}$ K	(Np)	45.94 (2)	0.363 (9)	
$ec_{7,6}$ N	(Np)	49.51 - 50.61	0.0127 (6)	

		Energy keV	Electrons per 100 disint.		Energy keV
$ec_{3,0\ L}$	(Np)	53.4 - 58.2	0.0354 (7)		
$ec_{2,0\ M}$	(Np)	53.802 - 55.877	7.7 (3)		
$ec_{2,0\ N}$	(Np)	58.040 - 59.138	0.846 (24)		
$ec_{7,5\ M}$	(Np)	59.09 - 61.17	0.096 (2)		
$ec_{7,5\ N}$	(Np)	63.33 - 64.43	0.0255 (5)		
$ec_{5,2\ K}$	(Np)	89.331 (10)	50.1 (13)		
$ec_{5,1\ K}$	(Np)	115.73 (4)	0.114 (5)		
$ec_{5,4\ L}$	(Np)	142.18 - 147.00	2.04 (5)		
$ec_{5,0\ K}$	(Np)	148.87 (4)	0.53 (3)		
$ec_{5,4\ M}$	(Np)	158.87 - 160.95	0.565 (14)		
$ec_{5,4\ N}$	(Np)	163.11 - 164.21	0.1546 (33)		
$ec_{5,2\ L}$	(Np)	185.573 - 190.390	10.1 (3)		
$ec_{5,2\ M}$	(Np)	202.261 - 204.336	2.45 (7)		
$ec_{5,2\ N}$	(Np)	206.499 - 207.597	0.662 (14)		
$ec_{5,1\ L}$	(Np)	211.97 - 216.79	0.040 (2)		
$ec_{7,0\ K}$	(Np)	213.69 (4)	0.0757 (18)		
$ec_{8,1\ K}$	(Np)	216.71 (4)	0.052 (7)		
$ec_{5,1\ M}$	(Np)	228.66 - 230.74	0.0105 (5)		
$ec_{5,0\ L}$	(Np)	245.11 - 249.93	0.172 (9)		
$ec_{8,0\ K}$	(Np)	249.92 (4)	0.0206 (9)		
$ec_{9,0\ K}$	(Np)	252.259 (23)	0.046 (7)		
$ec_{5,0\ M}$	(Np)	261.80 - 263.88	0.045 (3)		
$ec_{5,0\ N}$	(Np)	266.055 - 267.153	0.0123 (7)		
$ec_{7,0\ L}$	(Np)	309.93 - 314.75	0.0733 (17)		
$ec_{8,1\ L}$	(Np)	312.95 - 317.77	0.0108 (3)		
$ec_{7,0\ M}$	(Np)	326.62 - 328.70	0.0197 (5)		
$\beta^-_{0,9}$	max:	147.7 (6)	1.3 (9)	avg:	39.0 (2)
$\beta^-_{0,7}$	max:	186.2 (6)	2.9 (9)	avg:	49.8 (2)
$\beta^-_{0,6}$	max:	237.2 (6)	48.2 (25)	avg:	64.5 (2)
$\beta^-_{0,5}$	max:	251.1 (6)	40.9 (31)	avg:	68.6 (2)
$\beta^-_{0,2}$	max:	459.1 (6)	7 (4)	avg:	137.6 (2)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Np)	11.89 — 22.2		59.0 (21)	
$XK\alpha_2$	(Np)	97.069		14.8 (4)	} $K\alpha$
$XK\alpha_1$	(Np)	101.059		23.5 (6)	}
$XK\beta_3$	(Np)	113.303	}		
$XK\beta_1$	(Np)	114.234	}	8.57 (27)	$K\beta'_1$
$XK\beta''_5$	(Np)	114.912	}		

		Energy keV		Photons per 100 disint.	
$XK\beta_2$	(Np)	117.476	}		
$XK\beta_4$	(Np)	117.876	}	2.95 (10)	$K\beta_2'$
$XKO_{2,3}$	(Np)	118.429	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{6,5}$(Np)	13.81 (2)	48.8 (25)	M1+0.1%E2	492 (16)	0.099 (4)
$\gamma_{2,1}$(Np)	26.34463 (24)	22 (5)	E1	8 (2)	2.43 (6)
$\gamma_{1,0}$(Np)	33.19629 (22)	23 (3)	M1+1.66%E2	175 (24)	0.130 (5)
$\gamma_{9,7}$(Np)	38.54 (3)	0.9 (9)	M1+15%E2	280 (210)	0.0033 (20)
$\gamma_{3,1}$(Np)	42.704 (5)	0.65	M1+1.66%E2	75 (9)	0.0085
$\gamma_{4,2}$(Np)	43.420 (3)	4.3 (7)	M1+16.8%E2	180 (23)	0.024 (2)
$\gamma_{7,6}$(Np)	51.01 (3)	0.596 (25)	E1	0.753 (15)	0.340 (14)
$\gamma_{2,0}$(Np)	59.54091 (10)	73.7 (31)	E1	1.16 (7)	34.1 (9)
$\gamma_{7,5}$(Np)	64.83 (2)	1.800 (26)	E1	0.400 (8)	1.286 (17)
$\gamma_{4,1}$(Np)	69.76 (3)	0.0013 (3)	(E1)	0.330 (7)	0.00095 (19)
$\gamma_{3,0}$(Np)	75.899 (5)	0.05	(E2)	53.4 (11)	0.00091
$\gamma_{4,0}$(Np)	102.959 (3)	0.0072 (10)	E1	0.119 (3)	0.0064 (9)
$\gamma_{5,4}$(Np)	164.61 (2)	5.02 (11)	E2	1.70 (4)	1.86 (3)
$\gamma_{5,2}$(Np)	208.00 (1)	84.8 (19)	M1+2.4%E2	2.98 (7)	21.3 (3)
$\gamma_{6,2}$(Np)	221.80 (4)	0.0316 (13)	E2	0.547 (11)	0.0204 (8)
$\gamma_{5,1}$(Np)	234.40 (4)	0.189 (8)	M2	8.24 (16)	0.0205 (8)
$\gamma_{5,0}$(Np)	267.556 (12)	1.5 (4)	E1+19.4%M2	1.06 (6)	0.721 (10)
$\gamma_{8,3}$(Np)	292.77 (6)	0.0030 (9)	(E2)	0.215 (4)	0.0025 (7)
$\gamma_{8,2}$(Np)	309.1 (3)	0.00028	(E1)	0.0377 (8)	0.00027
$\gamma_{7,0}$(Np)	332.376 (16)	1.374 (19)	E2	0.146 (3)	1.199 (16)
$\gamma_{8,1}$(Np)	335.38 (4)	0.162 (9)	M1+17.5%E2	0.69 (8)	0.0958 (22)
$\gamma_{9,1}$(Np)	337.7 (2)	0.0101 (6)	(E2)	0.139 (3)	0.0089 (5)
$\gamma_{-1,2}$(Np)	340.45	0.0016 (3)			0.0016 (3)
$\gamma_{8,0}$(Np)	368.602 (20)	0.0675 (28)	M1(+E2)	0.622 (13)	0.0416 (17)
$\gamma_{9,0}$(Np)	370.928 (23)	0.167 (8)	M1+15.6%E2	0.53 (7)	0.109 (2)

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(Theoretical ICC)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	4.468	(5)	$\times 10^9$ y
Q_α	:	4269.7	(29)	keV
α	:	100		%
SF	:	5.45	(4)	$\times 10^{-5}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,2}$	4038 (5)	0.13 (3)
$\alpha_{0,1}$	4151 (5)	22.33 (50)
$\alpha_{0,0}$	4198 (3)	77.54 (50)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Th)	5.8 - 20.3		8.43 (25)
e_{AK}	(Th)			0.00012 (4)
	KLL	68.406 - 76.745	}	
	KLX	83.857 - 93.345	}	
	KXY	99.29 - 109.64	}	
$ec_{1,0\ L}$	(Th)	29.08 - 33.20		16.3 (8)
$ec_{1,0\ M}$	(Th)	44.37 - 46.22		4.46 (21)
$ec_{1,0\ N}$	(Th)	48.22 - 49.22		1.19 (6)
$ec_{2,1\ L}$	(Th)	93.0 - 97.2		0.080 (22)
$ec_{2,1\ M}$	(Th)	108.3 - 110.2		0.022 (6)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Th)	11.118 — 19.504		7.94 (28)	
XKα_2	(Th)	89.954		0.00109 (30)	} Kα
XKα_1	(Th)	93.351		0.0018 (5)	}
XKβ_3	(Th)	104.819	}		
XKβ_1	(Th)	105.604	}	0.00063 (17)	Kβ_1'
XKβ_5''	(Th)	106.239	}		
XKβ_2	(Th)	108.509	}		
XKβ_4	(Th)	108.955	}	0.00021 (6)	Kβ_2'
XKO$_{2,3}$	(Th)	109.442	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Th)	49.55 (6)	22.5 (5)	E2	321 (10)	0.0697 (26)
$\gamma_{2,1}$(Th)	113.5 (1)	0.13 (3)	[E2]	6.47 (19)	0.0174 (47)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	23.46	(5)	min
Q_{β^-}	:	1261.5	(16)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,32}$	164.5 (16)	0.0060 (5)		
$\beta^-_{0,31}$	212.3 (16)	0.0059 (4)		
$\beta^-_{0,30}$	221.1 (16)	0.0077 (4)		
$\beta^-_{0,29}$	247.9 (16)	0.0074 (4)		
$\beta^-_{0,28}$	269.3 (16)	0.0262 (9)		
$\beta^-_{0,27}$	295.0 (16)	0.0008 (2)		
$\beta^-_{0,26}$	297.3 (16)	0.211 (3)		
$\beta^-_{0,25}$	302.3 (16)	0.0284 (7)	1st forbidden	
$\beta^-_{0,24}$	398.1 (16)	0.0005 (2)		
$\beta^-_{0,23}$	412.0 (16)	0.0264 (4)	1st forbidden	
$\beta^-_{0,22}$	417.4 (16)	0.215 (3)		
$\beta^-_{0,21}$	442.2 (16)	0.228 (3)		
$\beta^-_{0,18}$	566.3 (16)	0.0118 (11)		
$\beta^-_{0,17}$	599.2 (16)	0.261 (6)	1st forbidden	7.35
$\beta^-_{0,15}$	697.6 (16)	0.0247 (7)		
$\beta^-_{0,14}$	731.2 (16)	0.0029 (4)		
$\beta^-_{0,13}$	743.5 (16)	0.063 (2)		
$\beta^-_{0,12}$	787.1 (16)	0.0033 (4)		
$\beta^-_{0,4}$	1143.9 (16)	2.2 (4)	1st forbidden	7.4
$\beta^-_{0,3}$	1186.5 (16)	72.8 (19)	1st forbidden	5.91
$\beta^-_{0,1}$	1230.4 (16)	9.4 (15)	Allowed	6.83
$\beta^-_{0,0}$	1261.5 (16)	14.4 (22)	Allowed	6.7

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Np)	6.04 - 13.12	14.7 (7)	
e_{AK}	(Np)		0.0091 (13)	
	KLL	73.501 - 83.134	}	
	KLX	90.358 - 101.054	}	
	KXY	107.19 - 118.66	}	
$ec_{1,0\ L}$	(Np)	8.704 - 13.520	14.0 (11)	
$ec_{4,3\ L}$	(Np)	20.7 - 25.5	1.48 (28)	
$ec_{3,1\ L}$	(Np)	21.106 - 25.920	3.72 (25)	
$ec_{1,0\ M}$	(Np)	25.392 - 27.467	3.6 (3)	

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		Energy keV	Electrons per 100 disint.		Energy keV
$ec_{1,0\ N}$	(Np)	29.630 - 30.728	0.99 (8)		
$ec_{4,3\ M}$	(Np)	37.4 - 39.4	0.39 (8)		
$ec_{3,1\ M}$	(Np)	37.794 - 39.869	0.94 (6)		
$ec_{4,3\ N}$	(Np)	41.6 - 42.7	0.10 (13)		
$ec_{3,1\ N}$	(Np)	42.032 - 43.130	0.248 (16)		
$ec_{2,0\ L}$	(Np)	48.78 - 53.60	0.115 (21)		
$ec_{3,0\ L}$	(Np)	52.237 - 57.050	10.7 (3)		
$ec_{2,0\ M}$	(Np)	65.47 - 67.55	0.032 (3)		
$ec_{8,3\ K}$	(Np)	67.48 (4)	0.049 (46)		
$ec_{10,8\ K}$	(Np)	68.61 (8)	0.010 (9)		
$ec_{3,0\ M}$	(Np)	68.925 - 71.000	2.64 (8)		
$ec_{3,0\ N}$	(Np)	73.163 - 74.261	0.704 (21)		
$ec_{8,3\ L}$	(Np)	163.72 - 168.54	0.0186 (6)		
$\beta^-_{0,32}$	max:	164.5 (16)	0.0060 (5)	avg:	43.7 (5)
$\beta^-_{0,31}$	max:	212.3 (16)	0.0059 (4)	avg:	57.3 (5)
$\beta^-_{0,30}$	max:	221.1 (16)	0.0077 (4)	avg:	59.9 (5)
$\beta^-_{0,29}$	max:	247.9 (16)	0.0074 (4)	avg:	67.6 (5)
$\beta^-_{0,28}$	max:	269.3 (16)	0.0262 (9)	avg:	74.0 (5)
$\beta^-_{0,27}$	max:	295.0 (16)	0.0008 (2)	avg:	81.7 (5)
$\beta^-_{0,26}$	max:	297.3 (16)	0.211 (3)	avg:	82.4 (5)
$\beta^-_{0,25}$	max:	302.3 (16)	0.0284 (7)	avg:	83.9 (5)
$\beta^-_{0,24}$	max:	398.1 (16)	0.0005 (2)	avg:	113.4 (5)
$\beta^-_{0,23}$	max:	412.0 (16)	0.0264 (4)	avg:	117.8 (5)
$\beta^-_{0,22}$	max:	417.4 (16)	0.215 (3)	avg:	119.6 (5)
$\beta^-_{0,21}$	max:	442.2 (16)	0.228 (3)	avg:	127.4 (5)
$\beta^-_{0,18}$	max:	566.3 (16)	0.0118 (11)	avg:	168.0 (5)
$\beta^-_{0,17}$	max:	599.2 (16)	0.261 (6)	avg:	179.0 (5)
$\beta^-_{0,15}$	max:	697.6 (16)	0.0247 (7)	avg:	212.6 (5)
$\beta^-_{0,14}$	max:	731.2 (16)	0.0029 (4)	avg:	224.3 (5)
$\beta^-_{0,13}$	max:	743.5 (16)	0.063 (2)	avg:	228.6 (5)
$\beta^-_{0,12}$	max:	787.1 (16)	0.0033 (4)	avg:	244.0 (5)
$\beta^-_{0,4}$	max:	1143.9 (16)	2.2 (4)	avg:	374.0 (5)
$\beta^-_{0,3}$	max:	1186.5 (16)	72.8 (19)	avg:	390.4 (5)
$\beta^-_{0,1}$	max:	1230.4 (16)	9.4 (15)	avg:	406.8 (5)
$\beta^-_{0,0}$	max:	1261.5 (16)	14.4 (22)	avg:	418.6 (5)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Np)	11.871 — 21.491	16.1 (5)	
$XK\alpha_2$	(Np)	97.069	0.091 (3)	} $K\alpha$
$XK\alpha_1$	(Np)	101.059	0.144 (5)	}

		Energy keV		Photons per 100 disint.	
XKβ_3	(Np)	113.303	}		
XKβ_1	(Np)	114.234	}	0.052 (2)	Kβ_1'
XKβ_5''	(Np)	114.912	}		
XKβ_2	(Np)	117.463	}		
XKβ_4	(Np)	117.876	}	0.018 (1)	Kβ_2'
XKO$_{2,3}$	(Np)	118.429	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Np)	31.1310 (12)	19.0 (14)	M1+E2	263 (13)	0.072 (4)
$\gamma_{4,3}$(Np)	43.06 (2)	2.0 (4)	M1+E2	154 (18)	0.013 (2)
$\gamma_{3,1}$(Np)	43.533 (1)	9.3 (6)	E1	1.14 (3)	4.35 (28)
$\gamma_{-1,1}$(Np)	46.6	0.009 (4)			0.009 (4)
$\gamma_{6,4}$(Np)	55.37 (5)	0.0076 (25)	M1+E2	90 (30)	0.0000836 (20)
$\gamma_{2,0}$(Np)	71.210 (2)	0.141 (4)	E2	71.9 (14)	0.00193 (4)
$\gamma_{3,0}$(Np)	74.664 (1)	65.8 (17)	E1	0.276 (6)	51.6 (13)
$\gamma_{4,1}$(Np)	86.72 (7)	0.065 (6)	E1	0.186 (4)	0.055 (5)
$\gamma_{15,11}$(Np)	111.0 (2)	0.0202 (5)			0.0202 (5)
$\gamma_{4,0}$(Np)	117.727 (20)	0.123 (10)	E1	0.0841 (17)	0.113 (9)
$\gamma_{-1,2}$(Np)	134.71 (13)	0.0019 (3)			0.0019 (3)
$\gamma_{-1,3}$(Np)	142.5 (1)	0.0045 (6)			0.0045 (6)
$\gamma_{7,2}$(Np)	170.15 (5)	0.031 (1)			0.031 (1)
$\gamma_{-1,4}$(Np)	174.07 (6)	0.0097 (3)			0.0097 (3)
$\gamma_{8,3}$(Np)	186.15 (4)	0.10 (5)	[M1+E2]	2.6 (16)	0.0288 (7)
$\gamma_{10,8}$(Np)	187.28 (8)	0.020 (9)	[M1+E2]	2.6 (16)	0.0056 (3)
$\gamma_{9,7}$(Np)	197.28 (12)	0.0024 (3)			0.0024 (3)
$\gamma_{24,17}$(Np)	201.18 (6)	0.0005 (2)			0.0005 (2)
$\gamma_{-1,5}$(Np)	220.52 (4)	0.0282 (7)			0.0282 (7)
$\gamma_{-1,6}$(Np)	236.28 (14)	0.00092 (18)			0.00092 (18)
$\gamma_{21,16}$(Np)	239.86 (5)	0.00087 (23)			0.00087 (23)
$\gamma_{21,15}$(Np)	255.37 (5)	0.0011 (2)			0.0011 (2)
$\gamma_{30,19}$(Np)	258.44 (6)	0.00073 (18)			0.00073 (18)
$\gamma_{8,0}$(Np)	260.80 (2)	0.00310 (21)	[E1]	0.0549 (11)	0.0031 (2)
$\gamma_{-1,7}$(Np)	262.89 (19)	0.0008 (3)			0.0008 (3)
$\gamma_{-1,8}$(Np)	265.44 (17)	0.0009 (3)			0.0009 (3)
$\gamma_{28,18}$(Np)	296.93 (13)	0.0024 (8)	[M1+E2]	0.7 (5)	0.0014 (2)
$\gamma_{26,17}$(Np)	301.95 (3)	0.0018 (7)	[M1+E2]	0.6 (5)	0.0011 (3)
$\gamma_{32,20}$(Np)	312.05 (3)	0.0006			0.0006
$\gamma_{22,13}$(Np)	326.21 (7)	0.0044 (2)			0.0044 (2)
$\gamma_{-1,9}$(Np)	330.14 (14)	0.00069 (13)			0.00069 (13)
$\gamma_{-1,10}$(Np)	332.06 (14)	0.0012 (2)			0.0012 (2)
$\gamma_{30,18}$(Np)	345.13 (8)	0.0039 (2)			0.0039 (2)
$\gamma_{-1,11}$(Np)	348.23 (18)	0.0007 (3)			0.0007 (3)
$\gamma_{-1,12}$(Np)	351.33 (15)	0.0007 (2)			0.0007 (2)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{-1,13}$(Np)	361.83 (8)	0.0044 (3)			0.0044 (3)
$\gamma_{10,3}$(Np)	373.51 (4)	0.034 (10)	[M1+E2]	0.35 (22)	0.025 (6)
$\gamma_{11,3}$(Np)	378.06 (6)	0.0101 (4)			0.0101 (4)
$\gamma_{11,2}$(Np)	381.27 (16)	0.0006 (2)			0.0006 (2)
$\gamma_{-1,14}$(Np)	393.01 (18)	0.0006 (2)			0.0006 (2)
$\gamma_{25,15}$(Np)	395.19 (11)	0.0021 (2)			0.0021 (2)
$\gamma_{12,3}$(Np)	399.13 (13)	0.0016 (3)			0.0016 (3)
$\gamma_{-1,15}$(Np)	400.55 (15)	0.0009 (2)			0.0009 (2)
$\gamma_{-1,16}$(Np)	404.84 (18)	0.0009 (3)			0.0009 (3)
$\gamma_{32,17}$(Np)	434.71 (4)	0.00122 (20)	(E1)	0.0184 (4)	0.0012 (2)
$\gamma_{-1,17}$(Np)	445.81 (12)	0.0011 (2)			0.0011 (2)
$\gamma_{10,0}$(Np)	448.18 (2)	0.00920 (31)	[E1]	0.0173 (4)	0.0090 (3)
$\gamma_{-1,18}$(Np)	452.17 (12)	0.0016 (2)			0.0016 (2)
$\gamma_{14,3}$(Np)	455.63 (6)	0.0008 (3)			0.0008 (3)
$\gamma_{12,0}$(Np)	474.36 (6)	0.0017 (2)			0.0017 (2)
$\gamma_{-1,19}$(Np)	478.13 (19)	0.00055 (23)			0.00055 (23)
$\gamma_{-1,20}$(Np)	479.55 (14)	0.0010 (2)			0.0010 (2)
$\gamma_{13,1}$(Np)	486.87 (3)	0.0627 (14)	[E1]	0.0147 (4)	0.0618 (14)
$\gamma_{-1,21}$(Np)	490.33 (13)	0.0007 (1)			0.0007 (1)
$\gamma_{15,2}$(Np)	492.76 (7)	0.0050 (2)			0.0050 (2)
$\gamma_{14,1}$(Np)	499.1 (1)	0.0021 (2)			0.0021 (2)
$\gamma_{-1,22}$(Np)	502.12 (17)	0.0006 (2)			0.0006 (2)
$\gamma_{16,3}$(Np)	504.76 (8)	0.00545 (31)	[E2]	0.0488 (10)	0.0052 (3)
$\gamma_{-1,23}$(Np)	506.80 (14)	0.0010 (2)			0.0010 (2)
$\gamma_{13,0}$(Np)	518.00 (2)	0.00456 (30)	[E1]	0.01300 (19)	0.0045 (3)
$\gamma_{18,6}$(Np)	522.12 (10)	0.00274 (33)	[M1+E2]	0.14 (10)	0.0024 (2)
$\gamma_{15,1}$(Np)	532.86 (10)	0.0023 (2)			0.0023 (2)
$\gamma_{-1,24}$(Np)	541.32 (10)	0.0029 (3)			0.0029 (3)
$\gamma_{17,4}$(Np)	544.48 (9)	0.0041 (5)	[M1+E2]	0.13 (9)	0.0036 (3)
$\gamma_{16,1}$(Np)	547.99 (12)	0.00202 (30)	[E1]	0.01170 (24)	0.0020 (3)
$\gamma_{-1,25}$(Np)	558.46 (17)	0.0006 (2)			0.0006 (2)
$\gamma_{29,11}$(Np)	560.63 (7)	0.0058 (3)			0.0058 (3)
$\gamma_{15,0}$(Np)	563.89 (4)	0.0004 (2)			0.0004 (2)
$\gamma_{-1,26}$(Np)	567.88 (18)	0.0004 (1)			0.0004 (1)
$\gamma_{-1,27}$(Np)	575.27 (5)	0.0131 (4)			0.0131 (4)
$\gamma_{-1,28}$(Np)	577.15 (14)	0.0014 (3)			0.0014 (3)
$\gamma_{-1,29}$(Np)	585.49 (14)	0.0012 (2)			0.0012 (2)
$\gamma_{17,3}$(Np)	587.62 (2)	0.0214 (15)	[M1+E2]	0.11 (7)	0.0193 (5)
$\gamma_{23,8}$(Np)	588.70 (8)	0.0055 (3)			0.0055 (3)
$\gamma_{-1,30}$(Np)	591.82 (19)	0.0009 (4)			0.0009 (4)
$\gamma_{-1,31}$(Np)	599.13 (15)	0.0007 (2)			0.0007 (2)
$\gamma_{-1,32}$(Np)	602.79 (8)	0.0048 (3)			0.0048 (3)
$\gamma_{-1,33}$(Np)	604.85 (6)	0.00096 (27)			0.00096 (27)
$\gamma_{23,7}$(Np)	607.96 (15)	0.0013 (3)			0.0013 (3)
$\gamma_{-1,34}$(Np)	614.53 (17)	0.0006 (2)			0.0006 (2)
$\gamma_{-1,35}$(Np)	618.03 (16)	0.0007 (2)			0.0007 (2)
$\gamma_{18,2}$(Np)	624.11 (7)	0.00626 (30)	[E1]	0.0091 (2)	0.0062 (3)
$\gamma_{-1,36}$(Np)	629.00 (11)	0.0027 (3)			0.0027 (3)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{17,1}$(Np)	631.10 (3)	0.0676 (20)	[E1]	0.00892 (17)	0.067 (2)
$\gamma_{32,11}$(Np)	644.253 (30)	0.0019 (4)			0.0019 (4)
$\gamma_{21,6}$(Np)	646.26 (10)	0.0029 (3)			0.0029 (3)
$\gamma_{-1,37}$(Np)	649.79 (19)	0.0009 (4)			0.0009 (4)
$\gamma_{17,0}$(Np)	662.28 (2)	0.171 (5)	[E1]	0.00815 (16)	0.170 (5)
$\gamma_{18,1}$(Np)	664.17 (9)	0.00544 (40)	[E1]	0.00811 (16)	0.0054 (4)
$\gamma_{-1,38}$(Np)	668.76 (18)	0.00055 (18)			0.00055 (18)
$\gamma_{-1,39}$(Np)	670.88 (20)	0.0006 (3)			0.0006 (3)
$\gamma_{-1,40}$(Np)	691.01 (6)	0.0074 (3)			0.0074 (3)
$\gamma_{-1,41}$(Np)	692.61 (13)	0.0016 (3)			0.0016 (3)
$\gamma_{18,0}$(Np)	695.23 (2)	0.00363 (30)	[E1]	0.00745 (15)	0.0036 (3)
$\gamma_{-1,42}$(Np)	701.21 (10)	0.0024 (2)			0.0024 (2)
$\gamma_{26,8}$(Np)	703.63 (10)	0.00235 (20)	[E2]	0.0234 (5)	0.0023 (2)
$\gamma_{19,3}$(Np)	707.38 (9)	0.0022 (2)			0.0022 (2)
$\gamma_{20,3}$(Np)	710.35 (15)	0.003			0.003
$\gamma_{-1,43}$(Np)	714.22 (9)	0.0030 (3)			0.0030 (3)
$\gamma_{26,7}$(Np)	722.85 (4)	0.0276 (7)	[E2]	0.0222 (4)	0.0270 (7)
$\gamma_{23,5}$(Np)	727.52 (10)	0.0026 (3)			0.0026 (3)
$\gamma_{-1,44}$(Np)	730.95 (6)	0.0090 (3)			0.0090 (3)
$\gamma_{-1,45}$(Np)	746.06 (11)	0.0043 (5)			0.0043 (5)
$\gamma_{21,2}$(Np)	748.09 (3)	0.0890 (4)			0.0890 (4)
$\gamma_{29,8}$(Np)	752.84 (8)	0.0013 (3)			0.0013 (3)
$\gamma_{-1,46}$(Np)	764.04 (11)	0.0026 (3)			0.0026 (3)
$\gamma_{-1,47}$(Np)	768.15 (11)	0.0020 (2)			0.0020 (2)
$\gamma_{-1,48}$(Np)	769.52 (17)	0.0004 (1)			0.0004 (1)
$\gamma_{22,2}$(Np)	772.94 (9)	0.0029 (2)			0.0029 (2)
$\gamma_{23,3}$(Np)	774.77 (4)	0.015 (4)			0.015 (4)
$\gamma_{30,8}$(Np)	779.57 (14)	0.0006 (1)			0.0006 (1)
$\gamma_{21,1}$(Np)	788.19 (7)	0.0049 (2)			0.0049 (2)
$\gamma_{26,6}$(Np)	791.13 (5)	0.0075 (2)			0.0075 (2)
$\gamma_{-1,49}$(Np)	795.13 (15)	0.0008 (2)			0.0008 (2)
$\gamma_{22,1}$(Np)	812.89 (3)	0.0685 (3)			0.0685 (3)
$\gamma_{21,0}$(Np)	819.26 (3)	0.129 (3)			0.129 (3)
$\gamma_{-1,50}$(Np)	829.59 (17)	0.00046 (13)			0.00046 (13)
$\gamma_{-1,51}$(Np)	831.89 (9)	0.0021 (2)			0.0021 (2)
$\gamma_{25,4}$(Np)	841.45 (4)	0.0025 (4)			0.0025 (4)
$\gamma_{22,0}$(Np)	844.10 (3)	0.139 (3)			0.139 (3)
$\gamma_{26,4}$(Np)	846.39 (4)	0.0324 (13)	[M1+E2]	0.04 (3)	0.0312 (8)
$\gamma_{23,0}$(Np)	849.44 (9)	0.0020 (2)			0.0020 (2)
$\gamma_{-1,52}$(Np)	862.56 (18)	0.0004 (1)			0.0004 (1)
$\gamma_{30,6}$(Np)	867.11 (11)	0.00076 (8)			0.00076 (8)
$\gamma_{28,5}$(Np)	869.57 (9)	0.0016 (1)			0.0016 (1)
$\gamma_{28,4}$(Np)	874.43 (3)	0.00343 (22)	[M1+E2]	0.038 (23)	0.0033 (2)
$\gamma_{25,3}$(Np)	884.45 (5)	0.0086 (2)			0.0086 (2)
$\gamma_{25,2}$(Np)	887.97 (3)	0.0023 (2)			0.0023 (2)
$\gamma_{26,3}$(Np)	889.49 (4)	0.0217 (7)	[M1+E2]	0.036 (22)	0.0209 (5)
$\gamma_{27,2}$(Np)	895.15 (15)	0.0008 (2)			0.0008 (2)
$\gamma_{-1,53}$(Np)	913.68 (9)	0.0019 (1)			0.0019 (1)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{28,3}$(Np)	917.40 (8)	0.00279 (12)	[M1+E2]	0.034 (22)	0.0027 (1)
$\gamma_{28,2}$(Np)	920.95 (8)	0.00261 (10)	[E1]	0.00450 (9)	0.0026 (1)
$\gamma_{30,4}$(Np)	922.83 (13)	0.0006 (1)			0.0006 (1)
$\gamma_{25,1}$(Np)	928.05 (3)	0.0051 (2)			0.0051 (2)
$\gamma_{31,4}$(Np)	931.51 (5)	0.00547 (33)	[M1+E2]	0.032 (19)	0.0053 (3)
$\gamma_{26,1}$(Np)	933.09 (3)	0.0263 (6)	[E1]	0.00439 (9)	0.0262 (6)
$\gamma_{29,3}$(Np)	938.98 (8)	0.00031 (8)			0.00031 (8)
$\gamma_{-1,54}$(Np)	948.88 (19)	0.00024 (10)			0.00024 (10)
$\gamma_{25,0}$(Np)	959.18 (3)	0.0078 (3)			0.0078 (3)
$\gamma_{28,1}$(Np)	960.99 (5)	0.01054 (30)	[E1]	0.00417 (9)	0.0105 (3)
$\gamma_{26,0}$(Np)	964.23 (2)	0.0909 (20)	[E1]	0.00415 (8)	0.0905 (20)
$\gamma_{-1,55}$(Np)	970.07 (14)	0.0009 (2)			0.0009 (2)
$\gamma_{31,3}$(Np)	974.58 (4)	0.00040 (8)	[E2]	0.0123 (5)	0.00040 (8)
$\gamma_{-1,56}$(Np)	988.51 (14)	0.00044 (9)			0.00044 (9)
$\gamma_{28,0}$(Np)	992.16 (2)	0.00281 (10)	[E1]	0.00395 (8)	0.0028 (1)
$\gamma_{-1,57}$(Np)	1002.40 (13)	0.00049 (9)			0.00049 (9)
$\gamma_{-1,58}$(Np)	1005.27 (13)	0.0006 (1)			0.0006 (1)
$\gamma_{-1,59}$(Np)	1009.38 (18)	0.0003 (1)			0.0003 (1)
$\gamma_{30,0}$(Np)	1040.37 (4)	0.0011 (1)			0.0011 (1)
$\gamma_{32,1}$(Np)	1065.76 (12)	0.00060 (8)	[M1+E2]	0.023 (13)	0.00059 (8)
$\gamma_{32,0}$(Np)	1096.99 (3)	0.00164 (10)	[M1+E2]	0.022 (13)	0.0016 (1)
$\gamma_{-1,60}$(Np)	1101.99 (16)	0.00031 (1)			0.00031 (1)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	1.55	(8)	$\times 10^5$ y
Q_{β^-}	:	480	(50)	keV
Q_{EC}	:	930	(50)	keV
Q_α	:	5010	(50)	keV
EC	:	87.8	(6)	%
β^-	:	12.0	(6)	%
α	:	0.2	(6)	%

2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	log ft	P_K	P_L	P_{M+}
$\epsilon_{0,6}$	82 (50)	~0.096	allowed	14.6		0.6	0.4
$\epsilon_{0,3}$	620 (50)	87.8 (43)	1st forbidden	14.1	0.726 (8)	0.201 (5)	0.073 (2)
$\epsilon_{0,2}$	781 (50)	<4.4	1st forbidden unique	>15.9	0.74	0.19	0.07

3 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,3}$	174 (50)	11.8 (12)	1st forbidden	14.5
$\beta^-_{0,2}$	333 (50)	<1.6	1st forbidden unique	>16

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(U)	6.07 - 21.68	128.8 (19)	
e_{AK}	(U)		2.1 (3)	
	KLL	71.78 - 80.95	}	
	KLX	88.15 - 98.43	}	
	KXY	104.51 - 115.59	}	
e_{AL}	(Pu)	6.19 - 23.10	10.7 (3)	
e_{AK}	(Pu)		0.021 (4)	
	KLL	75.26 - 85.36	}	
	KLX	92.61 - 103.73	}	
	KXY	109.93 - 121.78	}	
$ec_{1,0\ L}$	(Pu)	21.53 - 26.57	8.7 (5)	
$ec_{1,0\ M}$	(Pu)	38.70 - 40.86	2.42 (14)	
$ec_{2,1\ L}$	(Pu)	79.72 - 84.76	8.1 (6)	
$ec_{2,1\ M}$	(Pu)	96.89 - 99.04	2.28 (18)	
$ec_{3,2\ K}$	(Pu)	36.56 (2)	0.73 (8)	

		Energy keV	Electrons per 100 disint.	Energy keV
$ec_{3,2\ L}$	(Pu)	135.25 - 140.29	5.4 (6)	
$ec_{3,2\ M}$	(Pu)	152.42 - 154.57	1.50 (16)	
$ec_{1,0\ L}$	(U)	23.486 - 28.076	63.9 (19)	
$ec_{1,0\ M}$	(U)	39.696 - 41.690	17.7 (5)	
$ec_{2,1\ L}$	(U)	82.475 - 87.065	58.6 (16)	
$ec_{2,1\ M}$	(U)	98.685 - 100.680	16.25 (47)	
$ec_{3,2\ K}$	(U)	44.706 (3)	6.6 (3)	
$ec_{3,2\ L}$	(U)	138.55 - 143.14	36.0 (18)	
$ec_{3,2\ M}$	(U)	154.76 - 156.76	10.0 (5)	
$\beta^-_{0,3}$	max:	174 (50)	11.8 (12)	avg: 46 (15)
$\beta^-_{0,2}$	max:	333 (50)	1.6	avg: 92 (16)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11.619 — 20.714		117.5 (30)	
$XK\alpha_2$	(U)	94.666		20.2 (3)	} $K\alpha$
$XK\alpha_1$	(U)	98.44		32.4 (5)	}
$XK\beta_3$	(U)	110.421	}		
$XK\beta_1$	(U)	111.298	}	11.69 (25)	$K\beta'_1$
$XK\beta''_5$	(U)	111.964	}		
$XK\beta_2$	(U)	114.407	}		
$XK\beta_4$	(U)	115.012	}	4.00 (11)	$K\beta'_2$
$XKO_{2,3}$	(U)	115.377	}		
XL	(Pu)	12.1246 — 21.984		12.1 (4)	
$XK\alpha_2$	(Pu)	99.525		0.212 (23)	} $K\alpha$
$XK\alpha_1$	(Pu)	103.734		0.33 (4)	}
$XK\beta_3$	(Pu)	116.244	}		
$XK\beta_1$	(Pu)	117.228	}	0.123 (14)	$K\beta'_1$
$XK\beta''_5$	(Pu)	117.918	}		
$XK\beta_2$	(Pu)	120.54	}		
$XK\beta_4$	(Pu)	120.969	}	0.043 (5)	$K\beta'_2$
$XKO_{2,3}$	(Pu)	121.543	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pu)	44.63 (10)	11.9 (7)	E2	741 (15)	0.0161 (9)
$\gamma_{1,0}$(U)	45.244 (2)	87.8 (6)	E2	589 (12)	0.149 (3)
$\gamma_{5,4}$(U)	56.6 (5)	~0.08	(E2)	199 (10)	~0.0004
$\gamma_{2,1}$(Pu)	102.82 (2)	12.0 (6)	E2	13.87 (28)	0.81 (6)
$\gamma_{6,5}$(U)	104.1 (10)	~0.096	E2	11.1 (6)	~0.008
$\gamma_{2,1}$(U)	104.234 (6)	87.8 (6)	E2	10.99 (22)	7.32 (13)
$\gamma_{3,2}$(Pu)	158.35 (3)	11.8 (12)	E2	2.14 (4)	3.8 (4)
$\gamma_{3,2}$(U)	160.307 (3)	87.8 (43)	E2	1.76 (4)	31.8 (15)
$\gamma_{4,2}$(U)	538.1 (1)	~0.0008	E3	0.143 (3)	~0.0007
$\gamma_{5,2}$(U)	594.5 (3)	~0.008			~0.008
$\gamma_{4,1}$(U)	642.34 (5)	~0.068	E1+(M2+E3)	0.15 (2)	~0.059
$\gamma_{4,0}$(U)	687.60 (5)	~0.021	E1+(M2+E3)	0.31 (2)	~0.016

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	22.5	(4)	h
Q_{β^-}	:	537	(8)	keV
Q_{EC}	:	993	(13)	keV
EC	:	53	(1)	%
β^-	:	47	(1)	%

2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	log ft	P_K	P_L	P_{M+}
$\epsilon_{0,4}$	306 (13)	1.64 (9)	1st forbidden	7.3	0.621 (10)	0.274 (7)	0.105 (3)
$\epsilon_{0,1}$	948 (13)	8.3 (30)	allowed	7.8	0.751 (1)	0.184 (1)	0.0652 (1)
$\epsilon_{0,0}$	993 (13)	43.1 (32)	allowed	7.1	0.753 (1)	0.182 (1)	0.0646 (1)

3 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,1}$	492 (8)	11 (4)	Allowed	7.2
$\beta^-_{0,0}$	537 (8)	36 (4)	Allowed	6.8

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(U)	6.4 - 21.6	21.7 (15)	
e_{AK}	(U)		1.03 (17)	
	KLL	71.776 - 80.954	}	
	KLX	88.153 - 98.429	}	
	KXY	104.51 - 115.59	}	
e_{AL}	(Pu)	6.19 - 22.99	3.8 (14)	
$ec_{1,0\ L}$	(Pu)	21.53 - 26.57	8 (3)	
$ec_{1,0\ M}$	(Pu)	38.70 - 40.86	2.2 (8)	
$ec_{1,0\ L}$	(U)	23.484 - 28.074	6.9 (22)	
$ec_{1,0\ M}$	(U)	39.694 - 41.690	1.9 (6)	
$ec_{4,1\ K}$	(U)	526.75 (9)	0.121 (13)	
$ec_{4,1\ L}$	(U)	620.59 - 625.18	0.034 (4)	
$ec_{4,0\ K}$	(U)	572.00 (5)	0.064 (6)	
$ec_{4,0\ L}$	(U)	665.8 - 670.4	0.0199 (23)	
$\beta^-_{0,1}$	max:	492 (8)	11 (4)	avg: 143 (3)
$\beta^-_{0,0}$	max:	537 (8)	36 (4)	avg: 158 (3)

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5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11.618 — 20.714		21.3 (18)	
$XK\alpha_2$	(U)	94.666		9.9 (10)	} $K\alpha$
$XK\alpha_1$	(U)	98.44		15.8 (15)	}
$XK\beta_3$	(U)	110.421	}		
$XK\beta_1$	(U)	111.298	}	5.7 (6)	$K\beta'_1$
$XK\beta''_5$	(U)	111.964	}		
$XK\beta_2$	(U)	114.407	}		
$XK\beta_4$	(U)	115.012	}	1.95 (15)	$K\beta'_2$
$XKO_{2,3}$	(U)	115.377	}		
XL	(Pu)	12.124 — 21.984		4.2 (16)	

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pu)	44.63 (10)	11.2 (37)	E2	743 (15)	0.015 (5)
$\gamma_{1,0}$(U)	45.242 (3)	9.6 (30)	E2	589 (12)	0.016 (5)
$\gamma_{2,1}$(U)	104.234 (6)	0.0143 (17)	E2	11.0 (2)	0.00119 (14)
$\gamma_{4,2}$(U)	538.11 (10)	0.0143 (17)	E3	0.143 (3)	0.0125 (15)
$\gamma_{4,1}$(U)	642.35 (9)	1.24 (8)	E1+(M2+E3)	0.15 (2)	1.08 (6)
$\gamma_{4,0}$(U)	687.60 (5)	0.383 (28)	E1	0.31 (2)	0.292 (21)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	2.144	(7)	$\times 10^6$ y
Q_α	:	4958.3	(12)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,20}$	4515.1 (19)	0.038 (4)
$\alpha_{-1,1}$	4550.5 (22)	0.011 (3)
$\alpha_{0,18}$	4573 (3)	0.048 (23)
$\alpha_{0,17}$	4578.6 (14)	0.393 (23)
$\alpha_{0,16}$	4599.1 (18)	0.373 (9)
$\alpha_{0,15}$	4619.7 (21)	0.032 (8)
$\alpha_{0,14}$	4640 (1)	6.43 (3)
$\alpha_{0,13}$	4665.0 (9)	3.46 (3)
$\alpha_{0,12}$	4676.4	0.38 (2)
$\alpha_{0,11}$	4698.2 (8)	0.535 (10)
$\alpha_{0,10}$	4708.3 (20)}	
$\alpha_{0,9}$	4712.3 (20)}	1.174 (13)
$\alpha_{0,8}$	4741.3 (20)	0.019
$\alpha_{0,7}$	4766.5 (8)	9.5 (3)
$\alpha_{0,6}$	4771.4 (8)	23.0 (3)
$\alpha_{0,4}$	4788.0 (9)	47.64 (6)
$\alpha_{0,3}$	4803.5 (10)	2.02 (2)
$\alpha_{0,2}$	4816.8 (10)	2.430 (17)
$\alpha_{0,1}$	4866.4 (14)	0.51 (3)
$\alpha_{0,0}$	4872.7 (14)	2.41 (3)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pa)	5.90 - 21.01		47.1 (20)
e_{AK}	(Pa)			0.167 (24)
	KLL	70.08 - 78.82	}	
	KLX	85.99 - 95.86	}	
	KXY	101.87 - 112.59	}	
$ec_{13,5\ K}$	(Pa)	5.11 (2)		1.59 (9)
$ec_{4,2\ L}$	(Pa)	8.269 - 12.641		32.7 (15)
$ec_{14,12\ L}$	(Pa)	15.22 - 19.59		0.37 (11)
$ec_{4,2\ M}$	(Pa)	24.013 - 25.932		8.4 (4)
$ec_{6,2\ L}$	(Pa)	25.42 - 29.80		0.075 (3)
$ec_{14,5\ K}$	(Pa)	30.65 (2)		2.26 (22)
$ec_{14,12\ M}$	(Pa)	30.96 - 32.88		0.090 (27)

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		Energy keV	Electrons per 100 disint.
$ec_{2,0\ L}$	(Pa)	35.999 - 40.371	48.9 (29)
$ec_{14,4\ K}$	(Pa)	38.82 (2)	0.80 (12)
$ec_{6,2\ M}$	(Pa)	41.17 - 43.09	0.0186 (11)
$ec_{17,14\ L}$	(Pa)	41.48 - 45.86	0.3 (2)
$ec_{3,1\ L}$	(Pa)	42.8 - 47.2	0.80 (4)
$ec_{3,0\ L}$	(Pa)	49.38 - 53.76	0.3 (2)
$ec_{2,0\ M}$	(Pa)	51.743 - 53.662	13.4 (8)
$ec_{17,14\ M}$	(Pa)	57.23 - 59.15	0.08 (6)
$ec_{3,1\ M}$	(Pa)	58.5 - 60.5	0.220 (9)
$ec_{3,0\ M}$	(Pa)	65.13 - 67.05	0.08 (6)
$ec_{4,0\ L}$	(Pa)	65.372 - 69.744	13.9 (6)
$ec_{5,1\ L}$	(Pa)	66.88 - 71.26	0.0183 (6)
$ec_{5,0\ L}$	(Pa)	73.54 - 77.91	0.070 (7)
$ec_{4,0\ M}$	(Pa)	81.116 - 83.035	2.7 (7)
$ec_{5,0\ M}$	(Pa)	89.28 - 91.20	0.0170 (18)
$ec_{13,5\ L}$	(Pa)	96.597 - 100.969	0.369 (22)
$ec_{13,5\ M}$	(Pa)	112.341 - 114.260	0.091 (7)
$ec_{14,5\ L}$	(Pa)	122.144 - 126.516	0.49 (5)
$ec_{14,4\ L}$	(Pa)	130.309 - 134.681	0.257 (10)
$ec_{14,5\ M}$	(Pa)	137.888 - 139.807	0.121 (12)
$ec_{14,4\ M}$	(Pa)	146.053 - 147.972	0.0654 (34)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pa)	11.368 — 20.113		59.7 (32)	
$XK\alpha_2$	(Pa)	92.288		1.813 (20)	} $K\alpha$
$XK\alpha_1$	(Pa)	95.869		2.906 (20)	}
$XK\beta_3$	(Pa)	107.595	}		
$XK\beta_1$	(Pa)	108.422	}	1.06 (10)	$K\beta'_1$
$XK\beta''_5$	(Pa)	109.072	}		
$XK\beta_2$	(Pa)	111.405	}		
$XK\beta_4$	(Pa)	111.87	}	0.380 (9)	$K\beta'_2$
$XKO_{2,3}$	(Pa)	112.38	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{7,6}$(Pa)	5.18				0.220 (5)
$\gamma_{5,4}$(Pa)	8.22 (5)	≈9			≈0.12 (5)
$\gamma_{-1,1}$(Pa)	21.5				0.352 (13)
$\gamma_{-1,2}$(Pa)	27.7				0.84 (7)
$\gamma_{4,2}$(Pa)	29.374 (20)	58.2 (26)	E1	3.07 (6)	14.3 (6)
$\gamma_{14,12}$(Pa)	36.32 (2)	0.50 (14)	M1+1.20%E2	99 (20)	0.005 (1)
$\gamma_{6,2}$(Pa)	46.53 (6)	0.209 (8)	[E1]	0.914 (18)	0.109 (4)
$\gamma_{2,0}$(Pa)	57.104 (20)	67.4 (40)	E2	176 (4)	0.381 (21)
$\gamma_{17,14}$(Pa)	62.59 (10)	0.4 (3)	[M1+50%E2]	60 (50)	0.006 (2)
$\gamma_{3,1}$(Pa)	63.9 (1)	1.10 (5)	(E2)	102.3 (20)	0.0107 (4)
$\gamma_{3,0}$(Pa)	70.49 (10)	0.42 (28)	[M1+50%E2]	38 (26)	0.0107 (4)
$\gamma_{10,5}$(Pa)	74.54 (10)	0.13 (3)	[M1]	9.84 (20)	0.012 (3)
$\gamma_{4,0}$(Pa)	86.477 (10)	29.8 (10)	E1	1.43 (8)	12.26 (12)
$\gamma_{5,1}$(Pa)	87.99 (3)	0.167 (4)	[E1]	0.169 (4)	0.143 (3)
$\gamma_{5,0}$(Pa)	94.64 (5)	0.75 (8)	E1	0.140 (3)	0.66 (7)
$\gamma_{9,2}$(Pa)	106.15 (25)	0.523 (31)	[E2]	9.28 (19)	0.0509 (29)
$\gamma_{13,6}$(Pa)	108.7	0.32 (4)	M1+4.62%E2	3.5 (6)	0.071 (3)
$\gamma_{12,4}$(Pa)	115.40 (35)	0.0029 (14)	[M1+E2]	10 (4)	0.0026 (8)
$\gamma_{13,5}$(Pa)	117.702 (20)	2.26 (12)	M1+8.26%E2	12.2 (6)	0.171 (4)
$\gamma_{12,3}$(Pa)	131.101 (25)	0.106 (6)	E1	0.262 (5)	0.084 (5)
$\gamma_{14,6}$(Pa)	134.285 (20)	0.62 (9)	[M1+E2]	8.0 (11)	0.069 (5)
$\gamma_{18,9}$(Pa)	139.9 (1)	0.00560 (49)	[E1]	0.225 (5)	0.0046 (4)
$\gamma_{14,5}$(Pa)	143.249 (20)	3.3 (3)	M1+7.76%E2	6.94 (14)	0.42 (4)
$\gamma_{14,4}$(Pa)	151.414 (20)	1.38 (14)	M1+32.89%E2	4.9 (6)	0.234 (2)
$\gamma_{20,13}$(Pa)	153.37 (10)	0.021 (6)	[E2]	1.96 (4)	0.007 (2)
$\gamma_{13,2}$(Pa)	155.239 (20)	0.103 (9)	E1	0.176 (4)	0.088 (8)
$\gamma_{10,1}$(Pa)	162.41 (8)	0.0382 (12)	[E1]	0.158 (3)	0.033 (1)
$\gamma_{10,0}$(Pa)	169.156 (20)	0.0768 (4)	[E1]	0.143 (3)	0.0672 (3)
$\gamma_{16,7}$(Pa)	170.59 (6)	0.100 (22)	[M1+13.79%E2]	4.0 (5)	0.020 (4)
$\gamma_{16,6}$(Pa)	176.12 (6)	0.070 (16)	[M1+13.79%E2]	3.7 (5)	0.015 (3)
$\gamma_{14,2}$(Pa)	180.81 (10)	0.0180 (11)	[E1]	0.1223 (25)	0.016 (1)
$\gamma_{20,11}$(Pa)	186.86 (35)	0.003 (3)	[E1]	0.1131 (23)	0.003 (3)
$\gamma_{17,7}$(Pa)	191.46 (5)	0.074 (9)	[M1+13.79%E2]	2.9 (4)	0.019 (1)
$\gamma_{16,4}$(Pa)	193.26 (5)	0.167 (18)	[M1+13.79%E2]	2.8 (4)	0.044 (1)
$\gamma_{18,7}$(Pa)	194.67 (20)				0.033 (1)
$\gamma_{12,1}$(Pa)	194.95 (3)	0.192 (22)	E1	0.1024 (21)	0.174 (20)
$\gamma_{17,6}$(Pa)	196.86 (5)	0.078 (6)	[M1+13.79%E2]	2.7 (3)	0.0210 (1)
$\gamma_{18,6}$(Pa)	199.95 (6)	0.020 (3)	[M1]	2.85 (6)	0.0053 (8)
$\gamma_{12,0}$(Pa)	201.62 (5)	0.0429 (10)	E1	0.0946 (19)	0.0392 (9)
$\gamma_{20,9}$(Pa)	202.9 (2)	0.0052 (21)	[E1]	0.0932 (19)	0.0048 (19)
$\gamma_{16,3}$(Pa)	209.19 (5)	0.0163 (16)	[E1]	0.0868 (17)	0.0150 (15)
$\gamma_{13,0}$(Pa)	212.29 (5)	0.184 (11)	E1	0.0839 (17)	0.17 (1)
$\gamma_{17,4}$(Pa)	214.01 (5)	0.115 (13)	[M1+13.79%E2]	2.1 (3)	0.037 (2)
$\gamma_{16,2}$(Pa)	222.6 (2)				0.002 (2)
$\gamma_{17,3}$(Pa)	229.94 (5)	0.015 (3)	[E1]	0.0697 (14)	0.014 (3)
$\gamma_{14,0}$(Pa)	237.86 (2)	0.0610 (6)	[E1]	0.0645 (13)	0.0573 (6)
$\gamma_{19,2}$(Pa)	248.95 (10)	0.012 (3)	[M1+13.79%E2]	1.37 (16)	0.005 (1)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{20,7}$(Pa)	257.09 (20)	0.048 (24)	[M1]	1.41 (3)	0.02 (1)
$\gamma_{20,6}$(Pa)	262.44 (20)	0.01120 (49)	[M1]	1.33 (3)	0.0048 (2)
$\gamma_{20,4}$(Pa)	279.65 (20)	0.01320 (49)	[E2]	0.222 (5)	0.0108 (4)
$\gamma_{-1,4}$(Pa)	288.3				0.0162 (5)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	2.102	(5)	d
Q_{β^-}	:	1291.5	(4)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,15}$	89.0 (4)	0.51 (6)	1st forbidden	6.57
$\beta^-_{0,13}$	221.6 (4)	11.50 (7)	Allowed	6.44
$\beta^-_{0,12}$	263.0 (4)	44.75 (19)	Allowed	6.09
$\beta^-_{0,11}$	306.0 (4)	0.49 (1)	1st forbidden	8.25
$\beta^-_{0,10}$	308.4 (4)	0.27 (3)	Allowed	8.51
$\beta^-_{0,9}$	323.3 (6)	0.082 (6)	1st forbidden	9.11
$\beta^-_{0,8}$	328.7 (4)	1.25 (1)	1st forbidden	7.95
$\beta^-_{0,5}$	630.1 (4)	0.036 (3)	1st forbidden	10.44
$\beta^-_{0,4}$	686.4 (4)	0.103 (3)	1st forbidden	10.08
$\beta^-_{0,1}$	1247.4 (4)	41.0 (25)	Allowed	8.38

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Pu)	6.19 - 22.99	29.7 (14)	
e_{AK}	(Pu)		0.021 (8)	
	KLL	75.26 - 85.36	}	
	KLX	92.607 - 103.729	}	
	KXY	109.93 - 121.78	}	
$ec_{1,0\ L}$	(Pu)	20.97 - 26.01	58.6 (17)	
$ec_{1,0\ M}$	(Pu)	38.14 - 40.30	16.4 (5)	
$ec_{2,1\ L}$	(Pu)	78.78 - 83.82	2.65 (10)	
$ec_{14,9\ L}$	(Pu)	91.3 - 96.3	0.036 (6)	
$ec_{2,1\ M}$	(Pu)	95.95 - 98.10	0.74 (3)	
$ec_{15,14\ L}$	(Pu)	97.01 - 102.05	0.28 (6)	
$ec_{14,9\ M}$	(Pu)	108.5 - 110.6	0.0100 (19)	
$ec_{15,14\ M}$	(Pu)	114.18 - 116.34	0.070 (7)	
$ec_{13,2\ K}$	(Pu)	802.20 (2)	0.0258 (11)	
$ec_{10,1\ K}$	(Pu)	817.1 (1)	0.114 (16)	
$ec_{12,1\ K}$	(Pu)	862.66 (2)	0.242 (8)	
$ec_{13,1\ K}$	(Pu)	904.08 (2)	0.080 (4)	
$ec_{12,0\ K}$	(Pu)	906.75 (2)	0.160 (3)	
$ec_{10,1\ L}$	(Pu)	915.84 - 920.88	0.022 (3)	
$ec_{12,1\ L}$	(Pu)	961.35 - 966.39	0.055 (3)	
$ec_{12,1\ M}$	(Pu)	978.52 - 980.68	0.015 (3)	
$ec_{13,1\ L}$	(Pu)	1002.77 - 1007.81	0.0184 (9)	

		Energy keV		Electrons per 100 disint.		Energy keV
$ec_{12,0\ L}$	(Pu)	1005.44 - 1010.48		0.0405 (10)		
$ec_{12,0\ M}$	(Pu)	1022.61 - 1024.76		0.0101 (2)		
$\beta^-_{0,15}$	max:	89.0	(4)	0.51 (6)	avg:	23.0 (2)
$\beta^-_{0,13}$	max:	221.6	(4)	11.50 (7)	avg:	59.9 (2)
$\beta^-_{0,12}$	max:	263.0	(4)	44.75 (19)	avg:	72.0 (2)
$\beta^-_{0,11}$	max:	306.0	(4)	0.49 (1)	avg:	84.9 (2)
$\beta^-_{0,10}$	max:	308.4	(4)	0.27 (3)	avg:	85.6 (2)
$\beta^-_{0,9}$	max:	323.3	(6)	0.082 (6)	avg:	90.1 (2)
$\beta^-_{0,8}$	max:	328.7	(4)	1.25 (1)	avg:	91.8 (2)
$\beta^-_{0,5}$	max:	630.1	(4)	0.036 (3)	avg:	189.2 (2)
$\beta^-_{0,4}$	max:	686.4	(4)	0.103 (3)	avg:	208.4 (2)
$\beta^-_{0,1}$	max:	1247.4	(4)	41.0 (25)	avg:	412.2 (2)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pu)	12.125 — 21.984		32.4 (14)	
$XK\alpha_2$	(Pu)	99.525		0.210 (8)	} $K\alpha$
$XK\alpha_1$	(Pu)	103.734		0.332 (12)	}
$XK\beta_3$	(Pu)	116.244	}		
$XK\beta_1$	(Pu)	117.228	}	0.122 (5)	$K\beta_1'$
$XK\beta_5''$	(Pu)	117.918	}		
$XK\beta_2$	(Pu)	120.54	}		
$XK\beta_4$	(Pu)	120.969	}	0.042 (2)	$K\beta_2'$
$XKO_{2,3}$	(Pu)	121.543	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pu)	44.07 (2)	80.7 (23)	E2	788 (16)	0.1024 (21)
$\gamma_{2,1}$(Pu)	101.88 (2)	3.90 (14)	E2	14.5 (3)	0.252 (8)
$\gamma_{-1,1}$(Pu)	103.74 (2)	0.312 (3)			0.312 (3)
$\gamma_{14,9}$(Pu)	114.4 (4)	0.055 (10)	[E2]	8.47 (17)	0.0058 (10)
$\gamma_{-1,2}$(Pu)	116.27 (8)	0.04			0.04
$\gamma_{-1,3}$(Pu)	117.27 (8)	0.074			0.074
$\gamma_{15,14}$(Pu)	120.11 (5)	0.48 (6)	M1(+E2)	3.8 (6)	0.101 (5)
$\gamma_{-1,4}$(Pu)	120.5	0.02			0.02
$\gamma_{-1,5}$(Pu)	121.70 (8)	0.010 (1)			0.010 (1)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{15,13}$(Pu)	132.5 (1)	0.0018 (10)	[E1]	0.267 (5)	0.0014 (8)
$\gamma_{3,2}$(Pu)	157.42 (5)	0.003	[E2]	2.19 (4)	0.001
$\gamma_{15,12}$(Pu)	174.08 (5)	0.0261 (9)	[E1]	0.142 (3)	0.0229 (8)
$\gamma_{-1,6}$(Pu)	220.87 (11)	0.037 (9)	(M2)	11.4 (20)	0.0030 (5)
$\gamma_{8,5}$(Pu)	301.37 (7)	0.0128 (12)	E2	0.208 (4)	0.0106 (10)
$\gamma_{14,6}$(Pu)	319.29 (11)	0.013 (3)	M1+E2	0.59 (25)	0.0083 (10)
$\gamma_{10,5}$(Pu)	321.75 (20)	0.0013			0.0013 (8)
$\gamma_{11,5}$(Pu)	324.02 (9)	0.0184 (14)	M1+E2	0.26 (7)	0.0146 (8)
$\gamma_{7,4}$(Pu)	336.36 (15)	0.00020 (13)	[E1]	0.0324 (7)	0.0002 (1)
$\gamma_{8,4}$(Pu)	357.64 (7)	0.0612 (17)	M1+E2	0.214 (16)	0.0504 (13)
$\gamma_{10,4}$(Pu)	378.05 (13)	0.003			0.0030 (5)
$\gamma_{11,4}$(Pu)	380.31 (10)	0.0180 (8)	[M1]	0.623 (9)	0.0111 (5)
$\gamma_{14,5}$(Pu)	421.1 (1)	0.0309 (15)	[M1]	0.472 (7)	0.021 (1)
$\gamma_{6,3}$(Pu)	459.8 (2)	0.0023			0.0023 (15)
$\gamma_{5,2}$(Pu)	515.51 (7)	0.0386 (11)	E1+M2	0.022 (4)	0.0378 (11)
$\gamma_{4,1}$(Pu)	561.14 (5)	0.1072 (15)	E1	0.0115 (2)	0.106 (2)
$\gamma_{4,0}$(Pu)	605.16 (5)	0.078 (2)	E1	0.0100 (2)	0.077 (2)
$\gamma_{5,1}$(Pu)	617.39 (5)	0.0604 (7)	E1+M2	0.0120 (14)	0.0593
$\gamma_{6,2}$(Pu)	617.4	0.008 (0)			0.008
$\gamma_{10,2}$(Pu)	836.96 (7)	0.0210 (8)	[E2]	0.0174 (4)	0.0206 (8)
$\gamma_{12,2}$(Pu)	882.63 (3)	0.816 (9)	(E2)	0.0157 (3)	0.803 (9)
$\gamma_{-1,7}$(Pu)	885	0.040 (5)			0.040 (5)
$\gamma_{7,1}$(Pu)	897.34 (10)	0.0074 (10)	(E2)	0.0152 (3)	0.0073 (10)
$\gamma_{8,1}$(Pu)	918.70 (4)	0.531 (6)	E1	0.0047 (1)	0.529 (6)
$\gamma_{13,2}$(Pu)	923.99 (2)	2.64 (2)	(M1+E2)	0.014 (1)	2.604 (20)
$\gamma_{9,1}$(Pu)	924	0.065			0.065
$\gamma_{14,2}$(Pu)	936.60 (5)	0.369 (5)	[E1+M2]	0.0112 (22)	0.365 (5)
$\gamma_{10,1}$(Pu)	938.94 (10)	0.18 (2)	E0+E2	4.4 (4)	0.0327 (25)
$\gamma_{11,1}$(Pu)	941.40 (4)	0.504	[E1+M2]		0.504 (6)
$\gamma_{8,0}$(Pu)	962.76 (2)	0.648 (8)	E1	0.00433 (9)	0.645 (8)
$\gamma_{9,0}$(Pu)	968.9 (4)	0.017 (6)	[M2]	0.116 (3)	0.015 (8)
$\gamma_{10,0}$(Pu)	983.0 (3)	0.07 (2)	[E2]	0.0128 (3)	0.068 (20)
$\gamma_{12,1}$(Pu)	984.45 (2)	25.50 (13)	M1+E2	0.0125 (5)	25.18 (13)
$\gamma_{13,1}$(Pu)	1025.87 (2)	8.86 (7)	M1+E2	0.0120 (5)	8.76 (6)
$\gamma_{12,0}$(Pu)	1028.54 (2)	18.46 (13)	E2	0.0117 (2)	18.25 (13)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	2.356	(3)	d
Q_{β^-}	:	722.5	(10)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log *ft*
$\beta^-_{0,13}$	166.3 (5)	0.0026	1st forbidden	9.7
$\beta^-_{0,12}$	210.7 (5)	1.56 (16)	Allowed	7.3
$\beta^-_{0,11}$	217.3 (5)	0.0074	1st forbidden	9.7
$\beta^-_{0,10}$	230.3 (5)	0.02	1st forbidden	9.3
$\beta^-_{0,9}$	252.7 (5)	0.0027	1st forbidden unique	9.9
$\beta^-_{0,8}$	330.9 (5)	38.8 (9)	1st forbidden	6.3
$\beta^-_{0,7}$	335.1 (5)		2nd forbidden	
$\beta^-_{0,6}$	392.4 (5)	9.4 (14)	Allowed	7.4
$\beta^-_{0,5}$	437.0 (5)	43.0 (22)	Allowed	6.9
$\beta^-_{0,4}$	558.7 (5)		2nd forbidden	
$\beta^-_{0,3}$	646.8 (5)		Allowed	
$\beta^-_{0,2}$	665.2 (5)	0.4 (72)	Allowed	
$\beta^-_{0,1}$	714.6 (5)	6.5 (10)	Allowed	8.4
$\beta^-_{0,0}$	722.5 (5)		2nd forbidden unique	

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Pu)	6.19 - 22.99	47.9 (26)	
e_{AK}	(Pu)		1.36 (19)	
	KLL	75.26 - 85.36	}	
	KLX	92.61 - 103.73	}	
	KXY	109.93 - 121.78	}	
$ec_{1,0\ M}$	(Pu)	1.928 - 4.086	51 (6)	
$ec_{12,7\ K}$	(Pu)	2.6	0.1	
$ec_{6,5\ L}$	(Pu)	21.559 - 26.606	8.3 (10)	
$ec_{2,1\ L}$	(Pu)	26.311 - 31.358	13.3 (3)	
$ec_{2,0\ L}$	(Pu)	34.169 - 39.216	20.8 (32)	
$ec_{8,6\ L}$	(Pu)	38.36 - 43.40	0.457 (11)	
$ec_{6,5\ M}$	(Pu)	38.730 - 40.888	2.12 (26)	
$ec_{2,1\ M}$	(Pu)	43.482 - 45.640	3.6 (9)	
$ec_{6,4\ K}$	(Pu)	44.60 (6)	0.08 (3)	
$ec_{3,1\ L}$	(Pu)	44.74 - 49.78	7.1 (21)	
$ec_{2,0\ M}$	(Pu)	51.340 - 53.498	5.8 (9)	
$ec_{8,6\ M}$	(Pu)	55.53 - 57.68	0.114 (3)	
$ec_{12,6\ K}$	(Pu)	59.91 (3)	0.323 (10)	

		Energy keV	Electrons per 100 disint.		Energy keV
$ec_{3,1\ M}$	(Pu)	61.91 - 64.07	2.0 (6)		
$ec_{4,3\ L}$	(Pu)	64.96 - 70.00	0.054 (30)		
$ec_{7,5\ L}$	(Pu)	78.86 - 83.90	0.084 (21)		
$ec_{4,3\ M}$	(Pu)	82.13 - 84.28	0.014 (9)		
$ec_{8,5\ L}$	(Pu)	83.02 - 88.07	4.9 (8)		
$ec_{4,2\ L}$	(Pu)	83.37 - 88.41	0.42 (7)		
$ec_{5,3\ K}$	(Pu)	87.962 (2)	7.76 (18)		
$ec_{7,5\ M}$	(Pu)	96.03 - 98.18	0.023 (6)		
$ec_{8,5\ M}$	(Pu)	100.19 - 102.35	1.30 (21)		
$ec_{4,2\ M}$	(Pu)	100.54 - 102.69	0.117 (19)		
$ec_{12,7\ L}$	(Pu)	101.3 - 106.3	0.024		
$ec_{12,5\ K}$	(Pu)	104.59 (2)	0.52 (3)		
$ec_{8,4\ K}$	(Pu)	106	0.030 (6)		
$ec_{5,2\ K}$	(Pu)	106.392 (1)	21.4 (8)		
$ec_{6,3\ K}$	(Pu)	132.61 (3)	0.161 (6)		
$ec_{6,4\ L}$	(Pu)	143.29 - 148.33	0.016 (7)		
$ec_{6,2\ K}$	(Pu)	151.05 (3)	0.092 (4)		
$ec_{5,1\ K}$	(Pu)	155.808 (1)	16.1 (7)		
$ec_{12,6\ L}$	(Pu)	158.59 - 163.63	0.066 (2)		
$ec_{5,0\ K}$	(Pu)	163.669 (2)	0.066 (2)		
$ec_{12,6\ M}$	(Pu)	175.76 - 177.92	0.0161 (5)		
$ec_{5,3\ L}$	(Pu)	186.65 - 191.70	1.71 (4)		
$ec_{8,3\ K}$	(Pu)	194.089 (3)	0.0469 (10)		
$ec_{12,5\ L}$	(Pu)	203.28 - 208.32	0.105 (7)		
$ec_{5,3\ M}$	(Pu)	203.82 - 205.98	0.42 (9)		
$ec_{5,2\ L}$	(Pu)	205.08 - 210.13	4.48 (16)		
$ec_{8,2\ K}$	(Pu)	212.519 (3)	0.0532 (11)		
$ec_{12,5\ M}$	(Pu)	220.45 - 222.60	0.0255 (18)		
$ec_{5,2\ M}$	(Pu)	222.25 - 224.41	1.10 (4)		
$ec_{6,3\ L}$	(Pu)	231.3 - 236.3	0.0324 (11)		
$ec_{6,2\ L}$	(Pu)	249.74 - 254.78	0.0186 (8)		
$ec_{5,1\ L}$	(Pu)	254.50 - 259.54	3.28 (9)		
$ec_{5,0\ L}$	(Pu)	262.36 - 267.40	0.093 (3)		
$ec_{5,1\ M}$	(Pu)	271.67 - 273.82	0.801 (18)		
$ec_{5,0\ M}$	(Pu)	279.53 - 281.68	0.0256 (6)		
$\beta^-_{0,13}$	max:	166.3 (5)	0.0026	avg:	44.2 (2)
$\beta^-_{0,12}$	max:	210.7 (5)	1.56 (16)	avg:	56.8 (2)
$\beta^-_{0,11}$	max:	217.3 (5)	0.0074	avg:	58.7 (2)
$\beta^-_{0,10}$	max:	230.3 (5)	0.02	avg:	62.5 (2)
$\beta^-_{0,9}$	max:	252.7 (5)	0.0027	avg:	74.7 (2)
$\beta^-_{0,8}$	max:	330.9 (5)	38.8 (9)	avg:	98.3 (2)
$\beta^-_{0,7}$	max:	335.1 (5)		avg:	
$\beta^-_{0,6}$	max:	392.4 (5)	9.4 (14)	avg:	111.5 (2)
$\beta^-_{0,5}$	max:	437.0 (5)	43.0 (22)	avg:	125.6 (2)
$\beta^-_{0,4}$	max:	558.7 (5)		avg:	
$\beta^-_{0,3}$	max:	646.8 (5)		avg:	
$\beta^-_{0,2}$	max:	665.2 (5)	0.4 (72)	avg:	

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,1}$	max:	714.6	(5)	6.5 (10)	avg:	218.3 (2)
$\beta^-_{0,0}$	max:	722.5	(5)		avg:	

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pu)	12.125 — 21.984		51.3 (24)	
$XK\alpha_2$	(Pu)	99.525		13.5 (4)	} $K\alpha$
$XK\alpha_1$	(Pu)	103.734		21.4 (6)	}
$XK\beta_3$	(Pu)	116.244	}		
$XK\beta_1$	(Pu)	117.228	}	7.84 (25)	$K\beta_1'$
$XK\beta_5''$	(Pu)	117.918	}		
$XK\beta_2$	(Pu)	120.54	}		
$XK\beta_4$	(Pu)	120.969	}	2.72 (10)	$K\beta_2'$
$XKO_{2,3}$	(Pu)	121.543	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pu)	7.861 (2)	70 (8)	M1+0.3%E2	5716 (400)	0.0122 (12)
$\gamma_{3,2}$(Pu)	18.430 (4)	5.5 (30)	[M1+E2]		0.02
$\gamma_{6,5}$(Pu)	44.663 (5)	11.3 (14)	M1+4%E2	86 (8)	0.13 (1)
$\gamma_{2,1}$(Pu)	49.415 (3)	18 (5)	M1+20%E2	126 (8)	0.145 (35)
$\gamma_{2,0}$(Pu)	57.273 (4)	27 (7)	E2	222 (5)	0.12 (3)
$\gamma_{7,6}$(Pu)	57.3	≈0.012	M1(+E2)		≈0.012
$\gamma_{8,6}$(Pu)	61.460 (2)	1.900 (32)	E1	0.473 (10)	1.29 (2)
$\gamma_{3,1}$(Pu)	67.841 (7)	9.9 (30)	E2	98.3 (20)	0.10 (3)
$\gamma_{4,3}$(Pu)	88.06 (3)	0.078 (44)	M1+20%E2	12 (6)	0.006 (2)
$\gamma_{7,5}$(Pu)	101.96 (2)	0.12 (3)	E2	14.4 (3)	0.008 (2)
$\gamma_{8,5}$(Pu)	106.125 (2)	32.6 (9)	E1(+M2)	0.26 (3)	25.9 (3)
$\gamma_{4,2}$(Pu)	106.50 (3)	0.63 (10)	E2	11.8 (3)	0.049 (8)
$\gamma_{12,7}$(Pu)	124.4	0.15	E2	13.6 (3)	0.01
$\gamma_{6,4}$(Pu)	166.39 (6)	0.12 (5)	M1(+20%E2)	6.23 (13)	0.016 (7)
$\gamma_{12,6}$(Pu)	181.70 (3)	0.497 (14)	M1	4.78 (10)	0.086 (2)
$\gamma_{5,3}$(Pu)	209.753 (2)	13.47 (24)	M1+2%E2	2.94 (6)	3.42 (3)
$\gamma_{12,5}$(Pu)	226.38 (2)	0.91 (5)	M1+12%E2	2.58 (8)	0.255 (14)
$\gamma_{8,4}$(Pu)	227.83	0.54 (11)	M1+1.7%E2	0.0762 (15)	0.5 (1)
$\gamma_{5,2}$(Pu)	228.183 (1)	38.6 (12)	M1+7.3%E2	2.41 (8)	11.32 (22)
$\gamma_{6,3}$(Pu)	254.40 (3)	0.314 (10)	M1+2.5%E2	1.85 (4)	0.110 (3)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{6,2}$(Pu)	272.84 (3)	0.194 (8)	M1+2.6%E2	1.52 (3)	0.077 (3)
$\gamma_{5,1}$(Pu)	277.599 (1)	34.8 (9)	M1+5%E2	1.42 (6)	14.4 (1)
$\gamma_{5,0}$(Pu)	285.460 (2)	0.973 (13)	E2	0.248 (5)	0.78 (1)
$\gamma_{7,3}$(Pu)	311.70 (2)	0.002 (2)	(M1+E2)		0.002 (2)
$\gamma_{8,3}$(Pu)	315.880 (3)	1.649 (10)	E1(+0.006%M2)	0.0372 (8)	1.59 (1)
$\gamma_{6,1}$(Pu)	322.3 (2)	0.006	(E2)	0.170 (4)	0.0052
$\gamma_{8,2}$(Pu)	334.310 (3)	2.107 (21)	E1(+0.004%M2)	0.0329 (7)	2.04 (2)
$\gamma_{13,4}$(Pu)	392.4 (5)	0.0016	(E1)		0.0016
$\gamma_{11,3}$(Pu)	429.5 (5)	0.0039			0.0039
$\gamma_{10,2}$(Pu)	434.7 (5)	0.013	E1(+M2)		0.013
$\gamma_{11,2}$(Pu)	447.6 (5)	0.00026			0.00026
$\gamma_{12,2}$(Pu)	454.2 (5)	0.00082	(M1)		0.00082
$\gamma_{9,1}$(Pu)	461.9 (5)	0.0016	(E1)		0.0016
$\gamma_{9,0}$(Pu)	469.8 (5)	0.0011	(E1)		0.0011
$\gamma_{10,1}$(Pu)	484.3 (5)	0.001	(E1)		0.001
$\gamma_{10,0}$(Pu)	492.3 (5)	0.006	(E1)		0.006
$\gamma_{11,1}$(Pu)	497.8 (5)	0.0032			0.0032
$\gamma_{13,2}$(Pu)	498.7	0.001	(E1)		0.001
$\gamma_{12,1}$(Pu)	504.2 (5)	0.00078	(E2)		0.00078

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	87.74	(3)	y
Q_α	:	5593.20	(19)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,14}$	4432.1 (2)	~0.0000012
$\alpha_{0,13}$	4472.1 (2)	0.00000117 (7)
$\alpha_{0,12}$	4492.5 (2)	~0.0000002
$\alpha_{0,11}$	4526.3 (2)	0.000000150 (16)
$\alpha_{0,10}$	4567.4 (2)	0.00000023
$\alpha_{0,9}$	4587.9 (2)	0.00000130 (5)
$\alpha_{0,8}$	4661.7 (2)	0.0000081
$\alpha_{0,7}$	4664.1 (2)	0.000000075 (22)
$\alpha_{0,6}$	4702.8 (2)	0.0001
$\alpha_{0,5}$	4726.0 (2)	0.00000821 (16)
$\alpha_{0,4}$	5010.4 (2)	0.00000680 (23)
$\alpha_{0,3}$	5208.0 (2)	0.00292 (4)
$\alpha_{0,2}$	5358.1 (2)	0.104 (3)
$\alpha_{0,1}$	5456.3 (2)	28.85 (6)
$\alpha_{0,0}$	5499.03 (20)	71.04 (6)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(U)	5.9 - 21.6	10.6 (4)
e_{AK}	(U)		0.0000110 (15)
	KLL	71.78 - 80.95	}
	KLX	88.15 - 98.43	}
	KXY	104.51 - 115.59	}
$ec_{1,0\ L}$	(U)	21.74 - 26.33	20.6 (6)
$ec_{1,0\ M}$	(U)	37.95 - 39.95	5.7 (12)
$ec_{1,0\ N}$	(U)	42.057 - 43.119	1.544 (39)
$ec_{2,1\ L}$	(U)	78.095 - 82.685	0.0718 (17)
$ec_{2,1\ M}$	(U)	94.305 - 96.300	0.01992 (49)

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4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11.619 — 20.714		10.63 (8)	
XKα_2	(U)	94.666		0.000106 (3)	} Kα
XKα_1	(U)	98.44		0.000169 (5)	}
XKβ_3	(U)	110.421	}		
XKβ_1	(U)	111.298	}	0.0000609 (22)	K$\beta_1^{'}$
XK$\beta_5^{''}$	(U)	111.964	}		
XKβ_2	(U)	114.407	}		
XKβ_4	(U)	115.012	}	0.0000208 (6)	K$\beta_2^{'}$
XKO$_{2,3}$	(U)	115.377	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{8,6}$(U)	41.82 (11)	0.0000026 (14)	[E2]	863 (18)	0.0000000030 (16)
$\gamma_{1,0}$(U)	43.498 (1)	28.3 (8)	E2	713 (15)	0.0397 (8)
$\gamma_{11,9}$(U)	62.70 (1)	0.000000016 (4)	E1	0.426 (9)	0.000000011 (3)
$\gamma_{2,1}$(U)	99.852 (3)	0.1060 (23)	E2	13.42 (27)	0.00735 (8)
$\gamma_{11,7}$(U)	140.15 (2)	0.000000021 (7)	M1+63%E2	5.1 (15)	0.0000000035 (7)
$\gamma_{3,2}$(U)	152.719 (2)	0.00292 (4)	E2	2.14 (4)	0.000930 (7)
$\gamma_{13,8}$(U)	192.91 (7)	0.0000000012 (4)	[E2]	0.856 (17)	0.00000000066 (20)
$\gamma_{4,3}$(U)	200.97 (3)	0.00000680 (23)	E2	0.734 (15)	0.00000392 (13)
$\gamma_{11,5}$(U)	203.12 (3)	0.000000021 (5)	M1+66%E2	1.5 (3)	0.0000000085 (15)
$\gamma_{14,7}$(U)	235.9 (3)	0.000000010 (5)	[E1]	0.0673 (14)	0.000000009 (5)
$\gamma_{13,5}$(U)	258.227 (3)	0.000000074 (12)	(E1)	0.0548 (11)	0.000000070 (11)
$\gamma_{14,5}$(U)	299.1 (2)	0.000000046 (3)	[E1]	0.0395 (8)	0.000000044 (3)
$\gamma_{7,2}$(U)	705.9 (1)	0.000000050 (13)	[E1]	0.00698 (14)	0.000000050 (13)
$\gamma_{8,2}$(U)	708.3 (2)	0.00000050 (3)	[E2]	0.0219 (5)	0.00000049 (3)
$\gamma_{12,3}$(U)	727.8 (2)	0.0000000028 (3)	(E2)	0.0207 (4)	0.0000000027 (3)
$\gamma_{5,1}$(U)	742.813 (5)	0.00000513 (13)	E1	0.00636 (13)	0.00000510 (13)
$\gamma_{6,1}$(U)	766.38 (2)	0.0000223 (5)	E2	0.0187 (4)	0.0000219 (5)
$\gamma_{9,2}$(U)	783.4 (1)	0.000000022 (3)	[E2]	0.0179 (4)	0.000000022 (3)
$\gamma_{5,0}$(U)	786.27 (3)	0.00000322 (9)	E1	0.00573 (12)	0.00000320 (9)
$\gamma_{10,2}$(U)	804.4 (3)	0.00000017	E0+E2	0.57	0.00000011 (5)
$\gamma_{7,1}$(U)	805.80 (5)	0.000000056 (15)	[E1]	0.00549 (11)	0.000000056 (15)
$\gamma_{8,1}$(U)	808.2 (1)	0.0000041	E0+17%E2	4.3	0.000000767 (25)
$\gamma_{8,0}$(U)	851.7 (1)	0.00000129 (4)	[E2]	0.01513 (30)	0.00000127 (4)
$\gamma_{12,2}$(U)	880.5 (1)	≥0.00000015	(E0+E2)		≥0.00000015 (4)
$\gamma_{9,1}$(U)	883.24 (4)	0.00000073 (4)	E2	0.01409 (28)	0.00000072 (4)
$\gamma_{10,1}$(U)	904.37 (15)	0.000000062 (11)	[E2]	0.01346 (27)	0.000000061 (11)
$\gamma_{9,0}$(U)	926.72 (1)	0.000000565 (25)	(E2)	0.01284 (26)	0.000000558 (25)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{14,2}$(U)	941.94 (10)	0.000000472 (23)	[E2]	0.01244 (25)	0.000000466 (23)
$\gamma_{11,1}$(U)	946.00 (3)	0.000000092 (13)	(E1)	0.00412 (8)	0.000000092 (13)
$\gamma_{12,1}$(U)	980.3 (1)	0.000000042	(E2)	0.01152 (23)	0.000000042
$\gamma_{13,1}$(U)	1001.03 (3)	0.00000099 (4)	E2	0.01107 (22)	0.00000098 (4)
$\gamma_{14,1}$(U)	1041.7 (2)	0.0000002	(E0+E2)		0.000000197 (16)
$\gamma_{14,0}$(U)	1085.4 (2)	0.000000078 (9)	(E2)	0.00950 (19)	0.000000077 (9)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	24100	(11)	y
Q_α	:	5244.51	(21)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,53}$	4059.1 (3)	0.000000021 (5)
$\alpha_{0,52}$	4116.78 (25)	0.000000093 (9)
$\alpha_{0,51}$	4180.6 (3)	0.00000020 (3)
$\alpha_{0,50}$	4186.53 (27)	0.000000077 (7)
$\alpha_{0,49}$	4202.4 (3)	0.000000041 (4)
$\alpha_{0,48}$	4204.42 (21)	0.000000061 (15)
$\alpha_{0,47}$	4279.70 (26)	0.000000199 (12)
$\alpha_{0,46}$	4305.79 (28)	0.000000098 (13)
$\alpha_{0,45}$	4325.5 (10)	~0.000000042
$\alpha_{0,44}$	4326.92 (21)	0.000000228 (12)
$\alpha_{0,43}$	4349.15 (21)	0.00000030 (3)
$\alpha_{0,42}$	4364.42 (22)	0.000000084 (14)
$\alpha_{0,41}$	4390.20 (21)	0.00000101 (11)
$\alpha_{0,40}$	4392.08 (28)	0.000000247 (19)
$\alpha_{0,39}$	4400.0 (4)	0.0000103 (12)
$\alpha_{0,38}$	4400.26 (21)	0.000027 (3)
$\alpha_{0,37}$	4408.36 (22)	0.000000103 (17)
$\alpha_{0,36}$	4419.14 (26)	0.00000034 (4)
$\alpha_{0,35}$	4448.46 (21)	0.00000213 (9)
$\alpha_{0,34}$	4464.68 (21)	0.0000114 (3)
$\alpha_{0,33}$	4467.37 (21)	0.00000707 (13)
$\alpha_{0,32}$	4496.90 (21)	<0.000000034
$\alpha_{0,31}$	4503.24 (21)	0.00000631 (11)
$\alpha_{0,30}$	4508.72 (21)	0.0000264 (6)
$\alpha_{0,29}$	4529.52 (22)	0.00000322 (21)
$\alpha_{0,28}$	4534.08 (22)	0.00000284 (7)
$\alpha_{0,27}$	4558.75 (22)	0.000012 (4)
$\alpha_{0,26}$	4632.35 (21)	0.00086 (3)
$\alpha_{0,25}$	4655.27 (27)	0.0000033 (7)
$\alpha_{0,24}$	4690.29 (21)	0.00056 (5)
$\alpha_{0,23}$	4718.39 (21)	0.0000400 (11)
$\alpha_{0,22}$	4737.05 (21)	0.00570 (5)
$\alpha_{0,21}$	4748.81 (21)	0.00075 (11)
$\alpha_{0,20}$	4770.01 (21)	0.00125 (3)
$\alpha_{0,19}$	4795.73 (21)	0.000944 (17)
$\alpha_{0,18}$	4805.33 (22)	0.000017 (4)
$\alpha_{0,17}$	4823.80 (22)	≈0.000022
$\alpha_{0,16}$	4829.38 (21)	0.00354 (7)
$\alpha_{0,15}$	4866.91 (21)	0.0018 (5)
$\alpha_{0,14}$	4870.38 (21)	0.0007 (3)
$\alpha_{0,13}$	4911.69 (21)	0.0030 (16)

	Energy keV	Probability × 100
$\alpha_{0,12}$	4935.00 (21)	0.0050 (7)
$\alpha_{0,11}$	4962.83 (21)	0.007 (1)
$\alpha_{0,10}$	4988.13 (21)	0.0034 (10)
$\alpha_{0,8}$	5008.70 (21)	0.0182 (27)
$\alpha_{0,7}$	5029.51 (21)	0.013 (4)
$\alpha_{0,6}$	5055.34 (21)	0.0375 (12)
$\alpha_{0,5}$	5076.28 (21)	0.052 (8)
$\alpha_{0,4}$	5105.81 (21)	11.87 (3)
$\alpha_{0,3}$	5111.21 (21)	<0.02
$\alpha_{0,2}$	5143.82 (21)	17.14 (4)
$\alpha_{0,1}$	5156.59 (14)	70.79 (10)
$\alpha_{0,0}$	5156.65 (21)	~0.03

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(U)	5.9 - 21.6		4.66 (19)
e_{AK}	(U)			0.00045 (6)
	KLL	71.78 - 80.95	}	
	KLX	88.15 - 98.34	}	
	KXY	104.42 - 115.40	}	
$ec_{2,1\ M}$	(U)	7.427 - 9.425		15.4 (6)
$ec_{5,4\ L}$	(U)	8.28 - 12.87		0.0259 (11)
$ec_{4,2\ L}$	(U)	16.903 - 21.493		2.61 (16)
$ec_{3,0\ L}$	(U)	24.45 - 29.04		0.0286 (16)
$ec_{4,1\ L}$	(U)	29.866 - 34.456		6.09 (15)
$ec_{4,2\ M}$	(U)	33.113 - 35.111		0.70 (4)
$ec_{6,3\ L}$	(U)	35.07 - 39.66		0.0276 (13)
$ec_{4,1\ M}$	(U)	46.076 - 48.074		1.68 (4)
$ec_{5,2\ L}$	(U)	46.938 - 51.528		0.021 (6)
$ec_{8,4\ L}$	(U)	77.02 - 81.61		0.0139 (12)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(U)	11.619 — 20.714	4.66 (5)	
XKα_2	(U)	94.666	0.00418 (4)	} Kα
XKα_1	(U)	98.44	0.00661 (9)	}

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		Energy keV		Photons per 100 disint.	
$XK\beta_3$	(U)	110.421	}		
$XK\beta_1$	(U)	111.298	}	0.00239 (3)	$K\beta_1'$
$XK\beta_5''$	(U)	111.964	}		
$XK\beta_2$	(U)	114.407	}		
$XK\beta_4$	(U)	115.012	}	0.00131 (6)	$K\beta_2'$
$XKO_{2,3}$	(U)	115.377	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(U)	0.0765 (4)	100	E3	1×10^{10}	~0.00000001
$\gamma_{2,1}$(U)	12.975 (10)	20.7 (8)	M1+0.19(2)%E2	607 (17)	0.0341 (9)
$\gamma_{-1,1}$(U)	14.22 (3)	>0.006			>0.0055 (4)
$\gamma_{5,4}$(U)	30.04 (2)	0.0346 (14)	(M1)	157 (3)	0.000219 (8)
$\gamma_{4,2}$(U)	38.661 (2)	3.56 (21)	M1+22.2(16)%E2	339 (19)	0.01047 (21)
$\gamma_{-1,2}$(U)	40.41 (5)	>0.0002			>0.000163 (16)
$\gamma_{10,7}$(U)	41.93 (5)	0.0097 (5)	(M1)	58.6 (12)	0.000163 (8)
$\gamma_{3,0}$(U)	46.21 (5)	0.0389 (21)	M1+1.8(5)%E2	52.6 (27)	0.000726 (13)
$\gamma_{11,8}$(U)	46.68 (3)	0.0044 (13)	M1+9(5)%E2	86 (24)	0.000050 (6)
$\gamma_{7,5}$(U)	47.60 (3)	0.00259 (11)	(M1)	40.4 (8)	0.0000625 (25)
$\gamma_{4,1}$(U)	51.624 (1)	8.38 (18)	E2	310 (6)	0.02694 (26)
$\gamma_{12,10}$(U)	54.039 (8)	0.00560 (14)	M1	27.8 (6)	0.0001943 (28)
$\gamma_{6,3}$(U)	56.828 (3)	0.0382 (18)	M1+5.0(8)%E2	32.6 (15)	0.001136 (15)
$\gamma_{14,12}$(U)	65.708 (30)	0.00095 (29)	M1+4(6)%E2	19 (6)	0.0000473 (25)
$\gamma_{9,6}$(U)	67.674 (12)	0.00283 (12)	M1+3.6(11)%E2	16.9 (5)	0.000158 (5)
$\gamma_{5,2}$(U)	68.696 (6)	0.029 (8)	E2	78.6 (16)	0.00036 (10)
$\gamma_{8,5}$(U)	68.73 (2)	0.0036 (17)	(M1+20%E2)	27	0.00013 (6)
$\gamma_{-1,3}$(U)	74.96 (10)	>0.00004			>0.000038 (6)
$\gamma_{7,4}$(U)	77.592 (14)	0.0068 (38)	M1(+20(32)%E2)	17 (10)	0.000380 (6)
$\gamma_{13,9}$(U)	78.43 (2)	0.0026 (15)	M1(+20(32)%E2)	16 (10)	0.0001533 (28)
$\gamma_{17,13}$(U)	89.39 (6)	~0.000015	[M1]	6.40 (13)	~0.000002
$\gamma_{10,5}$(U)	89.64 (3)	0.00040 (22)	(M1+E2)	14 (8)	0.000027 (2)
$\gamma_{12,7}$(U)	96.14 (3)	0.00064 (3)	[E2]	16.0 (3)	0.0000379 (19)
$\gamma_{15,11}$(U)	97.6 (3)	0.0007 (5)	M1+20(19)%E2	7.0 (19)	0.00009 (6)
$\gamma_{8,4}$(U)	98.78 (2)	0.0204 (17)	E2	14.1 (3)	0.00135 (11)
$\gamma_{6,0}$(U)	103.06 (3)	0.00273 (9)	E2	11.58 (23)	0.000217 (6)
$\gamma_{11,5}$(U)	115.38 (5)	0.00362 (40)	E2	6.87 (14)	0.00046 (5)
$\gamma_{7,2}$(U)	116.26 (2)	0.0077 (15)	M1+24(36)%E2	12.2 (26)	0.000581 (19)
$\gamma_{10,4}$(U)	119.70 (3)	0.00021 (9)	(M1+E2)	9 (4)	0.000021 (3)
$\gamma_{14,10}$(U)	119.76 (2)	0.000063 (14)	[E2]	5.99 (12)	0.000009 (2)
$\gamma_{12,6}$(U)	122.35 (12)	0.00000125 (17)	(E1)	0.312 (6)	0.00000095 (13)
$\gamma_{37,29}$(U)	123.228 (5)	0.000000021 (5)	(M1)	12.19 (24)	0.0000000016 (4)
$\gamma_{21,14}$(U)	123.62 (5)	0.000310 (13)	[M1]	12.08 (24)	0.0000237 (9)
$\gamma_{9,3}$(U)	124.51 (3)	0.000413 (13)	E2	5.06 (10)	0.0000681 (19)
$\gamma_{10,3}$(U)	125.21 (10)	0.0000730 (21)	[E1]	0.296 (6)	0.0000563 (16)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{7,0}$(U)	129.296 (1)	0.00805 (6)	E1	0.275 (6)	0.00631 (4)
$\gamma_{19,12}$(U)	141.657 (20)	0.000296 (11)	[M1]	8.22 (16)	0.0000321 (10)
$\gamma_{12,5}$(U)	143.35 (20)	0.000110 (46)	[M1+E2]	5.3 (26)	0.0000174 (8)
$\gamma_{15,8}$(U)	144.201 (3)	0.00106 (3)	E2	2.72 (5)	0.000285 (7)
$\gamma_{13,6}$(U)	146.094 (6)	0.000432 (12)	E2	2.57 (5)	0.000121 (3)
$\gamma_{10,2}$(U)	158.1 (3)	0.0000029 (3)	[E2]	1.86 (4)	0.00000101 (10)
$\gamma_{18,11}$(U)	160.19 (5)	0.0000172 (36)	[E2]	1.77 (4)	0.0000062 (13)
$\gamma_{16,10}$(U)	161.450 (15)	0.000814 (42)	(M1)	5.67 (11)	0.000122 (6)
$\gamma_{17,9}$(U)	167.81 (5)	0.0000074 (20)	[E2]	1.47 (3)	0.0000030 (8)
$\gamma_{10,0}$(U)	171.393 (6)	0.0001255 (34)	[E1]	0.141 (3)	0.000110 (3)
$\gamma_{42,28}$(U)	172.560 (8)	~0.000000017	M1	4.70 (9)	~0.000000003
$\gamma_{12,4}$(U)	173.70 (5)	0.0000071 (18)	[E2]	1.28 (3)	0.0000031 (8)
$\gamma_{12,3}$(U)	179.220 (12)	0.0000739 (22)	[E1]	0.127 (3)	0.0000656 (19)
$\gamma_{-1,4}$(U)	184.55 (5)	0.000010 (3)	[M1]	3.87 (8)	0.0000021 (6)
$\gamma_{14,6}$(U)	188.23 (10)	0.0000123 (12)	[E1]	0.1140 (23)	0.0000110 (11)
$\gamma_{21,12}$(U)	189.36 (1)	0.00027 (11)	[M1+E2]	2.3 (14)	0.0000820 (14)
$\gamma_{-1,5}$(U)	193.13 (12)	>0.000009			>0.0000090 (9)
$\gamma_{19,10}$(U)	195.679 (8)	0.000456 (11)	M1	3.30 (7)	0.000106 (2)
$\gamma_{-1,6}$(U)	196.87 (5)	>0.000004			>0.0000037 (4)
$\gamma_{16,7}$(U)	203.550 (5)	0.002224 (49)	M1	2.95 (6)	0.000563 (9)
$\gamma_{21,11}$(U)	218.0 (5)	>0.000002			>0.0000012 (10)
$\gamma_{12,0}$(U)	225.42 (4)	0.0000161 (4)	[E1]	0.0747 (15)	0.0000150 (4)
$\gamma_{19,7}$(U)	237.77 (10)	0.0000422 (18)	[M1]	1.91 (4)	0.0000145 (6)
$\gamma_{26,14}$(U)	242.08 (3)	0.0000209 (14)	[M1]	1.82 (4)	0.0000074 (5)
$\gamma_{21,10}$(U)	243.38 (3)	0.000053 (18)	[M1+E2]	1.1 (7)	0.0000254 (7)
$\gamma_{14,3}$(U)	244.92 (5)	0.0000054 (5)		0.0618 (12)	0.0000051 (5)
$\gamma_{24,12}$(U)	248.95 (5)	0.0000188 (16)	[M1]	1.68 (3)	0.0000070 (6)
$\gamma_{22,10}$(U)	255.384 (15)	0.000204 (6)	[M1]	1.57 (3)	0.0000795 (20)
$\gamma_{20,7}$(U)	263.95 (3)	0.0000629 (26)	M1	1.43 (3)	0.0000259 (10)
$\gamma_{30,20}$(U)	265.7 (3)	0.0000017 (4)	[E1]	0.0514 (10)	0.0000016 (4)
$\gamma_{16,4}$(U)	281.2 (2)	0.0000036 (12)	[M1+E2]	0.7 (5)	0.0000021 (3)
$\gamma_{19,5}$(U)	285.3 (2)	0.0000032 (12)	[M1+E2]	0.7 (5)	0.0000019 (4)
$\gamma_{22,7}$(U)	297.46 (3)	0.000100 (3)	[M1]	1.025 (21)	0.0000492 (13)
$\gamma_{24,10}$(U)	302.87 (5)	0.0000097 (8)	[M1]	0.976 (20)	0.0000049 (4)
$\gamma_{26,12}$(U)	307.85 (5)	0.0000101 (8)	[M1]	0.933 (19)	0.0000052 (4)
$\gamma_{21,6}$(U)	311.78 (4)	0.0000266 (8)	[E1]	0.0361 (7)	0.0000257 (8)
$\gamma_{23,7}$(U)	316.41 (3)	0.0000248 (10)	M1	0.865 (17)	0.0000133 (5)
$\gamma_{16,2}$(U)	319.68 (10)	0.0000073 (19)	[M1+E2]	0.50 (35)	0.0000049 (5)
$\gamma_{19,3}$(U)	320.862 (20)	0.0000558 (12)	[E1]	0.0337 (7)	0.0000540 (12)
$\gamma_{24,8}$(U)	323.84 (3)	0.0000960 (25)	M1	0.811 (16)	0.0000530 (13)
$\gamma_{16,0}$(U)	332.845 (5)	0.000503 (8)	E1	0.0313 (6)	0.000488 (8)
$\gamma_{26,11}$(U)	336.113 (12)	0.000192 (5)	M1	0.733 (15)	0.0001111 (26)
$\gamma_{20,4}$(U)	341.506 (10)	0.0001106 (24)	M1	0.701 (14)	0.0000650 (13)
$\gamma_{24,7}$(U)	345.00 (2)	<0.000084	(M1)	0.682 (14)	<0.00005
$\gamma_{22,5}$(U)	345.013 (4)	0.000922 (15)	M1	0.682 (14)	0.000548 (8)
$\gamma_{-1,7}$(U)	350.8 (3)	>0.000002			>0.0000018 (4)
$\gamma_{19,2}$(U)	354.0 (5)	0.00000085 (33)	[E2]	0.1150 (23)	0.00000076 (30)
$\gamma_{26,10}$(U)	361.89 (5)	0.0000187 (11)	[M1]	0.598 (12)	0.0000117 (7)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{19,0}$(U)	367.073 (25)	0.0000893 (21)	[E1]	0.0254 (5)	0.0000871 (20)
$\gamma_{21,3}$(U)	368.554 (20)	0.0000899 (14)	[E1]	0.0252 (5)	0.0000877 (14)
$\gamma_{22,4}$(U)	375.054 (3)	0.002376 (37)	M1	0.543 (11)	0.001540 (21)
$\gamma_{20,2}$(U)	380.191 (6)	0.000460 (7)	M1	0.523 (10)	0.000302 (4)
$\gamma_{26,8}$(U)	382.75 (5)	0.000387 (7)	M1	0.513 (10)	0.000256 (4)
$\gamma_{24,5}$(U)	392.53 (3)	0.000179 (24)	M1	0.479 (10)	0.000121 (16)
$\gamma_{20,1}$(U)	393.14 (3)	0.000619 (25)	M1	0.477 (10)	0.000419 (17)
$\gamma_{23,3}$(U)	399.53 (6)	0.00000625 (27)	[E1]	0.0213 (4)	0.00000612 (26)
$\gamma_{25,6}$(U)	406.8 (2)	0.0000030 (7)	[E1]	0.0204 (4)	0.0000029 (7)
$\gamma_{27,11}$(U)	411.2 (3)	0.000010 (4)	[M1]	0.422 (8)	0.0000069 (30)
$\gamma_{42,20}$(U)	412.49 (6)	∼0.000000018	[E1]	0.0199 (4)	∼0.000000018
$\gamma_{22,2}$(U)	413.713 (5)	0.00207 (3)	M1	0.415 (8)	0.001464 (21)
$\gamma_{24,4}$(U)	422.598 (19)	0.0001669 (30)	M1	0.392 (8)	0.0001199 (20)
$\gamma_{22,1}$(U)	426.68 (3)	0.0000256 (6)	[E2]	0.0699 (14)	0.0000239 (6)
$\gamma_{24,3}$(U)	428.4 (3)	0.00000103 (10)	[E1]	0.0184 (4)	0.00000101 (10)
$\gamma_{26,6}$(U)	430.08 (10)	0.00000437 (19)	[E1]	0.0183 (4)	0.00000429 (19)
$\gamma_{23,0}$(U)	445.72 (3)	0.00000892 (26)	E1	0.0170 (3)	0.00000877 (26)
$\gamma_{-1,8}$(U)	446.82 (20)	0.0000009 (1)			0.00000085 (13)
$\gamma_{26,5}$(U)	451.481 (10)	0.000223 (25)	M1(+50%E2)	0.19 (13)	0.000187 (3)
$\gamma_{27,8}$(U)	457.61 (5)	0.00000199 (4)	[M1]	0.316 (6)	0.00000151 (3)
$\gamma_{24,2}$(U)	461.25 (5)	0.00000242 (5)	[E2]	0.0575 (12)	0.00000229 (5)
$\gamma_{25,3}$(U)	463.9 (3)	0.000000284 (30)	[E1]	0.0157 (3)	0.00000028 (3)
$\gamma_{24,0}$(U)	473.9 (5)	0.000000061 (30)	[E1]	0.0150 (3)	0.00000006 (3)
$\gamma_{26,4}$(U)	481.66 (12)	0.00000485 (11)	[E2]	0.0517 (10)	0.00000461 (10)
$\gamma_{26,3}$(U)	487.06 (10)	0.000000269 (19)	[E1]	0.0142 (3)	0.000000265 (19)
$\gamma_{31,10}$(U)	493.08 (5)	0.00000089 (3)	[E1]	0.0139 (3)	0.00000088 (3)
$\gamma_{-1,9}$(U)	497.0 (5)	0.000000044 (25)			0.000000044 (25)
$\gamma_{27,5}$(U)	526.4 (4)	0.000000059 (19)	[E2]	0.0419 (8)	0.000000057 (19)
$\gamma_{-1,10}$(U)	538.8 (2)	0.00000031 (2)			0.000000309 (19)
$\gamma_{33,8}$(U)	550.5 (2)	0.000000440 (25)	(E1)	0.01120 (22)	0.000000435 (25)
$\gamma_{-1,11}$(U)	557.3 (5)	0.00000004 (2)			0.000000038 (19)
$\gamma_{36,10}$(U)	579.4 (3)	0.000000091 (20)	[E2]	0.0337 (7)	0.000000088 (19)
$\gamma_{31,5}$(U)	582.89 (10)	0.000000624 (26)	[E1]	0.0100 (2)	0.000000618 (26)
$\gamma_{29,4}$(U)	586.3 (3)	0.000000155 (16)	[E1]	0.0099 (2)	0.000000153 (16)
$\gamma_{43,12}$(U)	596.0 (5)	0.000000040 (12)	[E2]	0.0317 (6)	0.000000039 (12)
$\gamma_{33,6}$(U)	597.99 (5)	0.00000179 (6)	[E2]	0.0314 (6)	0.00000174 (6)
$\gamma_{36,8}$(U)	599.6 (2)	0.000000204 (25)	[E1]	0.00948 (19)	0.000000202 (25)
$\gamma_{40,10}$(U)	606.9 (2)	0.000000136 (15)	M1(+E2)	0.12 (3)	0.000000121 (13)
$\gamma_{-1,12}$(U)	608.9 (2)	0.00000012 (2)			0.000000117 (12)
$\gamma_{31,4}$(U)	612.83 (3)	0.00000096 (5)	E1	0.00910 (18)	0.00000095 (5)
$\gamma_{35,6}$(U)	617.1 (1)	0.00000154 (9)	[M1]	0.142 (3)	0.00000135 (8)
$\gamma_{31,3}$(U)	618.28 (6)	0.00000212 (8)	(E2)	0.0292 (6)	0.00000206 (8)
$\gamma_{33,5}$(U)	619.21 (6)	0.00000122 (8)	[E1]	0.00892 (18)	0.00000121 (8)
$\gamma_{32,3}$(U)	624.78 (3)	<0.000000025	(M1)	0.137 (3)	<0.000000022
$\gamma_{29,2}$(U)	624.78 (5)	0.000000464 (19)	[E1]	0.00877 (18)	0.000000460 (19)
$\gamma_{28,0}$(U)	633.15 (6)	0.00000286 (7)	M1(+E2)	0.122 (11)	0.00000255 (6)
$\gamma_{29,1}$(U)	637.73 (5)	0.00000065 (6)	[E1]	0.00844 (17)	0.00000064 (6)
$\gamma_{29,0}$(U)	637.80 (5)	0.00000197 (20)	E2	0.0273 (5)	0.00000192 (19)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{38,7}$(U)	639.99 (10)	0.00000869 (21)	[E2]	0.0271 (5)	0.00000846 (20)
$\gamma_{30,2}$(U)	645.94 (4)	0.00001502 (30)	E1	0.00824 (16)	0.0000149 (3)
$\gamma_{33,4}$(U)	649.32 (6)	0.00000073 (5)	[E1]	0.00816 (16)	0.00000072 (5)
$\gamma_{-1,13}$(U)	650.53 (6)	0.00000027 (4)			0.00000027 (4)
$\gamma_{34,4}$(U)	652.05 (2)	0.00000668 (20)	E1	0.00809 (16)	0.00000663 (20)
$\gamma_{33,3}$(U)	654.88 (8)	0.00000233 (5)	(E2)	0.0258 (5)	0.00000227 (5)
$\gamma_{30,1}$(U)	658.86 (6)	0.00000967 (26)	E1	0.00794 (16)	0.00000959 (26)
$\gamma_{31,0}$(U)	664.58 (5)	0.000001712 (41)	E2	0.0251 (5)	0.00000167 (4)
$\gamma_{36,5}$(U)	668.2 (5)	0.000000040 (12)	[E1]	0.00773 (15)	0.000000040 (12)
$\gamma_{43,8}$(U)	670.8 (5)	≤0.000000009 (3)			≤0.000000009 (3)
$\gamma_{32,0}$(U)	670.99 (4)	≤0.000000009 (3)	[M1+E2]	0.06 (4)	≤0.000000009 (3)
$\gamma_{35,3}$(U)	674.05 (3)	0.000000556 (22)		0.1120 (22)	0.00000050 (2)
$\gamma_{40,5}$(U)	674.4 (5)	0.000000111 (11)	(M1)	0.1120 (22)	0.00000010 (1)
$\gamma_{-1,14}$(U)	685.97 (11)	0.00000127 (6)	E1	0.00736 (15)	0.00000126 (6)
$\gamma_{-1,15}$(U)	688.1 (3)	0.000000114 (11)			0.000000112 (11)
$\gamma_{34,2}$(U)	690.81 (8)	0.00000059 (5)	E1	0.00727 (15)	0.00000059 (5)
$\gamma_{-1,16}$(U)	693.2 (5)	0.000000033 (13)			0.000000032 (13)
$\gamma_{46,10}$(U)	693.81 (1)	0.000000019 (7)	(E2)	0.0229 (5)	0.000000019 (7)
$\gamma_{41,5}$(U)	697.8 (5)	0.000000076 (15)			0.000000074 (15)
$\gamma_{-1,17}$(U)	699.6 (5)	0.00000008 (2)			0.000000080 (16)
$\gamma_{33,0}$(U)	701.1 (2)	0.000000555 (29)	[M1+E2]	0.06 (4)	0.000000524 (19)
$\gamma_{34,1}$(U)	703.68 (5)	0.00000413 (13)	E1	0.00702 (14)	0.00000410 (13)
$\gamma_{-1,18}$(U)	712.96 (5)	0.000000052 (6)			0.000000052 (6)
$\gamma_{44,7}$(U)	714.71 (14)	0.000000081 (8)	E2	0.0215 (4)	0.000000079 (8)
$\gamma_{39,4}$(U)	718.0 (5)	0.00000278 (6)	E1	0.00677 (14)	0.00000276 (6)
$\gamma_{35,0}$(U)	720.3 (5)	0.000000029 (5)			0.000000029 (5)
$\gamma_{47,10}$(U)	720.55 (3)	0.000000020 (2)			0.000000020 (2)
$\gamma_{41,4}$(U)	727.9 (2)	0.000000136 (8)	M1	0.0911 (18)	0.000000125 (7)
$\gamma_{46,7}$(U)	736.5 (5)	0.000000031 (9)	M1+59(8)%E2	0.0481 (10)	0.000000030 (9)
$\gamma_{-1,19}$(U)	742.7 (5)	0.000000038 (11)			0.000000038 (11)
$\gamma_{37,2}$(U)	747.4 (5)	0.000000082 (16)	E1	0.00629 (13)	0.000000081 (16)
$\gamma_{38,2}$(U)	756.23 (6)	0.0000029 (5)	[M1+E2]	0.05 (3)	0.0000028 (5)
$\gamma_{39,2}$(U)	756.4 (4)	0.00000069 (19)	[E1]	0.00615 (12)	0.00000069 (19)
$\gamma_{47,7}$(U)	762.6 (2)	∼0.00000001			∼0.00000001
$\gamma_{45,5}$(U)	763.60 (15)	>0.000000042	E0(+M1)	0.9	>0.000000022
$\gamma_{41,2}$(U)	766.47 (3)	0.00000065 (11)	E0+M1	4.0 (4)	0.00000013 (2)
$\gamma_{51,12}$(U)	767.29 (4)	0.00000014 (3)			0.00000014 (3)
$\gamma_{38,1}$(U)	769.15 (8)	0.0000153 (32)	M1+E0	2.0 (2)	0.0000051 (10)
$\gamma_{39,1}$(U)	769.4 (5)	0.0000068 (12)	E1	0.00596 (12)	0.0000068 (12)
$\gamma_{-1,20}$(U)	777.1 (3)	0.000000028 (7)			0.000000028 (7)
$\gamma_{41,1}$(U)	779.43 (3)	0.000000147 (10)	M1	0.0759 (15)	0.000000137 (9)
$\gamma_{-1,21}$(U)	786.9 (2)	0.000000089 (9)	E2	0.0177 (4)	0.000000087 (9)
$\gamma_{-1,22}$(U)	788.5 (3)	0.000000035 (7)			0.000000035 (7)
$\gamma_{42,2}$(U)	792.68 (6)	0.000000020 (4)	(E1)	0.00565 (11)	0.000000020 (4)
$\gamma_{-1,23}$(U)	796.9 (3)	0.000000015 (3)			0.000000015 (3)
$\gamma_{-1,24}$(U)	803.2 (2)	0.000000064 (5)			0.000000064 (5)
$\gamma_{42,1}$(U)	805.65 (6)	0.000000029 (4)	E2	0.0169 (3)	0.000000028 (4)
$\gamma_{43,2}$(U)	808.21 (4)	0.000000130 (6)	M1	0.0690 (14)	0.000000122 (6)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{46,4}$(U)	813.7 (2)	0.000000048 (5)	M1	0.0677 (14)	0.000000045 (5)
$\gamma_{50,9}$(U)	816.0 (2)	0.000000026 (4)	[M1+E2]	0.042 (25)	0.000000025 (4)
$\gamma_{43,0}$(U)	821.25 (4)	0.000000050 (11)	E1+M2		0.000000050 (11)
$\gamma_{51,10}$(U)	821.3 (2)	∼0.000000006			∼0.000000006
$\gamma_{-1,25}$(U)	826.8 (3)	0.000000018 (6)			0.000000018 (6)
$\gamma_{-1,26}$(U)	828.9 (2)	0.00000014 (1)			0.000000134 (8)
$\gamma_{52,12}$(U)	832.2 (2)	0.000000030 (4)			0.000000030 (4)
$\gamma_{-1,27}$(U)	837.3 (2)	0.000000020 (4)			0.000000020 (4)
$\gamma_{47,4}$(U)	840.4 (2)	0.000000056 (6)	M1(+E0)	0.14 (2)	0.000000049 (5)
$\gamma_{44,1}$(U)	843.78 (1)	0.000000147 (9)	M1(+E0)	0.09 (1)	0.000000135 (8)
$\gamma_{47,2}$(U)	879.2 (3)	0.000000037 (4)	[M1+E2]	0.035 (20)	0.000000036 (4)
$\gamma_{47,1}$(U)	891.0 (3)	0.000000076 (8)	[E2]	0.0139 (3)	0.000000075 (8)
$\gamma_{-1,28}$(U)	895.4 (3)	0.000000008 (3)			0.0000000076 (25)
$\gamma_{-1,29}$(U)	898.1 (3)	0.000000018 (4)			0.000000018 (4)
$\gamma_{-1,30}$(U)	905.5 (3)	0.000000008 (3)			0.0000000076 (25)
$\gamma_{-1,31}$(U)	911.7 (3)	0.000000014 (3)			0.000000014 (3)
$\gamma_{49,4}$(U)	918.7 (3)	0.000000009 (3)			0.0000000088 (30)
$\gamma_{-1,32}$(U)	931.9 (3)	0.000000013 (4)			0.000000013 (4)
$\gamma_{50,3}$(U)	940.3 (3)	0.000000051 (5)	[E2]	0.01250 (25)	0.000000050 (5)
$\gamma_{48,2}$(U)	955.41 (2)	0.0000000321 (31)	M1+27(13)%E2	0.036 (4)	0.000000031 (3)
$\gamma_{49,2}$(U)	957.6 (3)	0.000000032 (3)			0.000000032 (3)
$\gamma_{48,1}$(U)	968.37 (2)	0.000000029 (5)	M1+27(20)%E2	0.035 (19)	0.000000028
$\gamma_{51,2}$(U)	979.7 (3)	0.000000029 (5)	[M1+E2]	0.026 (15)	0.000000028 (5)
$\gamma_{-1,33}$(U)	982.7 (3)	0.000000011 (3)			0.0000000107 (25)
$\gamma_{53,7}$(U)	986.90 (4)	0.000000021 (5)	E1	0.00383 (8)	0.000000021 (5)
$\gamma_{51,1}$(U)	992.64 (3)	0.000000027 (4)			0.000000027 (4)
$\gamma_{52,4}$(U)	1005.7 (3)	0.000000018 (3)			0.0000000177 (25)
$\gamma_{-1,34}$(U)	1009.4 (3)	0.000000014 (3)			0.0000000139 (25)
$\gamma_{52,0}$(U)	1057.3 (2)	0.000000045 (7)			0.000000045 (7)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	6561	(7)	y
Q_α	:	5255.75	(15)	keV
α	:	100		%
SF	:	5.7		$\times 10^{-6}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,10}$	4217.6 (2)	<0.0000001
$\alpha_{0,9}$	4223.8 (4)	<0.00000013
$\alpha_{0,8}$	4226.1 (3)	<0.00000017
$\alpha_{0,7}$	4264.3 (3)	0.00000065 (8)
$\alpha_{0,6}$	4436.4 (2)	0.000000013 (7)
$\alpha_{0,5}$	4492.0 (2)	0.0000193 (4)
$\alpha_{0,4}$	4654.5 (2)	0.000047 (5)
$\alpha_{0,3}$	4863.5 (2)	0.001082 (18)
$\alpha_{0,2}$	5021.1 (2)	0.0863 (18)
$\alpha_{0,1}$	5123.6 (2)	27.16 (19)
$\alpha_{0,0}$	5168.13 (15)	72.74 (18)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(U)	5.01 - 21.60	10.3 (8)
e_{AK}	(U)		0.0000027 (4)
	KLL	71.78 - 80.95	}
	KLX	88.15 - 98.43	}
	KXY	104.51 - 115.59	}
$ec_{1,0\ L}$	(U)	23.486 - 28.076	19.8 (6)
$ec_{1,0\ M}$	(U)	39.696 - 41.690	5.48 (15)
$ec_{1,0\ N}$	(U)	43.803 - 44.865	1.483 (40)
$ec_{2,1\ L}$	(U)	82.475 - 87.067	0.0571 (10)
$ec_{2,1\ M}$	(U)	98.687 - 100.680	0.01585 (33)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11.619 — 20.714		10.34 (15)	
$XK\alpha_2$	(U)	94.666		0.0000260 (6)	} $K\alpha$
$XK\alpha_1$	(U)	98.44		0.0000416 (9)	}
$XK\beta_3$	(U)	110.421	}		
$XK\beta_1$	(U)	111.298	}	0.0000150 (4)	$K\beta_1^{'}$
$XK\beta_5^{''}$	(U)	111.964	}		
$XK\beta_2$	(U)	114.407	}		
$XK\beta_4$	(U)	115.012	}	0.00000513 (16)	$K\beta_2^{'}$
$XKO_{2,3}$	(U)	115.377	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(U)	45.244 (2)	27.3 (8)	E2	589 (12)	0.0462 (9)
$\gamma_{2,1}$(U)	104.233 (5)	0.0856 (14)	E2	10.99 (22)	0.00714 (7)
$\gamma_{3,2}$(U)	160.308 (3)	0.001116 (17)	E2	1.76 (4)	0.0004045 (22)
$\gamma_{4,3}$(U)	212.46 (5)	0.0000464 (48)	E2	0.599 (12)	0.000029 (3)
$\gamma_{5,2}$(U)	538.1 (1)	0.000000168 (14)	E3	0.143 (3)	0.000000147 (12)
$\gamma_{5,1}$(U)	642.34 (5)	0.00001449 (43)	E1+(M2+E3)	0.15 (2)	0.0000126 (3)
$\gamma_{5,0}$(U)	687.56 (10)	0.00000466 (14)	E1	0.31 (2)	0.00000356 (9)
$\gamma_{6,1}$(U)	698.94	<0.000000025			<0.000000025
$\gamma_{9,2}$(U)	810.8	<0.000000043			<0.000000043
$\gamma_{7,1}$(U)	874.0 (2)	0.00000059 (6)	(E2)	0.0144 (3)	0.00000058 (6)
$\gamma_{8,1}$(U)	912.4 (3)	<0.00000007	(M1)	0.050 (1)	<0.00000007
$\gamma_{9,1}$(U)	915.1 (3)	<0.000000063	(M1+E0)		<0.000000063
$\gamma_{10,1}$(U)	921.2 (2)	<0.000000022	E1	0.00432 (9)	<0.000000022
$\gamma_{8,0}$(U)	958.0 (2)	<0.0000001			<0.0000001
$\gamma_{9,0}$(U)	960.3	<0.00000005			<0.00000005
$\gamma_{10,0}$(U)	966.9 (2)	<0.0000000501985	E1	0.00397 (8)	<0.00000005

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	14.33	(4)	y
Q_{β^-}	:	20.8	(2)	keV
Q_α	:	5140.0	(5)	keV
β^-	:	99.99756	(2)	%
α	:	0.00244	(2)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,0}$	20.8 (2)	99.99756 (2)	1st forbidden	5.8

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,10}$	4694 (3)	≈0.0000007
$\alpha_{0,9}$	4733 (3)	≈0.0000007
$\alpha_{0,8}$	4744 (5)	≈0.0000017
$\alpha_{0,7}$	4785.1 (11)	0.0000005 (2)
$\alpha_{0,6}$	4798.0 (5)	0.000029 (3)
$\alpha_{0,5}$	4853.8 (5)	0.000295 (8)
$\alpha_{0,4}$	4897.3 (5)	0.00203 (4)
$\alpha_{0,3}$	4973.1 (5)	0.000032 (3)
$\alpha_{0,2}$	4999.2 (5)	0.0000100 (12)
$\alpha_{0,1}$	5043.4 (5)	0.000025 (2)
$\alpha_{0,0}$	5054.6 (5)	0.0000086 (10)

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(U)	5.9 - 21.6	0.00117 (6)	
e_{AK}	(U)		0.000031 (5)	
	KLL	71.776 - 80.954	}	
	KLX	88.153 - 98.429	}	
	KXY	104.51 - 115.59	}	
$\beta^-_{0,0}$	max:	20.8 (2)	99.99756 (2)	avg: 5.8 (1)

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5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11.619 — 20.714		0.001166 (40)	
$XK\alpha_2$	(U)	94.666		0.000300 (7)	} $K\alpha$
$XK\alpha_1$	(U)	98.44		0.000479 (10)	}
$XK\beta_3$	(U)	110.421	}		
$XK\beta_1$	(U)	111.298	}	0.000179 (5)	$K\beta_1'$
$XK\beta_5''$	(U)	111.964	}		
$XK\beta_2$	(U)	114.407	}		
$XK\beta_4$	(U)	115.012	}	0.000059 (2)	$K\beta_2'$
$XKO_{2,3}$	(U)	115.377	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{5,4}$(U)	44.18 (3)	0.000258 (17)	M1+1.7(5)%E2	60.4 (29)	0.0000042 (2)
$\gamma_{2,1}$(U)	44.86 (10)	0.000111 (25)	[M1+15(4)%E2]	131 (25)	0.00000084 (10)
$\gamma_{2,0}$(U)	56.30 (12)	0.00051 (4)	(E2)	204 (4)	0.0000025 (2)
$\gamma_{6,5}$(U)	56.76 (10)	0.0000280 (41)	M1+1.1(13)E2	27 (3)	0.0000010 (1)
$\gamma_{3,1}$(U)	71.64 (9)	0.000189 (14)	(E2)	64.3 (13)	0.0000029 (2)
$\gamma_{4,3}$(U)	77.01 (4)	0.000225 (6)	(M1)	9.86 (20)	0.0000207 (4)
$\gamma_{6,4}$(U)	100.94 (11)	0.00000099	(E2)	12.8 (3)	0.000000072
$\gamma_{4,2}$(U)	103.680 (5)	0.000536 (14)	[M1+0.47(1)%E2]	4.20 (9)	0.000103 (2)
$\gamma_{7,4}$(U)	114 (1)	0.0000067 (13)	E1	0.0883 (17)	0.0000062 (12)
$\gamma_{5,3}$(U)	121.22 (5)	0.0000097 (10)	(M1)	12.8 (3)	0.00000070 (7)
$\gamma_{4,1}$(U)	148.567 (10)	0.001500 (27)	[M1+2.8(1)%E2]	7.05 (14)	0.0001863 (8)
$\gamma_{4,0}$(U)	159.96 (2)	0.0000179 (4)	(E2)	1.78 (3)	0.00000645 (9)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	3.73	(3)	$\times 10^5$ y
Q_α	:	4984.5	(10)	keV
α	:	100		%
SF	:	5.5		$\times 10^{-4}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,3}$	4600.1 (10)	0.00084 (6)
$\alpha_{0,2}$	4756.2 (10)	0.0304 (13)
$\alpha_{0,1}$	4858.2 (10)	23.44 (17)
$\alpha_{0,0}$	4902.3 (10)	76.53 (17)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(U)	5.9 - 21.6		8.40 (19)
e_{AK}	(U)			0.00000188 (29)
	KLL	71.78 - 80.95	}	
	KLX	88.15 - 98.43	}	
	KXY	104.51 - 115.59	}	
$ec_{1,0\ L}$	(U)	23.157 - 27.747		17.1 (5)
$ec_{1,0\ M}$	(U)	39.367 - 41.360		4.72 (14)
$ec_{1,0\ N}$	(U)	43.474 - 44.536		1.28 (4)
$ec_{2,1\ L}$	(U)	81.74 - 86.33		0.0209 (11)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11.62 — 21.73		8.71 (21)	
XKα_2	(U)	94.666		0.0000180 (13)	} Kα
XKα_1	(U)	98.44		0.0000288 (21)	}
XKβ_3	(U)	110.421	}		
XKβ_1	(U)	111.298	}	0.0000104 (8)	Kβ_1'
XKβ_5''	(U)	111.964	}		
XKβ_2	(U)	114.407	}		
XKβ_4	(U)	115.012	}	0.00000355 (27)	Kβ_2'
XKO$_{2,3}$	(U)	115.377	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(U)	44.915 (13)	23.5 (7)	E2	610 (12)	0.0384 (8)
$\gamma_{2,1}$(U)	103.50 (4)	0.0313 (16)	E2	11.36 (23)	0.00253 (12)
$\gamma_{3,2}$(U)	158.80 (8)	0.00084 (6)	E2	1.83 (4)	0.000298 (20)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	432.6	(6)	y
Q_α	:	5637.82	(12)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,36}$	4757.58 (13)	0.00004 (3)
$\alpha_{0,34}$	4800.99 (13)	0.000086
$\alpha_{0,33}$	4834.15 (13)	0.0007
$\alpha_{0,32}$	4888.98 (15)	
$\alpha_{0,30}$	4956.06 (15)	
$\alpha_{0,29}$	4961.63 (14)	
$\alpha_{0,28}$	4963.83 (13)	
$\alpha_{0,27}$	5007.07 (14)	0.0001
$\alpha_{0,25}$	5055.36 (13)	
$\alpha_{0,24}$	5065.97 (15)	0.00011
$\alpha_{0,23}$	5092.06 (13)	~0.0004
$\alpha_{0,22}$	5099.08 (13)	~0.0004
$\alpha_{0,21}$	5106.72 (16)	
$\alpha_{0,20}$	5117.21 (13)	0.0004
$\alpha_{0,19}$	5132.8 (2)	
$\alpha_{0,18}$	5155.12 (13)	0.0007
$\alpha_{0,17}$	5179.35 (13)	0.0003
$\alpha_{0,16}$	5181.63 (13)	0.0009
$\alpha_{0,15}$	5190.17 (23)	0.0006
$\alpha_{0,14}$	5217.26 (13)	
$\alpha_{0,13}$	5225.08 (13)	0.0013
$\alpha_{0,12}$	5232.6 (3)	
$\alpha_{0,11}$	5244.13 (13)	0.0022 (3)
$\alpha_{0,9}$	5280.99 (13)	0.0005
$\alpha_{0,8}$	5321.87 (13)	0.014 (3)
$\alpha_{0,6}$	5388.25 (13)	1.66 (3)
$\alpha_{0,5}$	5416.28 (13)	~0.01
$\alpha_{0,4}$	5442.86 (12)	13.23 (10)
$\alpha_{0,3}$	5469.47 (12)	<0.04
$\alpha_{0,2}$	5485.56 (12)	84.45 (10)
$\alpha_{0,1}$	5511.46 (12)	0.23 (1)
$\alpha_{0,0}$	5544.11 (12)	0.38 (1)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Np)	6.04 - 13.52		33.4 (17)
e_{AK}	(Np)			0.000114 (16)
	KLL	73.50 - 83.13	}	
	KLX	90.36 - 97.28	}	
	KXY	107.10 - 114.58	}	
$ec_{2,1\ L}$	(Np)	3.92 - 8.73		14 (5)
$ec_{1,0\ L}$	(Np)	10.769 - 15.590		15.9 (21)
$ec_{3,1\ L}$	(Np)	20.28 - 25.09		0.31 (7)
$ec_{2,1\ M}$	(Np)	20.606 - 22.681		3.7 (5)
$ec_{4,2\ L}$	(Np)	20.99 - 25.81		8.8 (12)
$ec_{1,0\ M}$	(Np)	27.46 - 29.53		4.0 (6)
$ec_{1,0\ N}$	(Np)	31.70 - 32.79		1.08 (16)
$ec_{6,4\ L}$	(Np)	33.13 - 37.95		0.87 (11)
$ec_{3,1\ M}$	(Np)	36.97 - 39.04		0.076 (17)
$ec_{2,0\ L}$	(Np)	37.114 - 41.930		30.2 (22)
$ec_{4,2\ M}$	(Np)	37.68 - 39.76		2.3 (4)
$ec_{3,1\ N}$	(Np)	41.2 - 42.3		0.021 (5)
$ec_{4,2\ N}$	(Np)	41.92 - 43.02		0.65 (9)
$ec_{6,4\ M}$	(Np)	49.82 - 51.90		0.228 (30)
$ec_{3,0\ L}$	(Np)	53.5 - 58.3		0.0232 (4)
$ec_{2,0\ M}$	(Np)	53.802 - 55.877		8.12 (25)
$ec_{6,4\ N}$	(Np)	54.06 - 55.16		0.062 (8)
$ec_{6,2\ L}$	(Np)	76.54 - 81.36		0.225 (5)
$ec_{6,2\ M}$	(Np)	93.23 - 95.31		0.0625 (16)
$ec_{6,2\ N}$	(Np)	97.47 - 98.57		0.0171 (4)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Np)	11.89 — 22.2		37.66 (17)	
$XK\alpha_2$	(Np)	97.069		0.001134 (30)	} Kα
$XK\alpha_1$	(Np)	101.059		0.00181 (5)	}
$XK\beta_3$	(Np)	113.303	}		
$XK\beta_1$	(Np)	114.234	}	0.000658 (21)	$K\beta_1'$
$XK\beta_5''$	(Np)	114.912	}		
$XK\beta_2$	(Np)	117.463	}		
$XK\beta_4$	(Np)	117.876	}	0.000226 (8)	$K\beta_2'$
$XKO_{2,3}$	(Np)	118.429	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{2,1}$(Np)	26.3446 (2)	21 (5)	E1 anomalous	8 (2)	2.31 (8)
$\gamma_{-1,1}$(Np)	32.183	0.0174 (4)			0.0174 (4)
$\gamma_{1,0}$(Np)	33.1963 (3)	21.3 (30)	M1+1.66%E2	175 (24)	0.1215 (28)
$\gamma_{3,1}$(Np)	42.704 (5)	0.42 (9)	(M1+≈1.7%E2)	≈75 (7)	0.0055 (11)
$\gamma_{4,2}$(Np)	43.420 (3)	12.1 (16)	M1+16.6%E2	180 (23)	0.0669 (29)
$\gamma_{14,10}$(Np)	51.01 (3)	0.000046 (21)	E1	0.753 (11)	0.000026 (12)
$\gamma_{6,4}$(Np)	55.56 (2)	1.19 (16)	M1+17.5%E2	65 (6)	0.0181 (18)
$\gamma_{-1,2}$(Np)	57.85 (5)				0.0052 (15)
$\gamma_{2,0}$(Np)	59.5409 (1)	77.6 (25)	E1 anomalous	1.16 (7)	35.92 (17)
$\gamma_{14,9}$(Np)	64.83 (2)	0.000196 (28)	E1	0.400 (8)	0.00014 (2)
$\gamma_{8,6}$(Np)	67.50 (2)	0.013 (4)	(M1+17%E2)	29 (6)	0.00042 (10)
$\gamma_{4,1}$(Np)	69.76 (3)	0.0039 (5)	(E1)	0.330 (7)	0.0029 (4)
$\gamma_{3,0}$(Np)	75.90 (1)	0.032	(E2)	53.1 (11)	0.0006
$\gamma_{5,1}$(Np)	96.79 (3)	0.000047 (16)			0.000047 (16)
$\gamma_{6,2}$(Np)	98.97 (2)	0.329 (10)	E2	15.2 (3)	0.0203 (4)
$\gamma_{4,0}$(Np)	102.98 (2)	0.0218 (5)	E1	0.1189 (24)	0.0195 (4)
$\gamma_{-1,3}$(Np)	106.42 (5)				0.000015
$\gamma_{20,13}$(Np)	109.70 (7)	0.000051	[E2]	9.44 (19)	0.0000049
$\gamma_{21,13}$(Np)	120.36 (8)				0.0000045
$\gamma_{8,4}$(Np)	123.05 (1)	0.00675 (30)	E2	5.75 (12)	0.00100 (4)
$\gamma_{6,1}$(Np)	125.30 (2)	0.00533 (26)	(E1)	0.299 (6)	0.0041 (2)
$\gamma_{29,22}$(Np)	139.44 (8)	0.000023 (5)	[E2]	3.37 (7)	0.0000053 (11)
$\gamma_{11,6}$(Np)	146.55 (3)	0.00172 (5)	E2	2.73 (6)	0.00046 (1)
$\gamma_{8,3}$(Np)	150.04 (3)	0.000087 (6)	[E1]	0.197 (4)	0.000073 (5)
$\gamma_{26,15}$(Np)	154.27 (20)	0.000004	[M1]	7.06 (14)	0.0000005
$\gamma_{29,20}$(Np)	159.26 (20)	0.0000016 (6)	[E1]	0.171 (4)	0.0000014 (5)
$\gamma_{24,13}$(Np)	161.54 (10)	0.000011	[M1]	6.20 (12)	0.0000015
$\gamma_{9,4}$(Np)	164.61 (2)	0.000178 (9)	E2	1.70 (4)	0.000066 (3)
$\gamma_{13,6}$(Np)	165.81 (6)	0.00011 (5)	[M1+E2]	3.7 (22)	0.000023 (1)
$\gamma_{18,8}$(Np)	169.56 (3)	0.000427 (26)	E2	1.51 (3)	0.00017 (1)
$\gamma_{11,5}$(Np)	175.07 (4)	0.000021 (3)	[E1]	0.137 (3)	0.000018 (3)
$\gamma_{-1,7}$(Np)	190.4				0.0000022 (5)
$\gamma_{25,11}$(Np)	191.96 (4)	0.0000415 (20)	[E2]	0.932 (19)	0.0000215 (10)
$\gamma_{29,18}$(Np)	196.76 (8)	0.00000054	[E1]	0.1045 (21)	0.00000049
$\gamma_{-1,8}$(Np)	201.70 (14)	0.0000008			0.0000008
$\gamma_{18,7}$(Np)	204.06 (6)	0.00000226 (7)	[E1]	0.0960 (19)	0.00000206 (6)
$\gamma_{9,2}$(Np)	208.005 (23)	0.00313 (6)	M1+2.38%E2	2.98 (6)	0.000786 (9)
$\gamma_{13,4}$(Np)	221.46 (3)	0.00011 (5)	[M1+E2]	1.5 (10)	0.0000434 (8)
$\gamma_{26,10}$(Np)	232.81 (5)	0.0000155 (4)	[M1]	2.22 (5)	0.00000482 (9)
$\gamma_{9,1}$(Np)	234.40 (4)	0.0000080 (8)	M2	8.24 (17)	0.00000087 (8)
$\gamma_{26,9}$(Np)	246.73 (10)	0.00000703 (22)	[M1]	1.88 (4)	0.00000244 (7)
$\gamma_{13,3}$(Np)	248.52 (3)	0.00000155 (3)	[E1]	0.0612 (12)	0.00000146 (3)
$\gamma_{22,7}$(Np)	261.00 (7)	0.00000169 (8)	[E2]	0.312 (6)	0.00000129 (6)
$\gamma_{13,2}$(Np)	264.88 (3)	0.000018 (7)	[M1+E2]	0.9 (7)	0.00000943 (12)
$\gamma_{9,0}$(Np)	267.54 (4)	0.000055 (2)	E1+19.4%M2	1.06 (6)	0.0000268 (6)
$\gamma_{-1,9}$(Np)	270.63 (15)				0.0000005 (2)
$\gamma_{-1,10}$(Np)	271.54				0.00000144 (5)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{20,6}$(Np)	275.77 (8)	0.000011 (4)	[M1+E2]	0.8 (6)	0.00000632 (10)
$\gamma_{27,9}$(Np)	278.04 (15)	0.00000270 (8)	[M1]	1.35 (3)	0.00000115 (3)
$\gamma_{13,1}$(Np)	291.3 (2)	0.00000318 (8)	[E1]	0.0430 (9)	0.00000305 (8)
$\gamma_{16,3}$(Np)	292.77 (6)	0.0000173 (4)	[E2]	0.215 (4)	0.0000142 (3)
$\gamma_{20,5}$(Np)	304.21 (20)	0.000000966 (21)	[E1]	0.0391 (8)	0.00000093 (2)
$\gamma_{16,2}$(Np)	309.1 (3)	0.00000210 (31)	[E1]	0.0377 (8)	0.0000020 (3)
$\gamma_{22,5}$(Np)	322.56 (3)	0.000257 (7)	(M1+26.5%E2)	0.702 (12)	0.000151 (4)
$\gamma_{-1,11}$(Np)	324.69	0.0000018 (3)			0.0000018 (3)
$\gamma_{-1,12}$(Np)	329.69	0.0000011 (2)			0.0000011 (2)
$\gamma_{14,0}$(Np)	332.35 (3)	0.000172 (5)	E2	0.147 (3)	0.000150 (4)
$\gamma_{16,1}$(Np)	335.37 (3)	0.00084 (4)	M1+17.3%E2	0.69 (8)	0.000496 (7)
$\gamma_{17,1}$(Np)	337.7 (2)	0.00000556 (10)	(E2)	0.140 (3)	0.00000488 (9)
$\gamma_{-1,13}$(Np)	350.71	0.00000139 (5)			0.00000139 (5)
$\gamma_{20,3}$(Np)	358.25 (20)	0.00000133 (5)	[E1]	0.0275 (6)	0.00000129 (5)
$\gamma_{16,0}$(Np)	368.62 (3)	0.000347 (9)	(M1)	0.622 (12)	0.000214 (5)
$\gamma_{17,0}$(Np)	370.94 (3)	0.000080 (4)	M1+16%E2	0.53 (7)	0.0000520 (8)
$\gamma_{-1,14}$(Np)	374.83	0.00000313 (5)			0.00000313 (6)
$\gamma_{22,3}$(Np)	376.65 (3)	0.000225 (9)	(M1)	0.586 (12)	0.000137 (3)
$\gamma_{23,3}$(Np)	383.81 (3)	0.000037 (7)	[M1+E2]	0.33 (23)	0.0000281 (6)
$\gamma_{-1,15}$(Np)	389.0 (3)	0.0000005			0.00000049
$\gamma_{-1,16}$(Np)	390.61 (5)	0.00000573 (8)			0.00000573 (10)
$\gamma_{29,7}$(Np)	400.78 (10)	0.00000018 (5)	[M1+E2]	0.29 (21)	0.00000014 (3)
$\gamma_{30,7}$(Np)	406.35 (15)	0.00000175 (28)	[M1+E2]	0.28 (20)	0.00000137 (5)
$\gamma_{-1,17}$(Np)	411.27	0.00000018 (4)			0.00000018 (4)
$\gamma_{22,1}$(Np)	419.33 (4)	0.000036 (5)	[M1+E2]	0.26 (18)	0.0000284 (4)
$\gamma_{23,1}$(Np)	426.47 (4)	0.000039 (9)	[M1+E2]	0.25 (18)	0.000031 (6)
$\gamma_{-1,18}$(Np)	429.9 (1)	0.00000109 (5)			0.00000109 (5)
$\gamma_{-1,19}$(Np)	440.63	0.00000056 (3)			0.00000056 (3)
$\gamma_{-1,20}$(Np)	442.81 (7)	0.00000331 (7)			0.00000331 (8)
$\gamma_{35,13}$(Np)	446.15 (6)	0.00000011 (2)			0.00000011 (2)
$\gamma_{22,0}$(Np)	452.6 (2)	0.00000251 (7)	[E2]	0.0635 (13)	0.00000236 (7)
$\gamma_{26,2}$(Np)	454.66 (8)	0.0000129 (2)	[M1]	0.351 (7)	0.00000953 (12)
$\gamma_{23,0}$(Np)	459.68 (10)	0.0000043 (5)	[M1+E2]	0.20 (14)	0.00000355 (7)
$\gamma_{29,5}$(Np)	462.34 (8)	0.0000012	[M1+E2]	0.20 (14)	0.000001
$\gamma_{30,5}$(Np)	468.12 (15)	0.0000032 (4)	[M1+E2]	0.19 (14)	0.00000269 (6)
$\gamma_{-1,21}$(Np)	486.05	0.00000105 (6)			0.00000105 (6)
$\gamma_{28,4}$(Np)	487.13 (4)	0.00000080 (6)	[M1]	0.291 (6)	0.00000062 (5)
$\gamma_{-1,22}$(Np)	494.39	0.00000010 (2)			0.00000010 (2)
$\gamma_{-1,23}$(Np)	501.39	0.00000014 (2)			0.00000014 (2)
$\gamma_{27,1}$(Np)	512.5 (3)	0.00000210 (41)	[E1]	0.0133 (3)	0.0000021 (4)
$\gamma_{26,0}$(Np)	514.0 (5)	0.0000039 (2)	[E1]	0.0132	0.0000038 (2)
$\gamma_{30,3}$(Np)	522.06 (15)	0.00000113 (11)	[M1+E2]	0.14 (10)	0.00000099 (5)
$\gamma_{-1,24}$(Np)	525.14	0.00000016 (3)			0.00000016 (3)
$\gamma_{38,13}$(Np)	529.17 (20)	0.00000072 (5)	[E2]	0.0437 (9)	0.00000069 (5)
$\gamma_{-1,25}$(Np)	532.44	0.00000008 (2)			0.00000008 (2)
$\gamma_{27,0}$(Np)	546.12 (6)	0.00000025 (3)	[E1]	0.0117 (2)	0.00000025 (3)
$\gamma_{-1,26}$(Np)	548.15	0.00000005 (2)			0.00000005 (2)
$\gamma_{-1,27}$(Np)	555.25	0.00000009 (2)			0.00000009 (2)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{33,6}$(Np)	563.46 (2)	0.000000460 (21)	[E2]	0.0378 (8)	0.00000044 (2)
$\gamma_{36,8}$(Np)	573.94 (20)	0.00000142 (12)	[M1+E2]	0.11 (8)	0.00000128 (5)
$\gamma_{-1,28}$(Np)	582.89	0.00000101 (6)			0.00000101 (6)
$\gamma_{31,2}$(Np)	586.59 (20)	0.00000128 (5)	[E2]	0.0346 (7)	0.00000124 (5)
$\gamma_{28,0}$(Np)	590.09 (4)	0.00000283 (6)	[E1]	0.0101 (2)	0.00000280 (6)
$\gamma_{34,6}$(Np)	597.19 (2)	0.0000080 (5)	[M1+E2]	0.10 (7)	0.00000729 (11)
$\gamma_{-1,29}$(Np)	600.26	0.00000022 (3)			0.00000022 (3)
$\gamma_{33,4}$(Np)	619.01 (2)	0.000065 (5)	[M1+E2]	0.09 (7)	0.000060 (2)
$\gamma_{38,8}$(Np)	627.18 (20)	0.00000056 (4)	[M1+E2]	0.09 (6)	0.00000051 (2)
$\gamma_{32,1}$(Np)	632.93 (15)	0.00000124 (5)			0.00000124 (5)
$\gamma_{-1,30}$(Np)	636.9	0.00000021 (3)			0.00000021 (3)
$\gamma_{36,6}$(Np)	641.32 (4)	0.0000076 (5)	[M1+E2]	0.08 (6)	0.00000704 (10)
$\gamma_{34,4}$(Np)	652.73 (2)	0.0000410 (25)	[M1+E2]	0.08 (6)	0.0000376 (9)
$\gamma_{33,2}$(Np)	662.40 (2)	0.00045 (10)	(E0+M1+E2)	0.23 (5)	0.000367 (6)
$\gamma_{32,0}$(Np)	666.2 (2)	0.00000095 (7)			0.00000095 (7)
$\gamma_{36,5}$(Np)	669.83 (2)	0.00000051 (7)	[E1]	0.0080 (2)	0.00000051 (7)
$\gamma_{37,5}$(Np)	675.78 (13)	0.00000091 (7)	[E2,M1]	0.07 (5)	0.00000085 (5)
$\gamma_{34,3}$(Np)	679.79 (2)	0.00000334 (8)	[E1]	0.00776 (16)	0.00000331 (8)
$\gamma_{33,1}$(Np)	688.72 (4)	0.0000325 (6)	[E1]	0.00758 (16)	0.0000323 (6)
$\gamma_{-1,31}$(Np)	693.46	0.00000354 (7)			0.00000354 (8)
$\gamma_{34,2}$(Np)	696.14 (2)	0.0000055 (3)	[M1+E2]	0.07 (5)	0.00000517 (8)
$\gamma_{-1,32}$(Np)	709.42 (5)	0.00000641 (18)			0.00000641 (19)
$\gamma_{-1,33}$(Np)	712.5	0.00000020 (3)			0.00000020 (3)
$\gamma_{33,0}$(Np)	721.96 (2)	0.000197 (5)	[E1]	0.0070 (2)	0.000196 (5)
$\gamma_{37,3}$(Np)	729.72 (15)	0.00000151 (6)	[M1]	0.099 (2)	0.00000137 (5)
$\gamma_{-1,34}$(Np)	731.44	0.00000046 (4)			0.00000046 (4)
$\gamma_{-1,35}$(Np)	736.68	0.00000128 (5)			0.00000128 (5)
$\gamma_{35,1}$(Np)	737.34 (5)	0.00000794 (8)			0.00000794 (11)
$\gamma_{-1,36}$(Np)	740.51	0.00000019 (3)			0.00000019 (3)
$\gamma_{-1,37}$(Np)	742.9 (3)	0.00000035			0.00000035
$\gamma_{-1,38}$(Np)	745.02	0.00000009 (2)			0.00000009 (2)
$\gamma_{-1,39}$(Np)	750.39	0.00000006 (2)			0.00000006 (2)
$\gamma_{34,0}$(Np)	755.68 (2)	0.00000789 (11)	[E1]	0.0064 (1)	0.00000784 (11)
$\gamma_{-1,40}$(Np)	759.5 (1)	0.00000181 (5)			0.00000181 (5)
$\gamma_{-1,41}$(Np)	763.31	0.00000023 (2)			0.00000023 (2)
$\gamma_{36,1}$(Np)	766.62 (4)	0.00000504 (6)	[E1]	0.00623 (12)	0.00000501 (6)
$\gamma_{35,0}$(Np)	770.57 (10)	0.00000481 (5)			0.00000481 (7)
$\gamma_{37,1}$(Np)	772.57 (12)	0.00000303 (5)	[M1]	0.0847 (17)	0.00000279 (4)
$\gamma_{-1,42}$(Np)	774.67	0.00000011 (2)			0.00000011 (2)
$\gamma_{-1,43}$(Np)	777.39	0.00000015 (2)			0.00000015 (2)
$\gamma_{-1,44}$(Np)	780.53	0.00000031 (2)			0.00000031 (2)
$\gamma_{-1,45}$(Np)	782.2 (5)	0.00000015			0.00000015
$\gamma_{39,3}$(Np)	786.00 (15)	0.00000062 (0)			0.00000062
$\gamma_{-1,46}$(Np)	789.0 (3)	0.00000042 (6)			0.00000042 (6)
$\gamma_{-1,47}$(Np)	792.6	0.00000003 (1)			0.00000003 (1)
$\gamma_{-1,48}$(Np)	794.92 (20)	0.00000094			0.00000094
$\gamma_{39,2}$(Np)	801.94 (20)	0.00000123 (7)			0.00000123 (7)
$\gamma_{-1,49}$(Np)	803.19	0.00000016 (3)			0.00000016 (3)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{37,0}$(Np)	805.77 (12)	0.00000033	[M1,E2]	0.05 (3)	0.00000031
$\gamma_{-1,50}$(Np)	811.9 (3)	0.00000063 (6)			0.00000063 (6)
$\gamma_{-1,51}$(Np)	819.33	0.00000043 (6)			0.00000043 (6)
$\gamma_{-1,52}$(Np)	822.21	0.00000024 (6)			0.00000024 (6)
$\gamma_{39,1}$(Np)	828.60 (12)	0.00000021 (4)			0.00000021 (4)
$\gamma_{-1,53}$(Np)	835.21	0.00000003 (1)			0.00000003 (1)
$\gamma_{-1,54}$(Np)	838.88	0.00000004 (1)			0.00000004 (1)
$\gamma_{-1,55}$(Np)	841.14	0.00000010 (3)			0.00000010 (3)
$\gamma_{-1,56}$(Np)	843.7	0.00000097 (8)			0.00000097 (8)
$\gamma_{-1,57}$(Np)	846.86	0.00000016 (3)			0.00000016 (3)
$\gamma_{-1,58}$(Np)	847.4 (5)	0.0000003			0.00000027 (3)
$\gamma_{-1,59}$(Np)	851.6 (10)	0.00000041 (6)			0.00000041 (6)
$\gamma_{-1,60}$(Np)	854.95	0.00000023 (4)			0.00000023 (4)
$\gamma_{-1,61}$(Np)	856.26	0.00000010 (3)			0.00000010 (3)
$\gamma_{40,2}$(Np)	861.34 (20)	0.00000008			0.00000008 (3)
$\gamma_{39,0}$(Np)	861.80 (12)	0.00000061 (6)			0.00000061 (6)
$\gamma_{-1,62}$(Np)	870.63	0.00000150 (3)			0.00000150 (4)
$\gamma_{-1,63}$(Np)	882	0.00000004 (1)			0.00000004 (1)
$\gamma_{-1,64}$(Np)	886.53	0.00000015 (3)			0.00000015 (3)
$\gamma_{40,1}$(Np)	887.68 (20)	0.00000033 (6)			0.00000033 (6)
$\gamma_{-1,65}$(Np)	890.38	0.00000032 (5)			0.00000032 (5)
$\gamma_{-1,66}$(Np)	894.47	0.00000003 (1)			0.00000003 (1)
$\gamma_{-1,67}$(Np)	898.17	0.00000006 (2)			0.00000006 (2)
$\gamma_{-1,68}$(Np)	902.61	0.00000033 (3)			0.00000033 (3)
$\gamma_{-1,69}$(Np)	909.95	0.00000005 (1)			0.00000005 (1)
$\gamma_{-1,70}$(Np)	912.4	0.00000028 (3)			0.00000028 (3)
$\gamma_{40,0}$(Np)	920.88 (20)	0.00000019 (3)			0.00000019 (3)
$\gamma_{-1,71}$(Np)	928.95	0.00000009 (2)			0.00000009 (2)
$\gamma_{-1,72}$(Np)	939.2	0.00000005 (1)			0.00000005 (1)
$\gamma_{41,0}$(Np)	946.06	0.000000010 (3)			0.000000010 (2)
$\gamma_{-1,73}$(Np)	952.72	0.00000003 (1)			0.00000003 (1)
$\gamma_{-1,74}$(Np)	955.91	0.00000060 (5)			0.00000060 (5)
$\gamma_{42,0}$(Np)	962.19	0.00000004 (1)			0.00000004 (1)
$\gamma_{-1,75}$(Np)	969.09	0.00000003 (1)			0.00000003 (1)
$\gamma_{-1,76}$(Np)	980.84	0.00000003 (1)			0.00000003 (1)
$\gamma_{43,0}$(Np)	1014.33	0.0000010 (2)			0.0000010 (2)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	16.01	(2)	h
Q_{β^-}	:	664.5	(4)	keV
Q_{EC}	:	751.3	(7)	keV
β^-	:	83.1	(3)	%
EC	:	16.9	(3)	%

2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	log ft	P_K	P_L	P_{M+}
$\epsilon_{0,1}$	706.8 (7)	10.6 (5)	1st forbidden non-unique	7.26	0.7261 (23)	0.2016 (15)	0.0532 (10)
$\epsilon_{0,0}$	751.3 (7)	6.3 (6)	1st forbidden non-unique	7.55	0.7303 (22)	0.1987 (15)	0.0522 (10)

3 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,1}$	622.4 (4)	45.8 (23)	1st forbidden non-unique	6.84
$\beta^-_{0,0}$	664.5 (4)	37.3 (23)	1st forbidden non-unique	7.03

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Pu)	6.09 - 13.83	9.9 (5)	
e_{AK}	(Pu)		0.36 (4)	
	KLL	75.263 - 85.357	}	
	KLX	92.607 - 103.729	}	
	KXY	109.93 - 121.78	}	
e_{AL}	(Cm)	6.19 - 14.46	15.4 (10)	
$ec_{1,0\ L}$	(Cm)	17.60 - 23.16	33.1 (18)	
$ec_{1,0\ M+}$	(Cm)	35.79 - 42.11	12.7 (7)	
$ec_{1,0\ T}$	(Cm)	17.60 - 42.11	45.8 (23)	
$ec_{1,0\ L}$	(Pu)	21.44 - 26.48	7.7 (4)	
$ec_{1,0\ M+}$	(Pu)	38.61 - 44.53	2.9 (2)	
$ec_{1,0\ T}$	(Pu)	21.44 - 44.53	10.6 (5)	
$\beta^-_{0,1}$	max:	622.4 (4)	45.8 (23)	avg: 185.92 (14)
$\beta^-_{0,0}$	max:	664.5 (4)	37.3 (23)	avg: 200.17 (14)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pu)	12.124 — 22.153		10.8 (5)	
XKα_2	(Pu)	99.525		3.55 (17)	} Kα
XKα_1	(Pu)	103.734		5.6 (3)	}
XKβ_3	(Pu)	116.244	}		
XKβ_1	(Pu)	117.228	}	2.06 (11)	Kβ_1'
XKβ_5''	(Pu)	117.918	}		
XKβ_2	(Pu)	120.54	}		
XKβ_4	(Pu)	120.969	}	0.72 (4)	Kβ_2'
XKO$_{2,3}$	(Pu)	121.543	}		
XL	(Cm)	12.633 — 23.527		18.0 (11)	

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Cm)	42.13 (5)	45.8 (23)	E2	1155 (17)	0.040 (2)
$\gamma_{1,0}$(Pu)	44.54 (2)	10.6 (5)	E2	748 (11)	0.014 (1)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	143	(2)	y
Q_{α}	:	5637.10	(25)	keV
Q_{IT}	:	48.60	(5)	keV
IT	:	99.54	(1)	%
α	:	0.46	(1)	%
SF	:	<4.8		$\times 10^{-9}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,68}$	4975 (3)	0.000009 (5)
$\alpha_{0,64}$	5027.3 (15)	0.00009 (5)
$\alpha_{0,59}$	5068 (3)	0.0012 (3)
$\alpha_{0,57}$	5082.6 (12)	0.00014 (5)
$\alpha_{0,56}$	5091.9 (7)	0.0009 (3)
$\alpha_{0,48}$	5143.07 (26)	0.0258 (11)
$\alpha_{0,47}$	5153.2 (15)	0.00009 (5)
$\alpha_{0,42}$	5173.45 (26)	0.00009 (5)
$\alpha_{0,41}$	5175.4 (10)	0.00009 (5)
$\alpha_{0,36}$	5207.15 (25)	0.409 (9)
$\alpha_{0,35}$	5215.4 (7)	0.00014 (5)
$\alpha_{0,28}$	5248.15 (25)	0.0018 (5)
$\alpha_{0,27}$	5248.21 (26)	0.0018 (5)
$\alpha_{0,25}$	5249.64 (26)	0.00009 (5)
$\alpha_{0,23}$	5251.80 (25)	0.00009 (5)
$\alpha_{0,20}$	5272.96 (25)	0.0046 (5)
$\alpha_{0,14}$	5314.95 (25)	0.0028 (5)
$\alpha_{0,11}$	5331.97 (25)	0.0007 (5)
$\alpha_{0,9}$	5367.73 (25)	0.0051 (9)
$\alpha_{0,6}$	5410.13 (25)	0.0046 (9)
$\alpha_{0,3}$	5458.68 (25)	0.00064 (18)
$\alpha_{0,1}$	5517.93 (25)	0.000014 (14)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Am)	6.26 - 23.70	22.1 (11)
e_{AL}	(Np)	6.036 - 13.516	0.35 (4)
e_{AK}	(Np)		0.0019 (7)
	KLL	73.501 - 83.134	}
	KLX	90.358 - 101.054	}
	KXY	107.19 - 118.66	}

		Energy keV	Electrons per 100 disint.
$ec_{1,0\ L}$	(Am)	24.8 - 30.10	47.1 (10)
$ec_{1,0\ M}$	(Am)	42.47 - 44.78	37.6 (9)
$ec_{1,0\ N}$	(Am)	46.98 - 48.15	11.9 (3)
$ec_{1,0\ O}$	(Am)	48.23 - 48.49	2.71 (6)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Am)	12.377 — 22.836		25.0 (11)	
XL	(Np)	11.871 — 21.491		0.37 (4)	
$XK\alpha_2$	(Np)	97.069		0.019 (9)	} $K\alpha$
$XK\alpha_1$	(Np)	101.059		0.030 (14)	}
$XK\beta_3$	(Np)	113.303	}		
$XK\beta_1$	(Np)	114.234	}	0.011 (5)	$K\beta_1^{'}$
$XK\beta_5^{''}$	(Np)	114.912	}		
$XK\beta_2$	(Np)	117.463	}		
$XK\beta_4$	(Np)	117.876	}	0.0037 (17)	$K\beta_2^{'}$
$XKO_{2,3}$	(Np)	118.429	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{3,2}$(Np)	24.34 (1)	0.021 (3)	M1+E2	322 (5)	0.000064 (9)
$\gamma_{1,0}$(Np)	26.427 (2)	<0.24	M1+E2	338 (5)	<0.000708
$\gamma_{11,10}$(Np)	32.64 (1)	0.0026 (4)	M1+E2	136.4 (20)	0.000019 (3)
$\gamma_{9,6}$(Np)	43.11 (1)	0.0040 (9)	M1+E2	61.3 (9)	0.000064 (14)
$\gamma_{19,11}$(Np)	43.33 (1)	0.00112 (18)	M1+E2	126.7 (18)	0.0000087 (14)
$\gamma_{10,6}$(Np)	46.833 (3)	0.00037 (7)	M1+E2	48.8 (7)	0.0000074 (14)
$\gamma_{1,0}$(Am)	48.60 (5)	99.54 (1)	E4	704000 (8000)	0.0001414 (22)
$\gamma_{6,3}$(Np)	49.371 (3)	0.244 (8)	E1	0.821 (12)	0.134 (4)
$\gamma_{14,9}$(Np)	53.67 (1)	0.097 (13)	M1+E2	46.0 (7)	0.0021 (3)
$\gamma_{30,19}$(Np)	53.85 (2)	0.00011 (6)	M1+E2	37.2 (6)	0.0000028 (14)
$\gamma_{9,5}$(Np)	57.51 (1)	0.0015 (4)	E1	0.549 (8)	0.00097 (23)
$\gamma_{3,1}$(Np)	60.247 (3)	0.132 (12)	M1+E2	23.1 (4)	0.0055 (5)
$\gamma_{36,20}$(Np)	66.92 (1)	0.0205 (6)	E1	0.368 (6)	0.0150 (5)
$\gamma_{28,14}$(Np)	67.92 (2)	0.100 (8)	M1+E2	24 (3)	0.0040 (3)
$\gamma_{6,2}$(Np)	73.72 (1)	0.0101 (7)	E1	0.285 (4)	0.0079 (6)
$\gamma_{19,10}$(Np)	75.98 (1)	0.00052 (8)	E2	52.8 (8)	0.0000097 (14)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{11,6}$(Np)	79.48 (1)	0.0033 (8)	M1+E2	26 (4)	0.000124 (23)
$\gamma_{27,11}$(Np)	85.16 (7)	0.020 (7)	M1+E2	19 (3)	0.0010 (3)
$\gamma_{3,0}$(Np)	86.674 (2)	0.205 (7)	M1+E2	7.95 (12)	0.0229 (7)
$\gamma_{-1,1}$(Np)	89.60 (5)	0.0013 (3)			0.0013 (3)
$\gamma_{9,3}$(Np)	92.48 (1)	0.00324 (35)	E1	0.1574 (22)	0.0028 (3)
$\gamma_{11,5}$(Np)	93.88 (1)	0.0042 (5)	E1	0.1513 (22)	0.0036 (4)
$\gamma_{14,6}$(Np)	96.78 (1)	0.0059 (10)	E2	16.90 (24)	0.00033 (6)
$\gamma_{30,11}$(Np)	97.18 (2)	0.00013 (7)	E2	16.58 (24)	0.000007 (4)
$\gamma_{36,14}$(Np)	109.61 (1)	≤0.14	M1+E2	6.7 (7)	≤0.0184
$\gamma_{6,1}$(Np)	109.618 (3)	≤0.02	E1	0.1010 (15)	≤0.0184
$\gamma_{14,5}$(Np)	111.18 (1)	0.0027 (5)	E1	0.0974 (14)	0.0025 (4)
$\gamma_{19,6}$(Np)	122.81 (1)	0.00039 (18)	M1+E2	9.6 (9)	0.00004 (2)
$\gamma_{36,11}$(Np)	126.92 (1)	0.0008 (4)	E2	5.03 (7)	0.00013 (7)
$\gamma_{23,8}$(Np)	131.50 (5)	0.00034 (8)	E1	0.268 (4)	0.00027 (6)
$\gamma_{28,8}$(Np)	135.21 (2)	0.0085 (5)	E1	0.251 (4)	0.0068 (4)
$\gamma_{6,0}$(Np)	136.045 (2)	0.0118 (3)	E1	0.247 (4)	0.0094 (3)
$\gamma_{28,7}$(Np)	139.05 (3)	≤0.00014	E1	0.235 (4)	≤0.00011
$\gamma_{8,1}$(Np)	139.11 (2)	≤0.00049	E2	3.40 (5)	≤0.00011
$\gamma_{30,7}$(Np)	151.01 (3)	0.000099 (22)	E1	0.194 (3)	0.000083 (18)
$\gamma_{19,4}$(Np)	152.70 (2)	≤0.00082	E1	0.189 (3)	≤0.00069
$\gamma_{9,1}$(Np)	152.73 (1)	≤0.00082	E1	0.189 (3)	≤0.00069
$\gamma_{11,2}$(Np)	153.19 (1)	0.00037 (4)	E1	0.187 (3)	0.00031 (4)
$\gamma_{20,5}$(Np)	153.87 (1)	0.0266 (8)	M1+E2	7.02 (10)	0.00332 (10)
$\gamma_{10,1}$(Np)	156.451 (3)	0.00032 (5)	E1	0.1784 (25)	0.00027 (5)
$\gamma_{-1,2}$(Np)	160.61 (2)	0.0004 (2)			0.00041 (18)
$\gamma_{34,8}$(Np)	163.1 (5)	≤0.079	M1+E2	3.9 (5)	≤0.0161
$\gamma_{36,9}$(Np)	163.29 (1)	≤0.079	M1+E2	3.9 (5)	≤0.0161
$\gamma_{-1,3}$(Np)	165.97 (15)	0.000046 (23)			0.000046 (23)
$\gamma_{45,13}$(Np)	170.7 (8)	0.00280 (22)	M1+E2	3.4 (5)	0.00063 (5)
$\gamma_{48,14}$(Np)	174.76 (6)	0.00720 (16)	M1+E2	3.1 (4)	0.00017 (4)
$\gamma_{30,6}$(Np)	176.66 (2)	0.00006 (3)	E2	1.285 (18)	0.000028 (14)
$\gamma_{10,0}$(Np)	182.878 (2)	0.00103 (4)	E1	0.1238 (18)	0.00092 (3)
$\gamma_{11,1}$(Np)	189.10 (1)	0.00030 (5)	E1	0.1146 (16)	0.00027 (5)
$\gamma_{23,4}$(Np)	190.88 (5)	0.00012 (3)	E1	0.1121 (16)	0.000106 (24)
$\gamma_{28,4}$(Np)	194.59 (2)	0.00157 (5)	E1	0.1072 (15)	0.00142 (5)
$\gamma_{19,2}$(Np)	196.52 (1)	0.00011 (5)	E1	0.1048 (15)	0.00010 (5)
$\gamma_{36,6}$(Np)	206.39 (1)	0.0027 (3)	E2	0.711 (10)	0.00156 (18)
$\gamma_{20,2}$(Np)	213.19 (1)	0.00015 (5)	M1+E2	1.73 (25)	0.000055 (18)
$\gamma_{11,0}$(Np)	215.522 (4)	0.00064 (10)	E1	0.0847 (12)	0.00059 (10)
$\gamma_{19,1}$(Np)	232.43 (1)	0.00060 (3)	E1	0.0712 (10)	0.00056 (3)
$\gamma_{-1,4}$(Np)	233.69 (10)	0.00013 (3)			0.00013 (3)
$\gamma_{25,2}$(Np)	236.90 (6)	0.00010 (5)	M1+E2	1.27 (19)	0.000046 (23)
$\gamma_{27,2}$(Np)	238.35 (7)	0.000017 (9)	E1	0.0673 (10)	0.000016 (8)
$\gamma_{17,0}$(Np)	250.33 (3)	≤0.0012	(M1+E2)	1.08 (16)	≤0.00056
$\gamma_{30,2}$(Np)	250.37 (2)	≤0.0006	E1	0.0602 (9)	≤0.00056
$\gamma_{42,4}$(Np)	270.55 (7)	0.000030 (9)	E1	0.0506 (7)	0.000029 (8)
$\gamma_{25,1}$(Np)	272.80 (6)	0.000069 (15)	M1+E2	0.85 (13)	0.000037 (8)
$\gamma_{36,2}$(Np)	280.11 (1)	0.000063 (7)	E1	0.0468 (7)	0.000060 (6)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{25,0}$(Np)	299.23 (6)	0.000046 (23)	M1+E2	0.65 (10)	0.000028 (14)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	7367	(23)	y
Q_α	:	5438.8	(10)	keV
α	:	100		%
SF	:	3.8	(7)	$\times 10^{-9}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,16}$	4695 (3)	0.0017 (5)
$\alpha_{0,15}$	4919 (3)	0.000085
$\alpha_{0,14}$	4930 (3)	0.00018
$\alpha_{0,13}$	4946 (3)	0.00034
$\alpha_{0,12}$	4997 (3)	0.0009 (4)
$\alpha_{0,11}$	5008 (3)	0.0009 (4)
$\alpha_{0,10}$	5029 (3)	0.0020 (6)
$\alpha_{0,9}$	5035 (3)	0.0020 (6)
$\alpha_{0,8}$	5088 (5)	0.0055 (6)
$\alpha_{0,7}$	5113 (1)	0.010 (1)
$\alpha_{0,6}$	5181 (1)	1.383 (7)
$\alpha_{0,4}$	5233.3 (10)	11.46 (5)
$\alpha_{0,3}$	5275.3 (10)	86.74 (5)
$\alpha_{0,1}$	5321 (1)	0.192 (3)
$\alpha_{0,0}$	5349.4 (23)	0.240 (3)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Np)	6.04 - 13.52		18.4 (11)
e_{AK}	(Np)			0.00058 (9)
	KLL	73.501 - 83.134	}	
	KLX	90.358 - 101.054	}	
	KXY	107.19 - 118.66	}	
$ec_{1,0\ L}$	(Np)	8.70 - 13.52		9.4 (22)
$ec_{4,3\ L}$	(Np)	20.8 - 25.6		7.4 (8)
$ec_{3,1\ L}$	(Np)	21.10 - 25.92		5.04 (11)
$ec_{1,0\ M}$	(Np)	25.39 - 27.47		2.4 (6)
$ec_{1,0\ N}$	(Np)	29.63 - 30.73		0.65 (15)
$ec_{6,4\ L}$	(Np)	32.753 - 37.570		1.10 (33)
$ec_{4,3\ M}$	(Np)	37.5 - 39.5		1.95 (26)
$ec_{3,1\ M}$	(Np)	37.79 - 39.87		1.266 (28)
$ec_{4,3\ N}$	(Np)	41.7 - 42.8		0.53 (6)
$ec_{3,1\ N}$	(Np)	42.03 - 43.13		0.336 (7)
$ec_{6,4\ M}$	(Np)	49.441 - 51.516		0.30 (9)

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		Energy keV	Electrons per 100 disint.
$ec_{3,0\ L}$	(Np)	52.23 - 57.05	13.91 (32)
$ec_{6,4\ N}$	(Np)	53.679 - 54.777	0.08 (2)
$ec_{4,1\ L}$	(Np)	64.28 - 69.10	0.0485 (14)
$ec_{3,0\ M}$	(Np)	68.92 - 71.00	3.44 (8)
$ec_{3,0\ N}$	(Np)	73.16 - 74.26	0.917 (21)
$ec_{6,3\ L}$	(Np)	76.073 - 80.890	0.17 (2)
$ec_{4,1\ M}$	(Np)	80.97 - 83.05	0.01194 (36)
$ec_{6,3\ M}$	(Np)	92.761 - 94.836	0.05 (1)
$ec_{4,0\ L}$	(Np)	95.41 - 100.23	0.0361 (32)
$ec_{6,3\ N}$	(Np)	96.999 - 98.097	0.010 (2)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Np)	11.871 — 21.491		18.9 (7)	
$XK\alpha_2$	(Np)	97.069		0.0058 (4)	} $K\alpha$
$XK\alpha_1$	(Np)	101.059		0.0092 (7)	}
$XK\beta_3$	(Np)	113.303	}		
$XK\beta_1$	(Np)	114.234	}	0.00335 (25)	$K\beta_1'$
$XK\beta_5''$	(Np)	114.912	}		
$XK\beta_2$	(Np)	117.463	}		
$XK\beta_4$	(Np)	117.876	}	0.00115 (9)	$K\beta_2'$
$XKO_{2,3}$	(Np)	118.429	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Np)	31.14 (3)	12.7 (30)	M1+3.08%E2	263 (13)	0.048 (11)
$\gamma_{4,3}$(Np)	43.1	10.1	M1+12.6%E2	154 (18)	0.065
$\gamma_{3,1}$(Np)	43.53 (2)	12.62 (23)	E1	1.143 (16)	5.89 (10)
$\gamma_{6,5}$(Np)	50.6 (10)	0.011 (2)	(E1)	0.77 (5)	0.0062 (10)
$\gamma_{6,4}$(Np)	55.18 (5)	1.81 (26)	M1+26.4%E2	107 (14)	0.0168 (11)
$\gamma_{3,0}$(Np)	74.66 (2)	85.7 (16)	E1	0.276 (4)	67.2 (12)
$\gamma_{4,1}$(Np)	86.71 (2)	0.41 (1)	E1	0.186 (3)	0.346 (9)
$\gamma_{6,3}$(Np)	98.5 (2)	0.25 (4)	(E2)	15.6 (3)	0.0151 (21)
$\gamma_{4,0}$(Np)	117.60 (15)	0.62 (5)	E1	0.0842 (13)	0.57 (5)
$\gamma_{6,1}$(Np)	141.90 (6)	0.141 (10)	E1	0.224 (4)	0.115 (8)
$\gamma_{7,2}$(Np)	169	0.0014	(E1)	0.149 (3)	0.0012
$\gamma_{9,5}$(Np)	195.0 (18)	0.001	(E1)	0.107 (3)	0.00085

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	10.1	(1)	h
Q_{β^-}	:	1427.3	(10)	keV
β^-	:	100		%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,9}$	387.1 (10)	100	1st forbidden non-unique	5.63

3 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Cm)	6.19 - 14.46	86 (9)	
e_{AK}	(Cm)		0.213 (27)	
	KLL	78.858 - 89.973	}	
	KLX	97.226 - 109.267	}	
	KXY	115.57 - 128.23	}	
$ec_{1,0\ L}$	(Cm)	18.439 - 24.000	73 (15)	
$ec_{3,2\ K}$	(Cm)	25.622 (2)	3.3 (7)	
$ec_{1,0\ M}$	(Cm)	36.628 - 38.956	21 (4)	
$ec_{1,0\ N}$	(Cm)	41.281 - 42.500	5.7 (12)	
$ec_{2,1\ L}$	(Cm)	74.857 - 80.410	70 (15)	
$ec_{4,3\ K}$	(Cm)	77.334 (4)	0.049 (11)	
$ec_{2,1\ M}$	(Cm)	93.046 - 95.374	20 (4)	
$ec_{2,1\ N}$	(Cm)	97.699 - 98.910	5.5 (12)	
$ec_{3,2\ L}$	(Cm)	129.337 - 134.890	36 (8)	
$ec_{3,2\ M}$	(Cm)	147.526 - 149.854	10.2 (21)	
$ec_{3,2\ N}$	(Cm)	152.179 - 153.390	2.8 (6)	
$ec_{4,3\ L}$	(Cm)	181.049 - 186.600	0.19 (4)	
$ec_{4,3\ M}$	(Cm)	199.238 - 201.566	0.053 (12)	
$ec_{4,3\ N}$	(Cm)	203.891 - 205.100	0.0147 (34)	
$ec_{9,4\ K}$	(Cm)	410.161 (16)	0.019 (6)	
$ec_{9,3\ K}$	(Cm)	615.736 (5)	3.9 (5)	
$ec_{9,3\ L}$	(Cm)	719.451 - 725.010	0.86 (11)	
$ec_{9,3\ M}$	(Cm)	737.640 - 739.968	0.21 (3)	
$ec_{9,3\ N}$	(Cm)	742.293 - 743.510	0.058 (8)	
$ec_{9,2\ K}$	(Cm)	769.599 (7)	0.34 (10)	
$ec_{9,2\ L}$	(Cm)	873.31 - 878.87	0.10 (3)	
$ec_{9,2\ M}$	(Cm)	891.50 - 893.83	0.026 (7)	
$\beta^-_{0,9}$	max:	387.1 (10)	100	avg: 109.6 (3)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Cm)	12.633 — 23.527		100 (10)	
$XK\alpha_2$	(Cm)	104.59		2.2 (3)	} $K\alpha$
$XK\alpha_1$	(Cm)	109.271		3.4 (4)	}
$XK\beta_3$	(Cm)	122.304	}		
$XK\beta_1$	(Cm)	123.403	}	1.29 (16)	$K\beta_1^{'}$
$XK\beta_5^{''}$	(Cm)	124.124	}		
$XK\beta_2$	(Cm)	126.889	}		
$XK\beta_4$	(Cm)	127.352	}	0.45 (6)	$K\beta_2^{'}$
$XKO_{2,3}$	(Cm)	127.97	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Cm)	42.965 (10)	100 (21)	E2	1050 (15)	0.096 (20)
$\gamma_{2,1}$(Cm)	99.383 (4)	100 (22)	E2	19.3 (3)	5.0 (11)
$\gamma_{3,2}$(Cm)	153.863 (2)	72 (15)	E2	2.81 (4)	19 (4)
$\gamma_{4,3}$(Cm)	205.575 (4)	0.66 (15)	E2	0.887 (13)	0.35 (8)
$\gamma_{9,4}$(Cm)	538.402 (16)	0.69 (20)	E2	0.0495 (7)	0.66 (19)
$\gamma_{9,3}$(Cm)	743.977 (5)	71 (9)	M1+0.46%E2	0.077 (5)	66 (8)
$\gamma_{9,2}$(Cm)	897.840 (7)	28 (8)	E2	0.01697 (24)	28 (8)

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(Theoretical ICC)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	26	(3)	min
Q_{β^-}	:	1516	(3)	keV
Q_{EC}	:	164	(9)	keV
β^-	:	99.964	(1)	%
EC	:	0.036	(1)	%

2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	log ft	P_K	P_L	P_{M+}
$\epsilon_{0,0}$	164 (9)	0.036 (1)	allowed	6.37	0.24 (5)	0.53 (4)	0.168 (12)

3 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,11}$	410 (3)	0.35 (9)	(1st forbidden non-unique)	6.8
$\beta^-_{0,10}$	432 (3)	0.56 (13)	(allowed)	6.67
$\beta^-_{0,7}$	496 (3)	0.08 (2)	(allowed)	7.7
$\beta^-_{0,6}$	531.1 (30)	1.36 (16)	allowed	6.58
$\beta^-_{0,1}$	1473 (3)	31 (9)	allowed	6.74
$\beta^-_{0,0}$	1516 (3)	67 (9)	allowed	6.45

4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Pu)	6.19 - 22.99	0.0124 (11)	
e_{AK}	(Pu)		0.000253 (45)	
	KLL	75.263 - 85.357	}	
	KLX	92.607 - 103.729	}	
	KXY	109.93 - 121.78	}	
e_{AL}	(Cm)	6.19 - 14.46	10.6 (23)	
e_{AK}	(Cm)		0.00125 (27)	
	KLL	78.858 - 89.973	}	
	KLX	97.226 - 109.267	}	
	KXY	115.57 - 128.23	}	
$ec_{1,0\ L}$	(Cm)	18.439 - 23.995	23 (7)	
$ec_{1,0\ M+}$	(Cm)	36.628 - 42.965	9 (3)	
$ec_{6,0\ T}$	(Cm)	856.66 - 984.91	1.0 (1)	
$\beta^-_{0,11}$	max:	410 (3)	0.35 (9)	avg: 116.9 (7)

		Energy keV		Electrons per 100 disint.		Energy keV
$\beta^-_{0,10}$	max:	432	(3)	0.56 (13)	avg:	123.7 (7)
$\beta^-_{0,7}$	max:	496	(3)	0.08 (2)	avg:	144.0 (7)
$\beta^-_{0,6}$	max:	531.1	(30)	1.36 (16)	avg:	155.7 (7)
$\beta^-_{0,1}$	max:	1473	(3)	31 (9)	avg:	495.8 (9)
$\beta^-_{0,0}$	max:	1516	(3)	67 (9)	avg:	512.3 (9)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Cm)	12.633 — 23.527		12.3 (27)	
XKα_2	(Cm)	104.59		0.013 (4)	} Kα
XKα_1	(Cm)	109.271		0.020 (6)	}
XKβ_3	(Cm)	122.304	}		
XKβ_1	(Cm)	123.403	}	0.0076 (21)	Kβ_1'
XKβ_5''	(Cm)	124.124	}		
XKβ_2	(Cm)	126.889	}		
XKβ_4	(Cm)	127.352	}	0.0027 (8)	Kβ_2'
XKO$_{2,3}$	(Cm)	127.97	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Cm)	42.965 (10)	32 (9)	E2	1050 (15)	0.030 (9)
$\gamma_{6,1}$(Cm)	941.95 (3)	0.36 (12)	E2	0.01547 (22)	0.35 (12)
$\gamma_{7,1}$(Cm)	977.80 (4)	0.08 (2)	E0(+M1+E2)		
$\gamma_{6,0}$(Cm)	984.91 (2)	1.0 (1)	E0		
$\gamma_{10,1}$(Cm)	1041.22 (3)	0.19 (6)	(M1+E2)		0.19 (6)
$\gamma_{11,1}$(Cm)	1062.95 (3)	0.30 (9)	anomalous E1	0.11 (3)	0.27 (8)
$\gamma_{10,0}$(Cm)	1084.181 (14)	0.37 (12)	anomalous (E2)	0.041 (11)	0.36 (12)
$\gamma_{11,0}$(Cm)	1105.91 (2)	0.05 (2)	anomalous (E1)	0.17 (4)	0.04 (2)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	162.86	(8)	d
Q_α	:	6215.56	(8)	keV
α	:	100		%
SF	:	6.36		$\times 10^{-6}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,15}$	4869.43 (23)	0.00000052 (14)
$\alpha_{0,14}$	4904.44 (23)	0.00000055 (15)
$\alpha_{0,13}$	5005.64 (19)	0.00000031 (10)
$\alpha_{0,12}$	5101.21 (10)	0.0000037 (10)
$\alpha_{0,11}$	5111.1 (3)	≤0.0000002
$\alpha_{0,10}$	5146.07 (12)	0.0000017 (5)
$\alpha_{0,9}$	5165.95 (16)	0.00000113 (21)
$\alpha_{0,8}$	5186.95 (12)	0.000035 (7)
$\alpha_{0,7}$	5366.22 (15)	≤0.00000022
$\alpha_{0,6}$	5462.47 (14)	0.000013 (3)
$\alpha_{0,5}$	5517.75 (11)	0.00025 (5)
$\alpha_{0,4}$	5607.76 (16)	0.00002
$\alpha_{0,3}$	5816.39 (11)	0.0046 (5)
$\alpha_{0,2}$	5969.24 (9)	0.034 (2)
$\alpha_{0,1}$	6069.37 (9)	25.94 (7)
$\alpha_{0,0}$	6112.72 (8)	74.06 (7)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Pu)	6.19 - 22.99	8.99 (21)
e_{AK}	(Pu)		0.0000082 (15)
	KLL	75.2 - 85.3	}
	KLX	92.6 - 103.6	}
	KXY	109.8 - 121.5	}
$ec_{1,0\ L}$	(Pu)	20.98 - 26.02	18.8 (6)
$ec_{1,0\ M}$	(Pu)	38.15 - 40.31	5.25 (15)
$ec_{2,1\ L}$	(Pu)	78.82 - 83.86	0.0263 (16)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pu)	12.12 — 23.07		9.92 (23)	
XKα_2	(Pu)	99.525		0.000082 (9)	} Kα
XKα_1	(Pu)	103.734		0.000130 (15)	}
XKβ_3	(Pu)	116.244	}		
XKβ_1	(Pu)	117.228	}	0.000048 (6)	Kβ_1'
XKβ_5''	(Pu)	117.918	}		
XKβ_2	(Pu)	120.54	}		
XKβ_4	(Pu)	120.969	}	0.0000165 (19)	Kβ_2'
XKO$_{2,3}$	(Pu)	121.543	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pu)	44.08 (3)	26.0 (8)	E2	787 (16)	0.0330 (7)
$\gamma_{2,1}$(Pu)	101.92 (4)	0.0388 (22)	E2	14.45 (21)	0.00251 (14)
$\gamma_{3,2}$(Pu)	157.42 (9)	0.0046 (5)	[E2]	2.19 (4)	0.00145 (16)
$\gamma_{4,3}$(Pu)	210.20 (14)	0.00002052	E2	0.710 (14)	0.000012
$\gamma_{8,5}$(Pu)	336.36 (15)	0.00000072 (31)	[E1]	0.0323 (6)	0.0000007 (3)
$\gamma_{9,5}$(Pu)	357.64 (7)	0.000000055 (11)	M1+E2	0.214 (15)	0.000000045 (9)
$\gamma_{7,3}$(Pu)	459.8 (2)	0.00000006 (3)			0.00000006 (3)
$\gamma_{6,2}$(Pu)	515.25 (19)	0.0000046 (12)	E1+M2	0.022 (3)	0.0000045 (12)
$\gamma_{5,1}$(Pu)	561.02 (10)	0.000152 (40)	E1	0.01153 (23)	0.00015 (4)
$\gamma_{5,0}$(Pu)	605.04 (10)	0.000106 (30)	E1	0.00999 (20)	0.000105 (30)
$\gamma_{6,1}$(Pu)	617.20 (12)	0.0000080 (21)	E1+M2	0.0120 (12)	0.0000079 (21)
$\gamma_{7,2}$(Pu)	617.22 (13)	0.00000016			0.00000016
$\gamma_{10,2}$(Pu)	837.01 (15)	0.00000019 (6)	[E2]	0.0174 (3)	0.00000019 (6)
$\gamma_{12,2}$(Pu)	882.63 (3)	0.000000068 (15)	(E2)	0.0157 (3)	0.000000067 (15)
$\gamma_{8,1}$(Pu)	897.33 (10)	0.000022 (6)	(E2)	0.0152 (3)	0.000022 (6)
$\gamma_{9,1}$(Pu)	918.7 (2)	0.00000054 (15)	E1	0.00469 (9)	0.00000054 (15)
$\gamma_{10,1}$(Pu)	938.91 (10)	0.00000097 (33)	E0+E2	4.4 (4)	0.00000018 (6)
$\gamma_{9,0}$(Pu)	962.8 (2)	0.00000053 (15)	E1	0.00432 (8)	0.00000053 (15)
$\gamma_{11,1}$(Pu)	974.5 (3)	0.0000002			0.0000002
$\gamma_{13,2}$(Pu)	979.8 (2)	0.00000026 (8)			0.00000026 (8)
$\gamma_{10,0}$(Pu)	983.0 (3)	0.00000051 (18)	[E2]	0.01276 (25)	0.00000050 (18)
$\gamma_{12,1}$(Pu)	984.5 (1)	0.0000020 (6)	M1+E2	0.01279 (26)	0.0000020 (6)
$\gamma_{12,0}$(Pu)	1028.5 (2)	0.0000016 (5)	E2	0.01171 (23)	0.0000016 (5)
$\gamma_{13,1}$(Pu)	1081.7 (3)	0.00000005 (2)			0.00000005 (2)
$\gamma_{15,2}$(Pu)	1118.3 (3)	0.00000017 (9)	[E2]	0.01001 (20)	0.00000017 (9)
$\gamma_{14,1}$(Pu)	1184.6 (3)	0.00000050 (15)	E2	0.00899 (18)	0.00000050 (15)
$\gamma_{15,1}$(Pu)	1220.2 (3)	0.00000035 (11)	E0+E2+(M1)	0.26 (3)	0.00000028 (9)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	28.9	(4)	y
Q_α	:	6168.8	(10)	keV
Q_{EC}	:	7.5	(17)	keV
α	:	99.71	(3)	%
EC	:	0.29	(3)	%

2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	log ft	P_K	P_L	P_{M+}
$\epsilon_{0,0}$	7.5 (17)	0.29 (3)	1st forbidden	7.2	0 (0)	0 (0)	1.000 (0)

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,27}$	5231 (15)	0.00039
$\alpha_{0,26}$	5268 (3)	0.0015
$\alpha_{0,25}$	5317 (3)	0.001
$\alpha_{0,24}$	5324 (3)	0.003
$\alpha_{0,23}$	5333 (3)	0.003
$\alpha_{0,22}$	5520.1 (11)	0.002
$\alpha_{0,21}$	5533 (3)	0.006
$\alpha_{0,20}$	5538 (3)	0.002
$\alpha_{0,19}$	5569.9 (10)	0.007
$\alpha_{0,18}$	5576 (3)	0.007
$\alpha_{0,17}$	5583.2 (10)	0.009
$\alpha_{0,16}$	5588 (3)	0.02
$\alpha_{0,15}$	5594 (3)	0.01
$\alpha_{0,14}$	5605.1 (11)	≤0.01
$\alpha_{0,13}$	5613 (3)	0.03
$\alpha_{0,12}$	5624 (5)	0.06
$\alpha_{0,11}$	5640 (3)	0.14
$\alpha_{0,10}$	5647 (3)	0.03
$\alpha_{0,9}$	5682 (1)	0.2
$\alpha_{0,8}$	5686.1 (10)	1.6 (1)
$\alpha_{0,7}$	5742.5 (10)	11.3 (2)
$\alpha_{0,6}$	5786.4 (10)	73.4 (4)
$\alpha_{0,5}$	5877.6 (14)	0.7
$\alpha_{0,4}$	5906.1 (10)	0.1
$\alpha_{0,3}$	5992.7 (10)	5.7 (2)
$\alpha_{0,2}$	6010.8 (10)	1.05 (12)
$\alpha_{0,1}$	6059.4 (10)	4.4 (2)
$\alpha_{0,0}$	6067.2 (10)	1.3 (2)

4 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Pu)	6.19 - 22.99	49.3 (15)
e_{AK}	(Pu)		1.34 (19)
	KLL	75.263 - 85.357 }	
	KLX	92.607 - 103.729 }	
	KXY	109.93 - 121.78 }	
$ec_{1,0\ M}$	(Pu)	1.93 - 4.09	63.0 (45)
$ec_{1,0\ N}$	(Pu)	6.30 - 7.44	17.4 (12)
$ec_{3,2\ M}$	(Pu)	12.50 - 14.66	0.6 (6)
$ec_{3,2\ N}$	(Pu)	16.87 - 18.01	0.16 (16)
$ec_{7,6\ L}$	(Pu)	21.559 - 26.606	9.4 (16)
$ec_{2,1\ L}$	(Pu)	26.308 - 31.355	18.4 (12)
$ec_{2,0\ L}$	(Pu)	34.169 - 39.216	9.67 (14)
$ec_{8,7\ L}$	(Pu)	34.2 - 39.2	1.720 (24)
$ec_{7,6\ M}$	(Pu)	38.730 - 40.888	2.36 (49)
$ec_{7,6\ N}$	(Pu)	43.104 - 44.239	0.66 (12)
$ec_{2,1\ M}$	(Pu)	43.479 - 45.637	4.96 (34)
$ec_{7,4\ K}$	(Pu)	44.60 (6)	0.079 (34)
$ec_{3,1\ L}$	(Pu)	44.737 - 49.784	14.3 (36)
$ec_{2,1\ N}$	(Pu)	47.853 - 48.988	1.36 (10)
$ec_{2,0\ M}$	(Pu)	51.340 - 53.498	2.700 (42)
$ec_{8,7\ M}$	(Pu)	51.4 - 53.5	0.419 (6)
$ec_{8,7\ N}$	(Pu)	55.7 - 56.9	0.1142 (16)
$ec_{2,0\ N}$	(Pu)	55.714 - 56.849	0.742 (11)
$ec_{3,1\ M}$	(Pu)	61.908 - 64.066	4 (1)
$ec_{4,3\ L}$	(Pu)	64.96 - 70.00	0.01633 (23)
$ec_{3,1\ N}$	(Pu)	66.282 - 67.417	1.10 (28)
$ec_{8,6\ L}$	(Pu)	78.86 - 83.90	0.0837 (12)
$ec_{9,6\ L}$	(Pu)	83.021 - 88.068	0.056 (10)
$ec_{4,2\ L}$	(Pu)	83.37 - 88.41	0.1284 (18)
$ec_{6,3\ K}$	(Pu)	87.962 (2)	8.42 (29)
$ec_{5,3\ L}$	(Pu)	94 - 99	0.442 (19)
$ec_{8,6\ M}$	(Pu)	96.03 - 98.18	0.02344 (40)
$ec_{9,6\ M}$	(Pu)	100.192 - 102.350	0.0148 (27)
$ec_{4,2\ M}$	(Pu)	100.54 - 102.70	0.0360 (6)
$ec_{6,2\ K}$	(Pu)	106.392 (2)	21.4 (7)
$ec_{5,3\ M}$	(Pu)	111.2 - 113.3	0.123 (6)
$ec_{5,3\ N}$	(Pu)	115.5 - 116.7	0.0340 (14)
$ec_{7,3\ K}$	(Pu)	132.61 (3)	0.160 (15)
$ec_{7,4\ L}$	(Pu)	143.29 - 148.33	0.016 (7)
$ec_{7,2\ K}$	(Pu)	151.08 (9)	0.096 (12)
$ec_{6,1\ K}$	(Pu)	155.808 (2)	16.0 (5)
$ec_{6,0\ K}$	(Pu)	163.669 (2)	0.0615 (19)
$ec_{6,3\ L}$	(Pu)	186.649 - 191.696	1.68 (6)
$ec_{8,3\ K}$	(Pu)	189.9 (2)	0.0143 (18)
$ec_{6,3\ M}$	(Pu)	203.820 - 205.978	0.408 (14)

		Energy keV	Electrons per 100 disint.
$ec_{6,2\ L}$	(Pu)	205.079 - 210.126	4.27 (14)
$ec_{6,3\ N}$	(Pu)	208.194 - 209.329	0.1112 (38)
$ec_{6,2\ M}$	(Pu)	222.250 - 224.408	1.038 (33)
$ec_{6,2\ N}$	(Pu)	226.624 - 227.759	0.282 (9)
$ec_{7,3\ L}$	(Pu)	231.3 - 236.3	0.0323 (30)
$ec_{7,2\ L}$	(Pu)	249.77 - 254.81	0.0193 (24)
$ec_{6,1\ L}$	(Pu)	254.495 - 259.542	3.22 (11)
$ec_{6,0\ L}$	(Pu)	262.36 - 267.40	0.0869 (27)
$ec_{6,1\ M}$	(Pu)	271.666 - 273.824	0.784 (25)
$ec_{6,1\ N}$	(Pu)	276.040 - 277.175	0.213 (7)
$ec_{6,0\ M}$	(Pu)	279.53 - 281.68	0.0238 (7)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pu)	12.1246 — 21.9844		52.1 (16)	
$XK\alpha_2$	(Pu)	99.525		13.34 (28)	} $K\alpha$
$XK\alpha_1$	(Pu)	103.734		21.1 (5)	}
$XK\beta_3$	(Pu)	116.244	}		
$XK\beta_1$	(Pu)	117.228	}	7.75 (21)	$K\beta_1'$
$XK\beta_5''$	(Pu)	117.918	}		
$XK\beta_2$	(Pu)	120.54	}		
$XK\beta_4$	(Pu)	120.969	}	2.69 (8)	$K\beta_2'$
$XKO_{2,3}$	(Pu)	121.543	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pu)	7.861 (2)	85.5	M1+E2	5700 (400)	0.015
$\gamma_{3,2}$(Pu)	18.430 (4)	0.8	(M1+E2)	8000 (6200)	0.0001
$\gamma_{7,6}$(Pu)	44.663 (5)	12.7 (23)	M1+E2	96 (13)	0.131 (16)
$\gamma_{2,1}$(Pu)	49.414 (2)	25.4	M1+E2	126 (8)	0.2
$\gamma_{2,0}$(Pu)	57.273 (4)	13.38	E2	222 (4)	0.06
$\gamma_{8,7}$(Pu)	57.30 (2)	2.368	[M1]	28.6 (4)	0.08
$\gamma_{9,7}$(Pu)	61.460 (2)	0.0222 (19)	E1	0.473 (7)	0.0151 (13)
$\gamma_{3,1}$(Pu)	67.841 (7)	20 (5)	E2	98.5 (14)	0.20 (5)
$\gamma_{4,3}$(Pu)	88.06 (3)	0.024	M1+E2	12.26 (18)	0.0018
$\gamma_{8,6}$(Pu)	101.96 (2)	0.123	E2	14.42 (21)	0.008
$\gamma_{9,6}$(Pu)	106.125 (2)	0.373 (34)	E1(+M2)	0.26 (4)	0.296 (25)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{4,2}$(Pu)	106.47 (4)	0.192	E2	11.80 (17)	0.015
$\gamma_{5,3}$(Pu)	117.1 (10)	0.7 (0)	[E2]	7.6 (4)	0.08
$\gamma_{7,4}$(Pu)	166.39 (6)	0.12 (5)	M1	6.22 (9)	0.016 (7)
$\gamma_{6,3}$(Pu)	209.753 (2)	13.95 (45)	M1+E2	3.24 (5)	3.29 (10)
$\gamma_{6,2}$(Pu)	228.183 (2)	37.7 (11)	M1+E2	2.56 (4)	10.6 (3)
$\gamma_{7,3}$(Pu)	254.40 (3)	0.314 (29)	M1+E2	1.85 (3)	0.11 (1)
$\gamma_{7,2}$(Pu)	272.87 (9)	0.201 (25)	M1+E2	1.518 (22)	0.08 (1)
$\gamma_{6,1}$(Pu)	277.599 (2)	34.3 (10)	M1+E2	1.448 (21)	14.0 (4)
$\gamma_{6,0}$(Pu)	285.460 (2)	0.910 (25)	E2	0.247 (4)	0.73 (2)
$\gamma_{8,3}$(Pu)	311.7 (2)	0.0350 (42)	M1+E2	1.06 (3)	0.017 (2)
$\gamma_{9,3}$(Pu)	315.880 (3)	0.0187 (21)	E1(+M2)	0.0372 (9)	0.018 (2)
$\gamma_{7,1}$(Pu)	322.3 (2)	0.0082 (12)	[E2]	0.1699 (24)	0.007 (1)
$\gamma_{9,2}$(Pu)	334.310 (3)	0.0248 (21)	E1(+M2)	0.0329 (6)	0.024 (2)
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6 References

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	18.11	(3)	y
Q_{α}	:	5901.74	(5)	keV
α	:	100		%
SF	:	1.36		$\times 10^{-4}$ %

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,9}$	4882.12 (8)	0.0000047 (11)
$\alpha_{0,8}$	4919.24 (7)	0.000050 (5)
$\alpha_{0,7}$	4958.20 (9)	0.000149 (16)
$\alpha_{0,6}$	5166.58 (7)	0.0000042 (30)
$\alpha_{0,5}$	5217.24 (7)	0.000055 (9)
$\alpha_{0,4}$	5315.3	0.00004
$\alpha_{0,3}$	5515.29 (6)	0.00352 (18)
$\alpha_{0,2}$	5665.41 (5)	0.0204 (15)
$\alpha_{0,1}$	5762.65 (5)	23.3 (4)
$\alpha_{0,0}$	5804.77 (5)	76.7 (4)

3 Electron Emissions

			Energy keV		Electrons per 100 disint.
e_{AL}	(Pu)		6.19 - 22.99		8.09 (20)
e_{AK}	(Pu)				0.0000061 (9)
		KLL	75.263 - 85.357	}	
		KLX	92.607 - 103.729	}	
		KXY	109.93 - 121.78	}	
$ec_{1,0\ L}$	(Pu)		19.720 - 24.767		16.9 (6)
$ec_{1,0\ M}$	(Pu)		36.891 - 39.049		4.72 (16)
$ec_{2,1\ L}$	(Pu)		75.76 - 80.80		0.0164 (11)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Pu)	12.125 — 21.984	8.92 (23)	
$XK\alpha_2$	(Pu)	99.525	0.000061 (4)	} Kα
$XK\alpha_1$	(Pu)	103.734	0.000097 (5)	}

		Energy keV		Photons per 100 disint.	
$XK\beta_3$	(Pu)	116.244	}		
$XK\beta_1$	(Pu)	117.228	}	0.0000354 (20)	$K\beta_1'$
$XK\beta_5''$	(Pu)	117.918	}		
$XK\beta_2$	(Pu)	120.54	}		
$XK\beta_4$	(Pu)	120.969	}	0.0000123 (7)	$K\beta_2'$
$XKO_{2,3}$	(Pu)	121.543	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pu)	42.824 (8)	23.4 (8)	E2	905 (18)	0.0258 (7)
$\gamma_{2,1}$(Pu)	98.860 (13)	0.0239 (16)	E2	16.6 (3)	0.00136 (9)
$\gamma_{3,2}$(Pu)	152.63 (2)	0.00355 (18)	(E2)	2.48 (5)	0.00102 (5)
$\gamma_{4,3}$(Pu)	202.4	0.00004	(E2)	0.817 (16)	0.000022
$\gamma_{8,6}$(Pu)	251.47 (6)	0.0000121 (24)	(E1)	0.0606 (12)	0.0000114 (23)
$\gamma_{7,5}$(Pu)	263.37 (8)	0.000065 (9)	(E1)	0.0547 (11)	0.000062 (9)
$\gamma_{9,6}$(Pu)	289.21 (7)	0.0000048 (48)	E2+M3	7 (7)	0.0000006 (3)
$\gamma_{8,5}$(Pu)	302.98 (6)	0.0000198 (31)	(E1)	0.0405 (8)	0.000019 (3)
$\gamma_{9,5}$(Pu)	340.72 (7)	0.0000018 (9)			0.0000018 (9)
$\gamma_{6,2}$(Pu)	507.16 (5)	0.0000088 (28)	(E1)	0.01401 (29)	0.0000087 (28)
$\gamma_{5,1}$(Pu)	554.52 (4)	0.000088 (11)	(E1)	0.01179 (24)	0.000087 (11)
$\gamma_{5,0}$(Pu)	597.34 (4)	0.000054 (7)	(E1)	0.01024 (21)	0.000053 (7)
$\gamma_{6,1}$(Pu)	606.03 (4)	0.0000081 (14)			0.0000081 (14)
$\gamma_{8,2}$(Pu)	758.63 (5)	0.0000141 (19)	(E2)	0.0212 (4)	0.0000138 (19)
$\gamma_{7,1}$(Pu)	817.89 (7)	0.000069 (9)	(E2)	0.0182 (4)	0.000068 (9)
$\gamma_{8,1}$(Pu)	857.50 (4)	0.0000057 (8)			0.0000057 (8)
$\gamma_{7,0}$(Pu)	860.71 (7)	0.0000082 (20)	(E0)		0.0000082 (20)
$\gamma_{9,1}$(Pu)	895.24 (6)	0.0000019 (7)	E1+M2	0.07 (7)	0.0000018 (6)
$\gamma_{8,0}$(Pu)	900.32 (4)	0.0000013 (6)			0.0000013 (6)
$\gamma_{9,0}$(Pu)	938.06 (6)	0.0000004 (4)			0.0000004 (4)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	8250	(70)	y
Q_α	:	5622.3	(5)	keV
α	:	100		%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,8}$	5152 (3)	≤0.005
$\alpha_{0,7}$	5234.4 (12)	0.32
$\alpha_{0,6}$	5303.6 (12)	5.0 (1)
$\alpha_{0,5}$	5361.8 (12)	93.2 (5)
$\alpha_{0,4}$	5371.4 (5)	0.0210 (9)
$\alpha_{0,3}$	5371.7 (5)	0.39 (22)
$\alpha_{0,2}$	5436.1 (5)	0.04
$\alpha_{0,1}$	5488.5 (5)	0.83
$\alpha_{0,0}$	5530.4 (4)	0.58

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pu)	6.19 - 22.99		50.1 (13)
e_{AK}	(Pu)			1.91 (27)
	KLL	75.263 - 85.357	}	
	KLX	92.607 - 103.729	}	
	KXY	109.93 - 121.78	}	
$ec_{5,1\ K}$	(Pu)	11.290 (2)		24.7 (7)
$ec_{6,2\ K}$	(Pu)	14.365 (9)		0.70 (14)
$ec_{7,3\ K}$	(Pu)	18.067 (16)		0.032 (32)
$ec_{1,0\ L}$	(Pu)	18.868 - 23.915		28.1 (16)
$ec_{2,1\ L}$	(Pu)	30.703 - 35.750		2.43 (15)
$ec_{6,5\ L}$	(Pu)	33.79 - 38.83		2.30 (22)
$ec_{1,0\ M}$	(Pu)	36.039 - 38.197		7.16 (42)
$ec_{4,0\ K}$	(Pu)	39.894 (1)		0.0135 (6)
$ec_{1,0\ N}$	(Pu)	40.413 - 41.548		1.96 (11)
$ec_{3,2\ L}$	(Pu)	42.431 - 47.478		0.32 (17)
$ec_{7,6\ L}$	(Pu)	46.133 - 51.180		0.15 (9)
$ec_{2,1\ M}$	(Pu)	47.874 - 50.032		0.615 (37)
$ec_{6,5\ M}$	(Pu)	50.96 - 53.12		0.62 (6)
$ec_{2,1\ N}$	(Pu)	52.248 - 53.383		0.168 (10)
$ec_{5,0\ K}$	(Pu)	53.2613 (14)		40.0 (11)
$ec_{6,5\ N}$	(Pu)	55.33 - 56.47		0.169 (17)
$ec_{5,2\ L}$	(Pu)	56.169 - 61.216		1.9 (6)
$ec_{3,2\ M}$	(Pu)	59.602 - 61.760		0.081 (44)

		Energy keV	Electrons per 100 disint.
$ec_{7,6\ M}$	(Pu)	63.304 - 65.462	0.035 (26)
$ec_{3,2\ N}$	(Pu)	63.976 - 65.111	0.022 (13)
$ec_{7,6\ N}$	(Pu)	67.678 - 68.813	0.010 (7)
$ec_{6,1\ K}$	(Pu)	68.17 (1)	0.502 (34)
$ec_{2,0\ L}$	(Pu)	72.676 - 77.722	0.153 (32)
$ec_{5,2\ M}$	(Pu)	73.340 - 75.498	0.52 (15)
$ec_{5,2\ N}$	(Pu)	77.714 - 78.849	0.144 (49)
$ec_{7,2\ K}$	(Pu)	83.602 (16)	0.013 (12)
$ec_{2,0\ M}$	(Pu)	89.846 - 92.004	0.043 (9)
$ec_{2,0\ N}$	(Pu)	94.220 - 95.355	0.0118 (25)
$ec_{7,5\ L}$	(Pu)	102.99 - 108.03	0.028 (8)
$ec_{5,1\ L}$	(Pu)	109.977 - 115.024	5.40 (16)
$ec_{6,2\ L}$	(Pu)	113.052 - 118.099	0.231 (19)
$ec_{7,3\ L}$	(Pu)	116.754 - 121.801	0.0160 (45)
$ec_{5,1\ M}$	(Pu)	127.148 - 129.306	1.329 (39)
$ec_{6,2\ M}$	(Pu)	130.223 - 132.381	0.059 (6)
$ec_{5,1\ N}$	(Pu)	131.522 - 132.657	0.362 (10)
$ec_{6,2\ N}$	(Pu)	134.597 - 135.732	0.0162 (17)
$ec_{4,0\ L}$	(Pu)	138.581 - 143.628	0.0915 (41)
$ec_{5,0\ L}$	(Pu)	151.948 - 156.995	8.40 (22)
$ec_{4,0\ M}$	(Pu)	155.752 - 157.910	0.0256 (11)
$ec_{6,1\ L}$	(Pu)	166.861 - 171.908	0.1357 (45)
$ec_{5,0\ M}$	(Pu)	169.119 - 171.277	2.05 (5)
$ec_{5,0\ N}$	(Pu)	173.493 - 174.628	0.560 (15)
$ec_{6,1\ M}$	(Pu)	184.032 - 186.190	0.0343 (11)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pu)	12.1246 — 21.9844		51.7 (10)	
$XK\alpha_2$	(Pu)	99.525		19.0 (5)	} $K\alpha$
$XK\alpha_1$	(Pu)	103.734		30.1 (7)	}
$XK\beta_3$	(Pu)	116.244	}		
$XK\beta_1$	(Pu)	117.228	}	11.06 (30)	$K\beta_1'$
$XK\beta_5''$	(Pu)	117.918	}		
$XK\beta_2$	(Pu)	120.54	}		
$XK\beta_4$	(Pu)	120.969	}	3.84 (12)	$K\beta_2'$
$XKO_{2,3}$	(Pu)	121.543	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pu)	41.972 (1)	38.2 (22)	M1+E2	102.4 (20)	0.369 (20)
$\gamma_{2,1}$(Pu)	53.807 (1)	3.34 (20)	M1+E2	44.7 (11)	0.073 (4)
$\gamma_{6,5}$(Pu)	56.89 (3)	3.16 (17)	M1+E2	87 (7)	0.0359 (21)
$\gamma_{3,2}$(Pu)	65.535 (3)	0.45 (22)	M1+E2	24 (12)	0.018 (2)
$\gamma_{7,6}$(Pu)	69.237 (18)	0.20 (4)	M1(+E2)	28 (14)	0.007 (3)
$\gamma_{5,2}$(Pu)	79.2728 (18)	2.8 (7)	M1+E2	22 (6)	0.120 (7)
$\gamma_{2,0}$(Pu)	95.7795 (12)	0.221 (47)	E2	19.3 (3)	0.0109 (23)
$\gamma_{7,5}$(Pu)	126.09 (4)	0.046 (13)	[E2]	5.59 (8)	0.007 (2)
$\gamma_{5,1}$(Pu)	133.081 (2)	34.7 (10)	M1+E2	11.36 (17)	2.81 (7)
$\gamma_{6,2}$(Pu)	136.156 (9)	1.13 (12)	M1+E2	9 (1)	0.113 (4)
$\gamma_{7,3}$(Pu)	139.858 (16)	0.064 (33)	[M1,E2]	7 (4)	0.008 (1)
$\gamma_{4,0}$(Pu)	161.685 (1)	0.210 (9)	E2	1.96 (3)	0.071 (3)
$\gamma_{5,0}$(Pu)	175.0523 (14)	61.0 (16)	M1+E2	5.21 (8)	9.83 (22)
$\gamma_{6,1}$(Pu)	189.965 (10)	0.889 (42)	M1+E2	3.36 (16)	0.204 (6)
$\gamma_{7,2}$(Pu)	205.393 (16)	0.028 (13)	[M1,E2]	2.1 (14)	0.009 (1)
$\gamma_{6,0}$(Pu)	231.935 (9)	0.0175 (27)	[E2]	0.498 (7)	0.0117 (18)
$\gamma_{-1,1}$(Pu)	388.16 (5)	0.019 (1)			0.019 (1)

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1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	4723	(27)	y
Q_α	:	5476.7	(9)	keV
α	:	99.97385	(7)	%
SF	:	0.02615	(7)	%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,2}$	5242.5 (10)	0.020 (2)
$\alpha_{0,1}$	5343.7 (9)	20.81 (22)
$\alpha_{0,0}$	5387.5 (9)	79.17 (22)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Pu)	6.19 - 22.99	7.20 (21)
$ec_{1,0\ L}$	(Pu)	21.441 - 26.488	15.1 (6)
$ec_{1,0\ M}$	(Pu)	38.612 - 40.770	4.22 (17)
$ec_{1,0\ N}$	(Pu)	42.986 - 44.121	1.161 (47)
$ec_{2,1\ L}$	(Pu)	79.7 - 84.7	0.0135 (15)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.
XL	(Pu)	12.125 — 21.984	7.95 (24)

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Pu)	44.545 (9)	20.82 (22)	E2	746 (22)	0.0279 (8)
$\gamma_{2,1}$(Pu)	102.8 (1)	0.020 (2)	E2	13.86 (42)	0.00134 (14)

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(Half-life, Alpha-decay transition probabilities)

1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	2.6470	(26)	y
Q_α	:	6216.87	(4)	keV
α	:	96.914	(3)	%
SF	:	3.086	(8)	%

2 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,3}$	5826.3	0.0019
$\alpha_{0,2}$	5976.6	0.23 (4)
$\alpha_{0,1}$	6075.64 (11)	15.1 (3)
$\alpha_{0,0}$	6118.1 (1)	81.7 (3)

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Cm)	6.3 - 24.5		5.02 (13)
e_{AK}	(Cm)			0.0000025 (4)
	KLL	78.858 - 89.973	}	
	KLX	97.226 - 109.267	}	
	KXY	115.57 - 128.23	}	
$ec_{1,0\ L}$	(Cm)	18.9 - 24.4		10.93 (33)
$ec_{1,0\ M}$	(Cm)	37.1 - 39.4		3.08 (9)
$ec_{1,0\ N}$	(Cm)	41.7 - 42.9		0.856 (26)
$ec_{2,1\ L}$	(Cm)	75.7 - 81.2		0.159 (27)
$ec_{2,1\ M}$	(Cm)	93.9 - 96.2		0.045 (8)
$ec_{2,1\ N}$	(Cm)	98.5 - 99.7		0.0125 (21)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Cm)	12.634 — 23.319		6.07 (14)	
$XK\alpha_2$	(Cm)	104.59		0.0000257 (7)	} $K\alpha$
$XK\alpha_1$	(Cm)	109.271		0.0000402 (11)	}
$XK\beta_3$	(Cm)	122.304	}		
$XK\beta_1$	(Cm)	123.403	}	0.0000151 (5)	$K\beta_1'$
$XK\beta_5''$	(Cm)	124.124	}		

		Energy keV		Photons per 100 disint.	
$XK\beta_2$	(Cm)	126.889	}		
$XK\beta_4$	(Cm)	127.352	}	0.00000530 (19)	$K\beta_2'$
$XKO_{2,3}$	(Cm)	127.97	}		

4.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Cm)	43.399 (25)	15.2 (3)	E2	1000 (15)	0.0152 (4)
$\gamma_{2,1}$(Cm)	100.2 (4)	0.232 (39)	E2	18.5 (5)	0.0119 (20)
$\gamma_{3,2}$(Cm)	154.5 (6)	0.00192	E2	2.76 (6)	0.00051

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High quality decay data are an essential input across a wide range of nuclear applications, and none more so than in the case of the actinides and their related decay chain data. Well defined nuclear data are essential to ensure safe procedures within mining operations, various nuclear fuel cycles for energy generation, environmental monitoring, specific analytical techniques, and diagnostic and radiotherapeutic treatments in nuclear medicine. A major objective of the IAEA nuclear data programme is to promote improvements in the accuracy and quality of nuclear data used in science and technology. The contents of this report constitute the results of a coordinated research project established to assemble an updated decay data library for actinides. Recommended half-lives and decay scheme data have been comprehensively evaluated, and are tabulated in terms of a carefully selected set of actinide radionuclides.

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