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NUCLEAR REACTIONS AND SUBSEQUENT RADIOACTIVE DECAYS INDUCED BY 14-MeV NEUTRONS

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Nuclear Reactions and Subsequent Radioactive Decays Induced by 14-MeV Neutrons

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Compilation of the data on nuclear reactions and subsequent radioactive decays induced by 14-MeV neutrons is presented in tabular form for most of isotopes available in nature, including the following:

Nuclide (isotopic abundance), type of nuclear reaction, reaction Q-value, reaction product, type of decay, decay Q-value, half life of reaction product, decay product, maximum reaction cross section, neutron energy for maximum cross section, reaction cross section for 14-MeV neutrons, radioactivity induced by irradiation of a neutron flux of 1×10^{15} n/cm^{2}sec for 4 months, and reference for the cross section.

The mass number dependences of (n,2n), (n,p) and (n,α) reaction cross sections by 14-MeV neutrons are given in figures to show general trends of the cross sections.

14 MeV中性子による核反応および引きつづき起る放射性崩壊

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天然に入手可能な多くのアイソトープの14 MeV中性子による核反応およびそれによって生ずる放射性崩壊のデータが収集されている。表に収められている項目は下記の通りである。

核種（天然に存在する割合），核反応型，核反応Q値，核反応生成核，崩壊型式，崩壊Q値，半減期，崩壊生成核，最大反応断面積，反応断面積が最大となる中性子エネルギー，14 MeV中性子に対する反応断面積，1molの原子を4ケ月1×10^{15} n/cm^2 secの中性子束で照射した後の放射能，文献。

一般的傾向を見るために，14 MeV中性子に対する（n，2n），（n，p）および（n，α）反応断面積と質量数の関係を図示してある。

§.1 Introduction

One of the most important factors to be considered in choosing construction materials for design of the possible nuclear fusion reactor is the nuclear reactions by 14-MeV neutrons and following radioactive decays. The nuclear data relevant to the reaction and decay are:

(1) Nuclear reaction cross section by 14-MeV neutrons, and, also by degraded neutrons due to slowing-down in the materials,

(2) Type of particle and its kinetic energy emitted from the nuclear reaction, and

(3) Type of decay, decay energy and half life of the reaction product.

In this report, these data are compiled for most of isotopes available in nature. Furthermore, the intensity of the radioactivity induced by irradiation of a neutron flux of 1×10^{15}n/cm^{2}sec for 4 months is also tabulated. From these data it is easy to estimate the radiation level after some period of cooling.

§.2 Nuclear reaction cross section

Reaction cross sections by 14-MeV neutrons have been hitherto reported in a lot of published papers. The discrepancies among the reported data are, however, very large and much larger than the errors quoted by authors of the papers. The cross sections, sometimes, fluctuate by an order of magnitude or larger. It is very difficult to evaluate these cross sections, because the origins of the discrepancies are not clear in most cases. One of the origins may be ambiguity in decay scheme of the products. In the present compilation, plural numbers of the data are presented for some cases, being quoted from the papers of experiments, compilations, evaulations and/or theoretical estimations. In the section of References, titles of the papers are shown for information. The figures in the table are limited to one or two digits in most cases, and any error of the cross sections is not quoted.

One remark which should be added is that, since in many measurements the activation method is adopted, sum of the cross sections to the ground state and to the isomeric states is not necessarily equal to the total cross section of the reaction, but may be larger.

Type of reactions possible by the 14-MeV neutrons are mostly (n,γ), (n,n'), (n,2n), (n,p) and (n,α) in addition to the elastic scattering

which is excluded in the present compilation.

(1) The (n,γ) reaction cross sections are an order of one millibarn or less at 14 MeV. They are several barns or more at the thermal energy. Sometimes large resonances exist between the two energies.

(2) The (n,n') reaction cross sections become flat above a few MeV, and they are about the magnitude of one barn. In present work, the cases leading to long-lived isomers are compiled except for Li isotopes.

(3) The (n,2n) reaction cross sections become to be the maximum around 14 MeV, and their magnitude amounts to a few barns. They increase with mass number A, and within the same isotopes they rapidly increase with A.

(4) The (n,p) and (n,α) reaction cross sections are by factor of ten less than those of the (n,2n) reactions. They decrease with A, and within the same isotopes they rapidly decrease with A. The (n,α) reaction cross sections are by factor of 2.5 smaller than those of the (n,p) reactions. Both approximately vary with A, atomic number Z, and neutron number N as in the following(ref.27).

$$\sigma(n,\alpha) = 0.4\sigma(n,p)$$
$$= 0.29\sigma_m \exp.\ [-33(N-Z)/A] \ . \qquad (1)$$

Here,

$$\sigma_m = \pi r_0^2\ (A^{1/3} + 1)^2,$$

with

$$r_0 = 1.2 \times 10^{-13}\ \text{cm} \ .$$

The (n,2n), (n,p) and (n,α) reaction cross sections for each nucleus are plotted with mass number in Figs. 1, 2 and 3, respectively. Symbol in the figures designate isotopes, abundance of which are more than or nearly equal to 30%. A group of points for the same isotopes are connected by a line, and labeled by the isotopic symbol. If plural data are shown for the same nuclide in the table, these are plotted in the figures. Then the maximum values are chosen for the connection in most cases. In Appendix, nuclei and nuclear reactions, cross sections of which are not available at this time, are listed.

§.3 Nuclear-reaction Q-value and kinetic energy of an emitted particle

The relation between the reaction Q-value in the third column of the table and the kinetic energy E of an emitted particle is given as follows.

$$E = (1 - \frac{m}{M+m_n})\ (Q + \frac{M}{M+m_n} E_n)\ . \tag{2}$$

If m_n and $m \ll M$,

$$E = (Q + E_n) - \frac{m}{M}\{Q + (1 + \frac{m_n}{m})E_n\}\ . \tag{3}$$

Here,

E_n : incident neutron energy,

m_n : neutron mass,

m : mass of an emitted particle, and

M : mass of a target nucleus.

The threshold energy of the nuclear reaction, if the Q-value is negative, is

$$(E_n)_{thres} = (1 + \frac{m_n}{M})\ (-Q)\ . \tag{4}$$

§.4 Induced radioactivity of a reaction product

Radioactivity R of a reaction product induced by a neutron flux F after irradiation time T is given as follows, if decrease rate of number of target atoms ($Fe^{-\sigma N_0}$) is neglected.

$$\begin{aligned} R &= \lambda \int_0^T F N_0 \sigma e^{-\lambda(T-t)} dt \\ &= F N_0 \sigma (1 - e^{-\lambda T}) \\ &= F N_0 \sigma (1 - e^{-0.693T/t_{1/2}})\ . \end{aligned} \tag{5}$$

Here,

σ : relevant reaction cross section of nucleus,

λ : decay constant of the product,

$t_{1/2}$: half life of the product, (λ=0.693/$t_{1/2}$), and

N_0 : number of relevant nuclei per cm^2.

In the case of appreciable decrease of the atoms due to the flux, a term $[-F^2\sigma e^{-\sigma N_0}\{T - \frac{1}{\lambda}(1 - e^{-\lambda T})\}]$ should be added to the right side of eq. (5). If one mol of the atoms are irradiated by a neutron flux of 1×10^{15}n/cm^2sec

for 4 months,

$$R\ (\text{curie/mol}) = 16.2\,\sigma\,(1 - e^{-84.5/t_{1/2}}), \qquad (6)$$
$$(\sigma \text{ in mb and } t_{1/2} \text{ in day})$$

or

$$R\ (\text{curie/mol}) = 1\ \ \sigma\,(1 - e^{-0.231/t_{1/2}}). \qquad (7)$$
$$(\sigma \text{ in mb and } t_{1/2} \text{ in year})$$

These formulae reduce to

$$R\ (\text{curie/mol}) = 16.2\sigma \quad \text{for } t_{1/2} \ll T, \qquad (8)$$
$$(\sigma \text{ in mb})$$

and

$$R\ (\text{curie/mol}) = 3.74\,\sigma/t_{1/2} \text{ for } t_{1/2} \gg T. \qquad (9)$$
$$(\sigma \text{ in mb and } t_{1/2} \text{ in year})$$

For the case of serial decay, the first and second product nuclei after the reaction decay as $e^{-\lambda_1 t}$ and $\frac{\lambda_1}{\lambda_2-\lambda_1}(e^{-\lambda_1 t} - e^{-\lambda_2 t})$, respectively. Then, in the case of irradiation of a neutron flux of 1×10^{15} n/cm^{2}sec for 4 months,

$$R_1 = R$$

and

$$R_2 = 16.2\,\sigma\,(1 - \frac{\lambda_2}{\lambda_2-\lambda_1}\,e^{-\lambda_1 T} + \frac{\lambda_1}{\lambda_2-\lambda_1}\,e^{-\lambda_2 T})\ . \qquad (10)$$

Here, λ_1 : decay constant of the first product,
λ_2 : decay constant of the second product,
R_1 : radioactivity of the first product, and
R_2 : radioactivity of the second product.

§.5 Explanation of the table

From the left to the right in columns of the table, the following items are tabulated.

Nuclide (Isotopic abundance) : The abundance is quoted from ref. 32.

Type of nuclear reaction:

Reaction Q-value (MeV) : quoted from ref. 4 and ref. 33 except

for Li, Q-values of which are quoted from ref. 12 and ref. 10.

Reaction product : Suffix m designates metastable state.

Type of decay : The reaction product leads to the decay product via IT (isometric transition), β^- decay, β^+ decay and/or EC (electron capture) (ref. 3 and ref. 34).

Decay Q-value (MeV) : level energy for IT, maximum energy for β^- decay, and Q-value of electron capture for β^+ decay and/or EC (ref. 3 and ref. 34).

Half life : quoted from ref. 3 and ref. 34.

Decay product : including the successive decay product, if exist. Number in parentheses shows the half life of the second decay product (ref. 3).

Maximum reaction cross section (barns) : Plus sign denotes the cross section increasing with energy around 14-MeV.

Neutron energy for the maximum cross section (MeV): "thermal" means thermal neutron energy.

Reaction cross section σ for the 14-MeV neutrons (barns):

Radioactivity (curie/mol) : being induced by a 14-MeV neutron flux of 1×10^{15} n/cm^{2}sec after 4-month irradiation of one mol of the atoms. Number in parentheses shows radioactivity of the second product.

Reference : for reaction cross section for the 14-MeV neutrons and, also, the maximum reaction cross sections.

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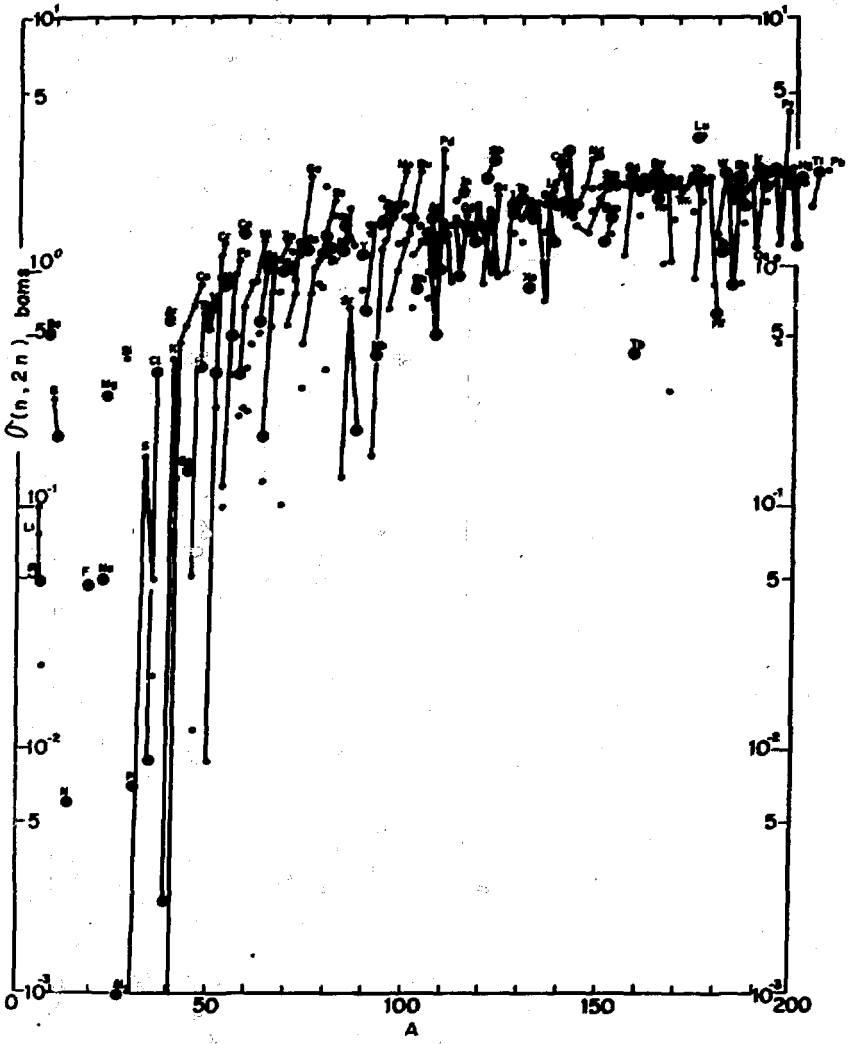

Fig. 1 σ(n,2n) vs. A The explanation of the figure is found in §.2.

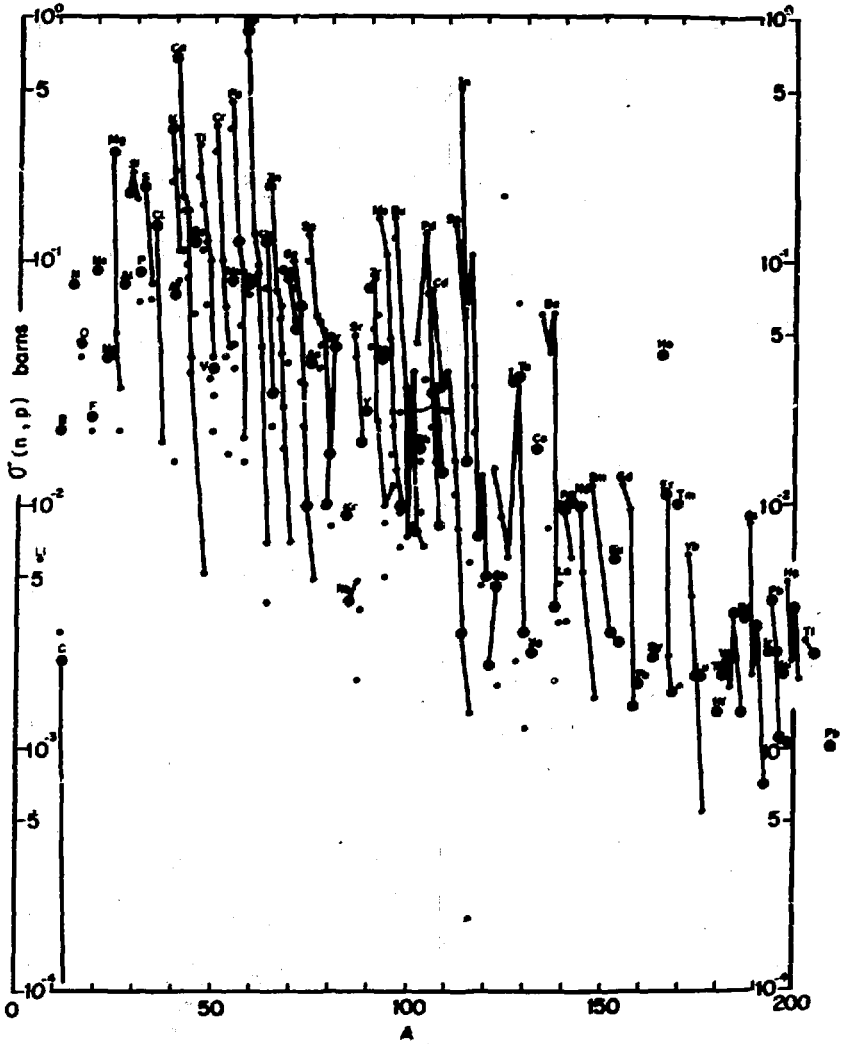

Fig. 2 σ(n,p) vs. A The explanation of the figure is found in §.2.

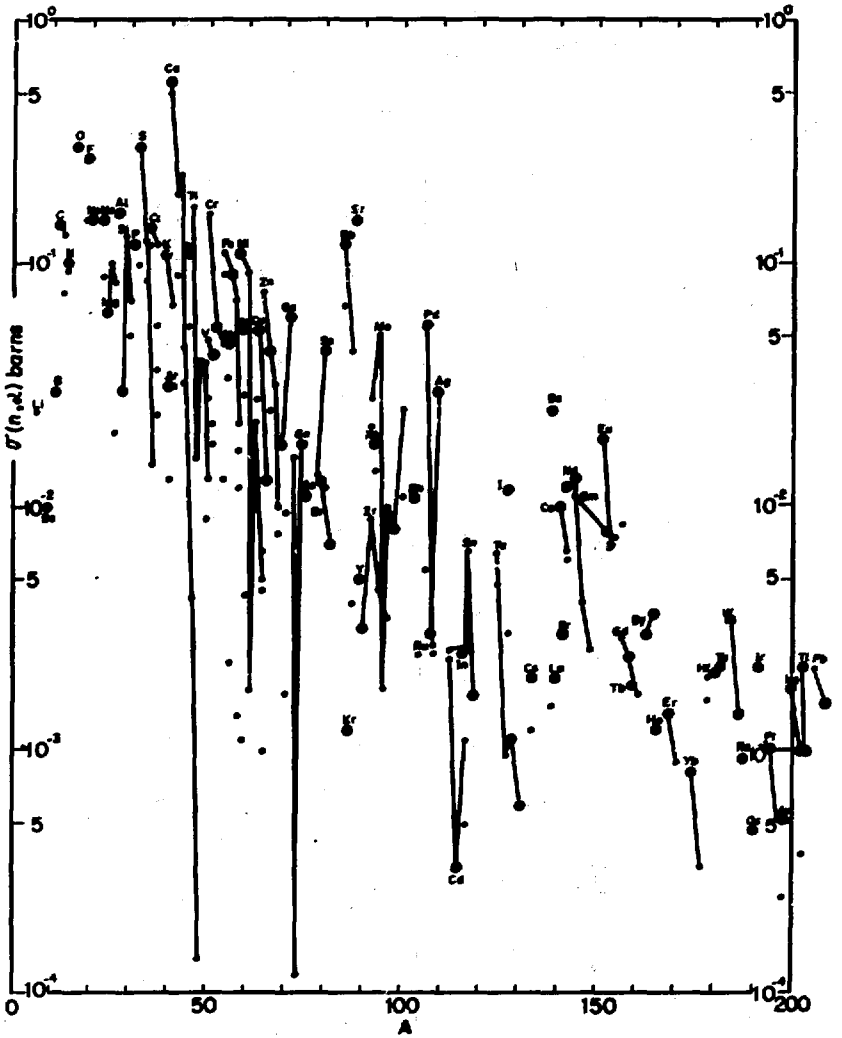

Fig. 3 σ(n,α) vs. A The explanation of the figure is found in §.2.

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σ at 14 MeV (barns)	Energy for σ	σ at 14 MeV (barns)	Radioactivity (Ci/g)	Reference
^{6}Li (7.52%)	(n,γ)	7.25	^{7}Li					0.045	thermal			5
	(n,n'γ)	-2.18	^{6}Li					+		0.080		12
	(n,2n)	-3.70	p+n	p / n	1.967 / 0.957	10^{-21}s	α			0.078		9
								+		0.1		5
	(n,p)	-2.73	^{6}He	β$^-$	3.51	0.8s	^{6}Li	0.018	5.5	0.080	129	7,12
	(n,α)	4.78	t	β$^-$	0.019	12.3y	^{3}He	3	0.25	0.085	32.9	5
	(n,nα)	-1.47	d					0.68	6.0	0.48		12
										0.3		5
	monoenergetic	———	———					0.78	5.0	0.53		12
^{7}Li (92.48%)	(n,γ)	2.03	^{8}Li	β$^-$ (n	16.002 -2.032)	0.84s	^{8}Be	0.035	thermal			5
	(n,n'γ)	-0.48	^{7}Li					0.29	4.5			10,11
	(n,2n)	-7.25	^{6}Li					+		0.049		9
										0.022		10
	(n,3n)	-12.92	^{5}Li	p	1.967		α	+		0.0002		9
	(n,d)	-7.76	^{6}He	β$^-$	3.51	0.8s	^{6}Li	+		0.01	162	5,10
	(n,nα)	-2.47	t	β$^-$	0.019	12.3y	^{3}He	0.45	8	0.34	32.9	5,10, 11
	(n,2np)	-11.91	^{5}He	n	0.957		α					
	(n,2nα)	-8.72	d					+		0.033		10
	monoenergetic	———	———					flat >8MeV		0.47		10
^{9}Be (100%)	(n,γ)	6.81	^{10}Be	β$^-$	0.555	2.7×10^6y	^{10}B	0.01	thermal	1×10^{-6}	0	1
	(n,2n)	-1.66	^{8}Be	α	0.095	2×10^{-16}s	α	0.6	6	0.5	8100	5
	(n,p)	-12.83	^{9}Li	β$^-$	13.61	0.17s	^{9}Be*, ^{9}Be*→^{8}Be+n			<0.004		7
	(n,t)	-10.44	t	β$^-$	0.0186	12.3y	^{3}He	+		0.02	32.9	1
	(n,α)	-0.60	^{6}He	β$^-$	3.510	0.8s	^{6}Li	0.11	3	0.01	162	7
^{10}B (18.5%)	(n,γ)	11.45	^{11}B					0.5	thermal			38
	(n,2n)	-8.44	^{9}B	p	0.185	6×10^{-19}s	^{8}Be			0.027	437	9
	(n,α+n$_1$)	2.79	^{7}Li					3837	thermal			38
	(n,n$_1$γ)	2.79	^{7}Li^{excit}		0.4774			0.056 at 10MeV				39
^{11}B (81.5%)	(n,γ)	3.37	^{12}B	β$^-$ (n	13.370 -3.369)	0.0203s	^{12}C	0.0055	thermal			38
	(n,2n)	-11.46	^{10}B							0.019		9
	(n,p)	-10.73	^{11}Be	β$^-$	11.51	13.65s	^{11}B			0.02	324	7
										0.093	46.6	5
	(n,t)	-9.56	^{9}Be	(n	-1.665		^{8}Be)					
	(n,α)	-6.63	^{8}Li	β$^-$ (n	16.002 -2.032)	0.84s	^{8}Be→2α	0.03	~14	0.03	406	7

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radio-activity (mCi/g mol)	References
^{12}C (98.89%)	(n,γ)	4.95	^{13}C					0.0034	thermal			5
	(n,2n)	-18.72	^{11}C	β^+	1.981	20.3m	^{11}B	0.018	33	0	0	5
	(n,p)	-12.59	^{12}B	β^- (n	13.370 -3.349)	0.0203s	^{12}C			0.0023	37.2	20
								0.018	18	0.002	32.4	7
	(n,α)	-5.70	^{9}Be	(n	-1.665		^{8}Be)	0.08	8.1	0.062		5
	(n,nα)	-5.70	$^{9}Be^{excit}$	—	2.4 and others	—	—			0.082		5
^{13}C (1.108%)	(n,γ)	8.18	^{14}C	β^-	0.156	5730y	^{14}N	0.001	thermal	1×10^{-10}	0	
	(n,p)	-12.65	^{13}B	β^-	13.437	0.019s	^{13}C			0	0	20
	(n,α)	-3.84	^{10}Be	β^-	0.555	2.7×10^6y	^{10}B			0.13	0	1
										0.075	0	19
^{14}N (99.63%)	(n,γ)	10.83	^{15}N					0.075	thermal			5
	(n,2n)	-10.55	^{13}N	β^+ (p	2.221 -1.944)	10m	^{13}C	0.018	18	0.046	97.2	5,7
	(n,p)	0.63	^{14}C	β^-	0.156	5730y	^{14}N	1.81	thermal	0.08	0.052	5,7
										0.032	0.021	20
	(n,α)	-0.16	^{11}B					2	1.6	0.1		6
										0.002		19
^{16}O (99.76%)	(n,γ)	4.14	^{17}O	(n	-4.142		^{16}O)	1.78×10^{-4}	thermal			20
	(n,2n)	-15.67	^{15}O	β^+	2.769	124s		0.018	32	0	0	5
	(n,p)	-9.64	^{16}N	β^-	10.422	7.2s		0.045	13.5	0.04	64.8	7
								0.08	12	0.046	745	20
	(n,α)	-2.22	^{13}C					0.35	16	0.3		5
^{19}F (100%)	(n,γ)	6.60	^{20}F	β^-	7.030	11.4s	^{20}Ne	0.0060	thermal			5
	(n,2n)	-10.43	^{18}F	β^+,EC	1.655	109.7m	^{18}O	0.1	18	0.047	761	7
	(n,2nα)	-10.43	$^{18}F^m$	—	—	138ns	—	0.1	19	0.045	729	7
	(n,p)	-4.04	^{19}O	β^-	4.819	29s	$^{19}F^m$,^{19}F (67ns)	0.045	>	0.02	324	7
								0.07	7.5	0.023	372	20
	(n,α)	-1.52	^{16}N	β^-	10.422	7.2s	^{16}O	0.3	6	0.085	249	5,7
										0.027	437	19
^{20}Ne (90.92%)	(n,p)	-6.24	^{20}F	β^-	7.030	11.4s	^{20}Ne			0.002	1490	20
	(n,α)	-0.59	^{17}O							0.15		19

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σ at 14 MeV (barns)	Energy for max. σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g)	References
^{23}Na (100%)	(n,γ)	6.96	^{24}Na	β^-	5.515	15h	^{24}Mg	0.13	thermal	$<10^{-4}$	0	5
	(n,γ*)	6.96	$^{24}Na^m$	IT β^-	0.473 5.900	20ms	$^{24}Na \xrightarrow{\beta^-,2.9} {}^{24}Mg$ (0.5%)	0.40	thermal	$<10^{-4}$	0	5
	(n,2n)	-12.42	^{22}Na	β^+,EC	2.843	2.6y	^{22}Ne	~0.1	~19	0.015	20.6	1
										0.043	59.2	23
	(n,p)	-3.60	Ne	β^-	4.380	37.6s	^{23}Na	~0.1	~10	0.04	640	7,20
	(n,α)	-3.87	^{20}F	β^-	7.020	11.4s	^{20}Ne	~0.2	~14	0.15	2400	7
										0.080	1430	19
^{24}Mg (78.6%)	(n,n')	1.37	$^{24}Mg^m$	IT	1.368	0.9ps	^{24}Mg	~0.7	~4	0.53	8020	5
	(n,2n)	-16.53	^{23}Mg	β^+	4.056	12.1s	^{23}Na			0.18	2920	29
	(n,p)	-4.73	^{24}Na	β^-	5.515	15.0h	^{24}Mg	0.22	13.5	0.20	3240	2
	(n,p*)	-4.73	$^{24}Na^m$	IT β^-	0.473 5.900	20ms	$^{24}Na \xrightarrow{\beta^-,2.9} {}^{24}Mg$ (0.5%)			0.08	1296	7
	(n,α)	-2.55	^{21}Ne							0.063		19
^{25}Mg (10.11%)	(n,2n)	-9.33	^{24}Mg							—		
	(n,p)	-3.05	^{25}Na	β^-	3.83	60s	^{25}Mg			0.04	648	5
										0.05	810	7,20
	(n,α)	0.48	^{22}Ne	β^+,EC	2.843	2.6y	^{22}Ne			0.10	130	19
^{26}Mg (11.17%)	(n,γ)	6.44	^{27}Mg	β^-	2.614	9.5m	$^{27}Al \xrightarrow{\beta^-,1.7} {}^{27}Al$ (0.3%)	0.027	thermal			6
	(n,2n)	-11.09	^{25}Mg							—		
	(n,p)	-7.52	^{26}Na	β^-	0.5	1.0s	$^{26}Mg^m \xrightarrow{\beta^-,3.4} {}^{26}Mg$ (0.3ps)			0.02	324	5,20
										0.03	486	7
	(n,α)	-5.42	^{23}Ne	β^-	4.380	37.6s	^{23}Na			0.004	1360	7
										0.015	243	19
^{27}Al (100%)	(n,γ)	7.73	^{28}Al	β^-	4.635	2.31m	$^{28}Al \xrightarrow{\beta^-,2.8} {}^{28}Si$ (0.5ps) (1%)	0.235	thermal	5×10^{-4}	8.1	5
	(n,2n)	-13.06	^{26}Al	β^+,EC	4.003	7.4×10^5y	$^{26}Mg^m \xrightarrow{\beta^-,2.8} {}^{26}Mg$ (0.4ps)	+		0.001	0	1
	(n,p)	-1.83	^{27}Mg	β^-	2.614	9.5m	$^{27}Mg \xrightarrow{\beta^-,2.7} {}^{27}Al$	0.10	12.0	0.08	1296	2,20
	(n,α)	-3.13	^{24}Na	β^-	5.515	15.0h	^{24}Mg	0.12	13.5	0.12	1940	2
	(n,α*)	-3.13	$^{24}Na^m$	IT β^-	0.473 5.900	20ms	$^{24}Na \xrightarrow{\beta^-,2.9} {}^{24}Mg$ (0.02%)			0.04	648	5
	(n,np)	-8	^{26}Mg							0.05		5
^{28}Si (92.27%)	(n,2n)	-17.18	^{27}Si	β^+	4.810	4.2s	^{27}Al			0	0	
	(n,p)	-3.06	^{28}Al	β^-	4.635	2.31m	$^{28}Al \xrightarrow{\beta^-,2.8} {}^{28}Si$ (0.5ps)	0.4	20	0.19	3070	1,20
	(n,α)	-2.65	^{25}Mg					~0.2	~8	0.013		5
	(n,αα*)	-2.65	^{25}Mg					~0.3	~8	0.03		5

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	Max. σ (barns)	Energy for max. σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g)	Reference
^{29}Si (4.68%)	(n,2n)	-8.47	^{28}Si							0.40 ±0.10(Fluctuation)		16
	(n,p)	-2.98	^{29}Al	β^-	3.68	6.6m	^{29}Si	0.30	9	0.23	3730	1
										0.11	1700	7,20
	(n,α)	-0.03	^{26}Mg							0.13		19
^{30}Si (3.09%)	(n,γ)	6.59	^{31}Si	β^-	1.48	2.62h	^{31}P	0.11	thermal			6
	(n,2n)	-10.61	^{29}Si									
	(n,pα)	-7.76	$^{26}Al^m$	IT		72s	^{26}Al (1.3%) ^{26}Si			0.18	2920	5
	(n,α)	-4.28	^{27}Mg	β^-	2.614	9.5m	^{27}Al (0.03%) ^{27}Al			0.07	113	7
										0.050	810	19
^{31}P (100%)	(n,γ)	7.94	^{32}P	β^-	1.710	14.3d	^{32}S	0.19	thermal			5
	(n,2n)	-12.31	^{30}P	β^+	4.24	2.50m	^{30}Si	+		0.007	113	1
										0.011	178	23
	(n,p)	-0.71	^{31}Si	β^-	1.48	2.62h	^{31}P	0.14	8	0.09	1460	2
										0.067	1085	20
	(n,α)	-1.94	^{28}Al	β^-	4.635	2.30m	^{28}Si (0.5%) ^{28}Si	1.4	11	0.12	1940	1,27
								1.5	11			19
	(n,np)	-7	^{30}Si							0.1		5
^{32}S (95.018%)	(n,2n)	-15.09	^{31}S	β^+	5.44	2.7s	^{32}P	(4×10^{-2}	16)	0	0	5
	(n,p)	-0.93	^{32}P	β^-	1.710	14.3d	^{32}S	0.4	11	0.20	3240	20
	(n,t)	-12.69	^{30}P	β^+	4.24	2.50m	^{30}Si			1×10^{-5}	0.162	5
	(n,α)	1.53	^{29}Si					~0.25	~4	0.10		5
										0.31		19
^{34}S (4.215%)	(n,γ)	6.99	^{35}S	β^+	5.44	87d	^{35}P	0.26	thermal			6
	(n,2n)	-11.41	^{33}S							0.16		5
	(n,p)	-4.32	^{34}P	β^-	5.1	12.4s	^{34}S			0.08	1300	7
										0.069	1120	20
	(n,α)	-1.33	^{31}Si	β^-	1.48	2.62h	^{31}P	+		0.125	2030	1
										0.085	1300	19

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/mol)	Reference
^{36}S (0.017%)	(n,2n)	-9.89	^{35}S	β^-	0.1674	88d	^{35}Cl			0.02	334	1
										0.050	810	20
	(n,α)	—	^{33}Si							0.015		19
^{35}Cl (75.4%)	(n,γ)	8.59	^{36}Cl	β^- EC,β^+	0.712 1.14	3.1×10^5y	^{36}Ar ^{36}S	30	thermal			6
	(n,2n)	-12.65	^{34}Cl	β^+	5.482	1.57s	^{34}S	0.05	19	0.085	81.0	7
	(n,2n*)	-12.65	$^{34}Cl^m$	β^+ IT	5.627 0.145	32.0m	^{34}Cl,^{34}S (32d) ^{34}S	+		0.004	64.8	1
	(n,p)	0.62	^{35}S	β^-	0.1674	88d	^{35}Cl	0.5	thermal	0.14	1400	1,20
	(n,α)	0.94	^{32}P	β^-	1.710	14.3d	^{32}S	$<5\times10^{-5}$	thermal	0.12	1940	1,27
										0.14	2260	19
^{37}Cl (24.6%)	(n,γ)	10.31	^{38}Cl	β^-	4.91	37.5m	^{38}Ar	0.56	thermal			6
	(n,2n)	-8.58	^{36}Cl	β^- β^+,EC	0.712 1.14	3.1×10^5y	^{36}Ar ^{36}S	+		0.35	0	1
	(n,p)	1.93	^{37}S	β^-	4.8	5.06m	^{37}Cl	+		0.018	292	1
	(n,α)	2.46	^{34}P	β^-	5.1	12.4s	^{34}S	-		0.12	1940	7
										0.055	891	19
										0.024	389	20
										0.036	583	27
^{40}Ar (99.6%)	(n,2n)	-9.87	^{39}Ar	β^-	0.565	269y	^{39}K			0.57	7.93	8
	(n,p)	-6.72	^{40}Cl	β^-	7.5	1.4m	^{40}Ar			0.015	243	7
										0.072	1170	20
	(n,α)	-2.49	^{37}S	β^-	4.8	5.06m	^{37}Cl			0.013	210	7,26
										0.031	502	21

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (Ci/g)	Reference
^{39}K (93.08%)	(n,γ)	7.80	^{40}K	β− EC, β^+	1.314 1.505	1.26×10^9y	^{40}Ca ^{40}Ar	~?	thermal			6
	(n,2n)	-13.09	^{38}K	β^+,EC	5.93	7.7m	^{38}Ar meta →^{38}Ar g	~0.025	~20	0.0016	25.9	1
	(n,2nα)	-13.09	$^{38}K^m$	β^+	6.06	0.95s	$^{38}Ar^g$	0.012	9.1	[illegible]	13.0	7
	(n,p)	0.22	^{39}Ar	β^-	0.565	2.69×10^2y	^{39}K	0.35	12	0.35	4.87	1
										0.21	2.92	20
	(n,α)	1.36	^{36}Cl	β^- β^+,EC	0.712 1.14	3.1×10^5y	^{36}Ar ^{36}S	0.16	8	0.11	0	1,19
	(n,np)	——	^{38}Ar							0.18		5
	(n,nα)	——	^{35}Cl							0.03		5
^{41}K (6.91%)	(n,2n)	-10.10	^{40}K	β^- β^+	1.314 1.505	1.26×10^9y	^{40}Ca ^{40}Ar	+		0.4	0	1
	(n,2nα)	-10.10	$^{40}K^m$			294ms				0.036		7
	(n,p)	-1.71	^{41}Ar	β^-	2.491	1.83h	^{41}K	0.09	18	0.08	1300	1
										0.11	1700	20
	(n,α)	-0.11	^{38}Cl	β^-	4.91	37.3m	^{38}Ar	0.033	12	0.071	502	1,27
										0.067	1090	19
^{40}Ca (96.97%)	(n,2n)	-15.63	^{39}Ca	β^+	6.50	0.87s	^{39}K	0.74	12	0	0	
	(n,p)	-0.53	^{40}K	β^- β^+	1.314 1.505	1.3×10^9y	^{40}Ca ^{40}Ar			0.60	0	1
										0.23	0	20
	(n,α)	1.75	^{37}Ar	EC	0.814	35.1d	^{37}Cl	0.8	10	0.5	7370	1
										0.55	8110	19
	(n,np)	——	^{39}K							0.20		5
^{42}Ca (0.64%)	(n,2n)	-11.47	^{41}Ca	EC	0.427	7.7×10^4y	^{41}K	+		0.13	0	1
	(n,p)	-2.73	^{42}K	β^-	3.52	12.4h	^{42}Ca	0.17	12	0.16	2900	1
										0.11 0.18	1700 2920	15 27
	(n,α)	0.35	^{39}Ar	β^-	0.565	2.7×10^2y	^{39}K	+		0.09	1.25	1
										0.30	4.16	19
^{43}Ca (0.145%)	(n,2n)	-7.93	^{42}Ca							0.47		15
	(n,p)	-1.84	^{43}K	β^-	1.82	22.4h	^{42}Ca	0.16	14	0.16	2590	1
										0.097	1570	7,27
										0.085	1380	20
	(n,α)	2.29	^{40}Ar							0.23		19
	(n,np)	-11	^{42}K	β^-	3.52	12.4h	^{42}Ca	+		0.02	324	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (mCi/g)	Reference
^{44}Ca (2.08%)	(n,γ)	7.41	^{45}Ca	β^-	0.252	153d	^{45}Sc	0.67	thermal			6
	(n,2n)	-11.14	^{43}Ca							0.54		15
										0.4		8
	(n,p)	-4.88	^{44}K	β^-	5.2	22m	^{44}Ca	0.041	12	0.035	567	1,20
										0.040	648	27
	(n,α)	-2.75	^{41}Ar	β^-	2.491	1.83h	^{41}K	+		0.045	729	1,19
										0.032	518	27
^{46}Ca (0.003%)	(n,2n)	-10.40	^{45}Ca	β^-	0.252	1.65×10^2d	^{45}Sc	+		0.65	4220	1,15
	(n,α)	——	^{43}Ar	——	——	——	——			0.0042		19
^{48}Ca (0.185%)	(n,2n)	-9.95	^{47}Ca	β^-	1.979	4.53d	$^{47}Sc \rightarrow ^{47}Ti$ (3.43d)	+		0.8	13000 (1300C)	1
	(n,p)	——	^{48}K	——	——	——	——			0.0052	842 (842)	20
	(n,α)	——	^{45}Ar	——	——	——	——			0.00014		19
^{45}Sc (100%)	(n,γ)	8.77	^{46}Sc	β^-	2.367	83.9d	$^{46}Ti^{omit} \rightarrow ^{46}Ti^{g}$	25	thermal	0.003	30.9	5
	(n,2n)	-11.32	^{44}Sc	β^+,EC	3.647	3.92h	^{44}Ca	~0.25	~18	0.14	2270	1,7
	(n,2n^m)	-11.32	$^{44}Sc^m$	IT	0.26	2.45d	$^{44}Sc^g, ^{44}Ca$ (3.92h)	~0.15	~18	0.11	1700 (1700)	1,7
	(n,p)	0.53	^{45}Ca	β^-	0.252	1.65×10^2d	^{45}Sc	0.11	8	0.06	309	1,2
										0.12	700	20
	(n,α)	-0.40	^{42}K	β^-	3.52	12.4h	^{42}Ca	0.055	14	0.055	891	1,27
										0.11	1780	19
^{46}Ti (7.95%)	(n,2n)	-13.20	^{45}Ti	β^+,EC	2.059	3.09h	^{45}Sc	+		0.012	194	1
										0.051	826	23
	(n,p)	-1.58	^{46}Sc	β^-	2.367	84d	$^{46}Ti^{omit} \rightarrow ^{46}Ti^{g}$	0.3	15	0.3	3000	7
										0.22	3260	20,27
	(n,α)	-0.08	^{43}Ca							0.17		19
^{47}Ti (7.75%)	(n,2n)	-8.88	^{46}Ti							0.39		15
	(n,p)	0.18	^{47}Sc	β^-	0.600	3.43d	^{47}Ti	+		0.11	1700	2,27
										0.17	2750	20
	(n,α)	2.18	$^{44}Ca^{omit}$	IT	1.156	4ps	^{44}Ca			0.0016	25.9	17
	(n,np)	——	^{46}Sc	β^-	2.367	84d	$^{46}Ti^{omit} \rightarrow ^{46}Ti^{g}$	+		0.05	514	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (mCi/g)	Reference
^{47}Ti (73.45%)	(n,γ)	8.14	^{48}Ti					0.0083	thermal			6
	(n,2n)	-11.63	^{46}Ti							0.37		8,15
	(n,p)	-3.21	^{47}Sc	β^-	3.98	44h	$^{47}Ti^{excit} \rightarrow {}^{47}Ti\,\beta$	0.065	14	0.065	1050	2,27
										0.12	1940	20
	(n,α)	-2.03	^{44}Ca	β^-	0.252	165d	^{44}Sc			0.039	253	21,27
	(n,np)	-11	^{46}Sc	β^-	0.600	3.4d	^{46}Ti	+		0.01	162	1
^{49}Ti (5.51%)	(n,γ)	10.95	^{50}Ti					0.0019	thermal			6
	(n,2n)	-8.13	^{48}Ti							0.61		15
	(n,p)	-1.22	^{49}Sc	β^-	2.000	57.5m	^{49}Ti	0.033	15	0.033	535	1,27
										0.10	16200	20
	(n,α)	0.23	^{46}Ca							0.039		19
	(n,np)	-11	^{48}Sc	β^-	3.98	1.83d	$^{48}Ti^{excit} \rightarrow {}^{48}Ti\,\beta$	+		0.0013	21.1	1
^{50}Ti (5.34%)	(n,γ)	6.38	^{51}Ti	β^-	2.46	5.8m	$^{51}V^{excit} \rightarrow {}^{51}V\,\beta$	0.004	thermal	0.003	48.6	5
	(n,2n)	-10.95	^{49}Ti							0.54		15
	(n,p)	-6.11	^{50}Sc	β^-	6.5	1.72m	$^{50}Ti^{excit} \rightarrow {}^{50}Ti\,\beta$	+		0.02	324	1,27
										0.040	648	20
	(n,α)	-3.44	^{47}Ca	β^-	1.979	4.53d	$^{47}Sc \rightarrow {}^{47}Ti$ (4.43d)	+		0.009	145 (145)	1,21
										0.013	210 (210)	17,27
^{50}V (0.24 %)	(n,2n)	-9.33	^{49}V	EC	0.60	330d	^{49}Ti	+		0.54	1900	1
										0.074	271	20
	(n,α)	0.76	^{47}Sc	β^-	0.600	3.43d	^{47}Ti	+		0.028	454	1
										0.048	778	19
^{51}V (99.76%)	(n,γ)	7.31	^{52}V	β^-	3.97	3.76m	$^{52}Cr^{excit} \rightarrow {}^{52}Cr\,\beta$	4.9 (0.001 3)	thermal			5
	(n,2n)	-11.05	^{50}V	β^- EC	1.033 2.215	6×10^{15}y	$^{50}Cr \rightarrow {}^{50}Cr\,\beta$ (6ps) $^{50}Ti \rightarrow {}^{50}Ti\,\beta$ (0.7ps)	+		0.65	0	1
										0.47	0	15
	(n,p)	-1.68	^{51}Ti	β^-	2.46	5.8m	$^{51}V^{excit} \rightarrow {}^{51}V\,\beta$	0.037	13	0.036	583	1,27
										0.028	454	20
	(n,α)	-2.06	^{48}Sc	β^-	3.98	1.83d	$^{48}Ti^{excit} \rightarrow {}^{48}Ti\,\beta$	0.035	17	0.022	356	1,5
										0.042	680	19
										0.018	292	27
	(n,nα)	-3	^{47}Sc	β^-	0.600	3.43d	^{47}Ti	+		0.003	48.6	1

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^{50}Cr (4.31%)	(n,γ)	9.26	^{51}Cr	β^+,(EC)	0.751	27.8d	^{51}V	13.5	thermal			6
	(n,2n)	-12.94	^{49}Cr	β^+,(EC)	2.56	42m	^{49}Sc,^{49}Ti (330d)	0.09	20	0.009	146 (33.0)	17
										0.029	470 (106)	23
	(n,p)	-0.26	^{50}V	β^- EC	1.033 2.215	6×10^{15}y	^{50}Cr,$^{50}Ti^S$ (6ps) ^{50}Ti,$^{50}Ti^S$ (0.7ps)			0.36 0.28	0 0	20 27
	(n,α)	0.32	^{47}Ti							0.16	0	19
	(n,np)	——	^{49}V	EC	0.60	330d	^{49}Ti	+		0.15	549	1
^{52}Cr (83.76%)	(n,2n)	-12.04	^{51}Cr	EC	0.752	27.8d	^{51}V	+		0.25	3060	1
										0.35	5300	23
	(n,p)	-3.20	^{52}V	β^-	3.97	3.77m	^{52}Cr,$^{52}Cr^S$ (0.7ps)	0.13	11	0.10	1620	20,27
	(n,α)	-1.21	^{49}Ti							0.054	275	19
^{53}Cr (9.55%)	(n,2n)	-7.94	^{52}Cr							1.05		15
										0.05		8
	(n,p)	-[illegible].46	^{53}V	β^-	3.4	2.0m	$^{53}Cr^{omeit}$ $\rightarrow{}^{53}Cr^S$			0.04	640	1
										0.064	1040	20
	(n,α)	1.00	^{50}Ti							0.005		19
^{54}Cr (2.38%)	(n,γ)	6.26	^{55}Cr	β^-	2.59	3.5m	^{55}Mn	0.38	thermal			6
	(n,2n)	-9.72	^{53}Cr							1.19		15
										0.76		8
	(n,p)	-6.22	^{54}V	β^-	7.3	55s	$^{54}Cr^{omeit}$ $\rightarrow{}^{54}Cr^S$			0.016	259	20
										0.044	713	27
	(n,α)	-1.55	^{51}Ti	β^-	2.46	5.0m	$^{51}V^{omeit}$ $\rightarrow{}^{51}V^S$	+		0.013	211	1,27
										0.047	761	19
^{55}Mn (100%)	(n,γ)	7.27	^{56}Mn	β^-	3.702	2.576h	^{56}Fe	13	thermal	7.6×10^{-4}	12.3	5
	(n,2n)	-10.22	^{54}Mn	EC	1.379	303d	$^{54}Cr^{omeit}$ $\rightarrow{}^{54}Cr^S$	0.9	17	0.8	3150	2
										0.84	3310	23
	(n,p)	-1.81	^{55}Cr	β^-	2.59	3.5m	^{55}Mn	0.090	15	0.093	1340	1
										0.045	729	7
										0.036	583	27
	(n,α)	-0.63	^{52}V	β^-	3.97	3.77m	^{52}Cr	0.036	14	0.034	551	1,27
										0.046	745	19

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σ_th.n (barns)	Energy for σ_n.n (MeV)	σ at 14 MeV (barns)	Radioactivity (Ci/g)	Reference
^{54}Fe (5.84%)	(n,γ)	9.30	^{55}Fe	EC	0.23	2.6y	^{55}Mn	2.5	thermal			6
	(n,2n)	-13.38	^{53}Fe	β^+,(EC)	0.590	8.5m	$^{53m,53}Cr$ (2.6y,γ)	<0.08	18	0.01	162	1,7
										0.024	227	23
	(n,p)	0.89	^{54}Mn	EC	1.379	303d	^{54}Cr (15ps)	0.35	9	0.35	1380	2,27
										0.44	2730	20
	(n,α)	0.86	^{51}Cr	EC	0.752	27.8d	^{51}V	+		0.09	1300	1
										0.11	1700	19,27
	(n,t)	-12.43	^{52}Mn	EC,β^+	4.708	5.7d	^{52}Cr	+		5×10^{-5}	0.81	1
	(n,t^*)	-12.43	$^{52}Mn^m$	β^+,(EC)	5.091	22m	^{52}Cr	+		4×10^{-5}	6.48	1
	(n,nα)	-9	^{53}Mn	EC	0.598	2×10^6y	^{53}Cr	+		0.11	0	1
^{56}Fe (91.68%)	(n,γ)	7.63	^{57}Fe					<2.7	thermal			6
	(n,2n)	-11.20	^{55}Fe	EC	0.232	2.6y	^{55}Mn	+		0.34	466	1
										0.49	675	23
	(n,p)	-2.92	^{56}Mn	β^-	3.702	2.58h	^{56}Fe	0.12	13.5	0.12	1940	2,20, 27
	(n,α)	0.32	^{53}Cr							0.0023		17
										0.09		19
^{57}Fe (2.17%)	(n,2n)	-7.65	^{56}Fe							0.87		15
	(n,p)	-1.78	^{57}Mn	β^-	2.7	1.7m	^{57}Fe	0.10	15	0.09	146	1
										0.054	875	20,27
	(n,α)	2.48	^{54}Cr							0.070		19
	(n,np)	-11	^{56}Mn	β^-	3.702	2.58h	^{56}Fe	+		0.004	64.8	1
^{58}Fe (0.31%)	(n,γ)	6.59	^{59}Fe	β^-	1.573	46d	^{59}Co	0.98	thermal			6
	(n,2n)	-10.06	^{57}Fe							1.0		15
	(n,p)	-5.32	^{58}Mn	β^-	6.5	1.1m	^{58}Fe			0.015	243	1
										0.019	308	20
	(n,α)	-1.39	^{55}Cr	β^-	2.59	3.5m	^{55}Mn	<0.0015	thermal	0.012	194	1
										0.017	275	19
										0.022	356	27

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σ n,γ (barns)	Energy for σ n,γ (MeV)	σ at 14 MeV (barns)	Radio-activity (Ci/g)	References
^{59}Co (100%)	(n,γ)	7.40	^{60}Co	β^-	2.980	5.26y	^{60}Ni	20	thermal	0.000	2.13	1
	(n,2n)	-10.46	^{58}Co	EC,β^+	2.300	71d	^{58}Fe	+		0.25	2000	1
										0.46	7230	7
	(n,2n^m)	-9.46	$^{58}Co^m$	IT	0.025	9h	^{58}Co,β,^{58}Fe (71.3d)	+		0.38	6640 (43000)	1
								+0.8	+38	0.46	20000 (7230)	7
	(n,p)	-0.78	^{59}Fe	β^-	1.573	45d	^{59}Co	0.00	+54	0.00	1100	1
										0.072	900	20,27
	(n,t)	-8.92	^{57}Fe					+		0.0000		1
	(n,α)	0.32	^{56}Mn	β^-	3.700	2.58h	^{56}Fe	0.000	34	0.000	470	2,27
										0.056	880	19
										0.0011	17.8	17
^{58}Ni (67.76%)	(n,γ)	9.01	^{59}Ni	EC	1.07	8×10^4y	^{59}Co	~ 4.4	thermal			6
	(n,2n)	-12.20	^{57}Ni	EC,β^+	3.34	36h	^{57}Co,^{57}Fe (270d)	+		0.023	373 (1000)	1
										0.004	386 (140)	23
	(n,p)	0.30	^{58}Co	EC,β^+	2.300	71d	^{58}Fe	0.7	30	0.5	2640	2
	(n,p^m)	0.30	$^{58}Co^m$	IT	0.025	9.0h	^{58}Co,β,^{58}Fe (71.3d)	0.41	8	0.37	5000 (43400)	1
										0.22	2860 (2400)	7
	(n,d)	-5.95	^{57}Co	EC	0.837	272d	^{57}Fe	0.56	14	0.56	2400	1
	(n,α)	2.09	^{56}Fe	EC	0.23	2.6y	^{56}Mn	0.11	12	0.11	156	2
										0.0014	1.99	17
	(n,n^m)	2.09	^{56}Fe,metic		1.322 1.432		^{56}Fe,β,^{56}Mn (2.6y)			0.0044		17
	(n,np)	-8	^{57}Co	EC	0.837	270d	^{57}Fe	+		0.24	1000	1
^{60}Ni (26.16%)	(n,2n)	-11.39	^{59}Ni	EC	1.07	8×10^4y	^{59}Co	+		0.26	0	.
										0.26	0	15
	(n,p)	-2.06	^{60}Co	β^-	2.819	5.26y	^{60}Ni	0.34	13	0.13	92.4	1
	(n,p^m)	-2.06	$^{60}Co^m$	IT (β^-)	0.0006	10.5m	^{60}Co,β,^{60}Ni (5.3y)	0.004	13	0.013	211	1
										0.02	426	7
	(n,α)	1.35	^{57}Fe							0.0043		17
										0.096		19

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	mat.e (barns)	Energy for mat.e (MeV)	σ at 14 MeV (barns)	Radioactivity (Curie/mol)	Reference
^{61}Ni (1.25%)	(n,2n)	-7.82	^{60}Ni							0.46		15
										0.80		8
	(n,p)	-0.53	^{61}Co	β^-	1.29	99m	^{61}Ni			0.006	1560	27
										0.006	1430	19
	(n,α)	3.57	^{58}Fe							0.0009		17
	(n,α^n)	3.57	^{58}Fe^{metic}	IT	0.810	7ps	^{58}Fe^g			0.0081	17.4	17
	(n,np)	-10	^{60}Co	β^-	2.519	5.26y	^{60}Ni^{metic} $\rightarrow$ ^{60}Ni^g	+		0.0033	2.37	1
	(n,np^n)	-10	^{60}Co^m	IT (β^-)	0.0046	10.5m	^{60}Co^g,^{60}Ni (5.3y)	+		0.0033	53.5	1
^{62}Ni (3.66%)	(n,γ)	6.84	^{63}Ni	β^-	0.062	92y	^{63}Cu	20	thermal	0.000	0.122	1
	(n,2n)	-10.80	^{61}Ni							0.81		15
	(n,p)	-4.44	^{62}Co	β^-	5.22	13.9m	^{62}Ni	0.002	14	0.002	306	1
	(n,p^n)	-4.44	^{62}Co^m	β^-	——	1.6m	^{62}Ni	0.002	14	0.002	306	1
	(n,α)	-0.44	^{59}Fe	β^-	1.573	45d	^{59}Co	+		0.017	233	1,27
										0.002	302	19,21
	(n,np)	-11	^{61}Co	β^-	1.29	99m	^{61}Ni	+		0.0000	303	1
^{64}Ni (1.16%)	(n,γ)	6.10	^{65}Ni	β^-	2.13	2.54h	^{65}Cu	1.6	thermal			6
	(n,2n)	-9.66	^{63}Ni	β^-	0.062	92y	^{63}Cu	+		1.0	40.7	1
										1.2	40.8	15
	(n,p)	-6.22	^{64}Co	——	——	7.8m	——	+		0.002	32.4	1
										0.005	81.0	7
	(n,p^n)	-6.22	^{64}Co^m	——	——	2.8m	——		32.4	0.002	32.4	1
	(n,α)	-2.41	^{61}Fe	β^-	5.8	6.0m	^{61}Co,^{61}Ni (99%)			0.001	16.2 (16.2)	1
										0.0045	72.9 (72.9)	19
										0.006	81.0 (81.0)	7,27
	(n,np)	-12	^{63}Co	β^-	3.6	53s	^{63}Ni,^{63}Cu (99%)			0.0030	36.7 (0.142)	1
^{63}Cu (69.1%)	(n,γ)	7.92	^{64}Cu	β^- β^+,EC	0.573 1.678	12.8h	^{64}Zn ^{64}Ni	44	thermal	0.0025	40.5	6
	(n,2n)	-10.85	^{62}Cu	β^+,EC	2.90	9.8m	^{62}Ni	1.0	19	0.5	8100	2,7
										0.56	9070	23
	(n,p)	0.72	^{63}Ni	β^-	0.067	92y	^{63}Cu	0.12	14	0.12	4.08	1,27
										0.077	3.13	20
	(n,^{3}He)	-9.53	^{61}Co	β^-	1.29	1.65h	^{61}Ni	+	3.13	0.0066	25.9	1
	(n,α)	1.72	^{60}Co	β^-	2.819	5.26y	^{60}Ni	0.040	12	0.038	27.0	2,27
										0.0000	1.99	17
	(n,α^n)	1.72	^{60}Co^m	IT (β^-)	0.0046 2.877	10.5m	^{60}Co^g,^{60}Ni (5.26y)	0.027	12	0.025	405 (17.0)	1
	(n,np)	-4	^{62}Ni							0.15		5

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g) max.	Reference
^{65}Cu (30.9%)	(n,γ)	7.87	^{66}Cu	β⁻	2.63	5.1m	^{66}Zn	2	thermal	0.006	97.2	6
	(n,2n)	-9.90	^{64}Cu	β⁻ β⁺,EC	0.573 1.678	12.9h	^{64}Zn ^{64}Ni	1.1	18	0.9	14600	2
										0.97	15700	23
	(n,p)	-1.25	^{65}Ni	β⁻	2.13	2.56h	^{65}Cu	0.021	14	0.021	340	1
										0.029	470	20,27
	(n,^{3}He)	-12.26	^{63}Co	β⁻	3.6	52s	^{63}Ni,^{63}Cu (92%)			~0.001	~16.2 (0.041)	5
	(n,α)	-0.09	^{62}Co	β⁻	5.22	13.9m	^{62}Ni	+		0.011	178	1
	(n,α^a)	-0.09	^{62}Co^m	β⁻	~5	1.6m	^{62}Ni	+		0.0010	29.2	1
	(n,nα)	-7	^{61}Co	β⁻	1.29	1.65h	^{61}Ni	+		0.0010	29.2	1
^{64}Zn (48.89%)	(n,γ)	7.98	^{65}Zn	EC,β⁺	1.35	235d	^{65}Cu	0.5	thermal	0.003	14.1	1
	(n,2n)	-11.86	^{63}Zn	β⁺,EC	3.366	38m	^{63}Cu	0.4	18	0.125	2030	1,7
										0.191	3090	23
	(n,p)	0.21	^{64}Cu	β⁻ EC,β⁺	0.573 1.678	12.8h	^{64}Zn ^{64}Ni	0.29	11.5	0.018	2920	13,27
										0.20	3240	20
	(n,α)	3.87	^{61}Ni							0.0066		17
										0.077		19
	(n,np)	——	^{63}Cu							0.4		5
^{66}Zn (27.81%)	(n,2n)	-11.05	^{65}Zn	EC,β⁺	1.35	245d	^{65}Cu	+		0.53	2500	1
										0.74	3490	23
	(n,p)	-1.85	^{66}Cu	β⁻	2.63	5.1m	^{66}Zn	0.076	13	0.076	1230	1,27
										0.078	1260	20,5
	(n,α)	2.27	^{63}Ni	β⁻	0.067	92y	^{63}Cu	+		0.043	1.75	1
										0.025	1.01	19
	(n,np)	——	^{65}Cu							0.05		5
^{67}Zn (4.11%)	(n,2n)	-7.05	^{66}Zn							0.91		15
										1.0		8
	(n,p)	0.21	^{67}Cu	β⁻	0.57	59h	^{67}Zn	0.58	14	0.058	940	1
										0.065	1050	20
										0.042	680	27
	(n,α)	4.88	^{64}Ni							0.032		19
	(n,np)	-9	^{66}Cu	β⁻	2.63	5.1m	^{66}Zn	+		0.01	162	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σ at 14 MeV (barns)	Energy for σ at 14 MeV (MeV)	σ at 14 MeV (barns)	Radio-activity (curie/g)	Reference
^{68}Zn (18.56%)	(n,γ)	6.48	^{69}Zn	β^-	0.90	51m	^{69}Ga	0.1	thermal	0.003	48.6	1
								1.0	thermal			5
	(n,γ*)	6.48	$^{69}Zn^m$	IT	0.439	14h	$^{69}Zn^g$,^{69}Ga (245d)	0.01	thermal	3×10^{-4}	4.86 (1.41)	1
								0.1	thermal			5
	(n,2n)	-10.36	^{67}Zn							1.0		15
										0.73		8
	(n,p)	-3.00	^{68}Cu	β^-	4.6	30s	^{68}Zn			0.005	405	5,20
										0.017	275	27
	(n,α)	0.70	^{65}Ni	β^-	2.13	2.50h	^{65}Cu	+		0.060	162	13,27
										0.0070	126	19
	(n,np)	-10	^{67}Cu	β^-	0.57	59h	^{67}Zn	+		5×10^{-4}	8.10	1
^{70}Zn (0.62%)	(n,γ)	5.84	^{71}Zn	β^-	2.61	2.5m	^{71}Ga	0.1	thermal	0.002	32.4	1,5
	(n,2n)	-9.22	^{69}Zn	β^-	0.901	55m	^{69}Ga	+		0.3	4000	1
										1.3	21100	7
	(n,2n*)	-9.22	$^{69}Zn^m$	IT	0.439	14h	$^{69}Zn^g$,^{69}Ga (57h)			0.9	14600	1
								0.61	18	0.57	9230	13
	(n,p)	——	^{70}Cu							0.0070		20
	(n,α)	-0.71	^{67}Ni	β^-	4.1	50s	^{67}Cu,^{67}Zn (59h)	+		0.0092	154 (138)	1
										0.0017	275 (275)	19
	(n,nα)	-6	^{66}Ni	β^-	0.20	55h	^{66}Cu,^{66}Zn (51m)			8×10^{-4}	13.0 (13.0)	1
^{69}Ga (60.2%)	(n,γ)	7.65	^{70}Ga	β^-	1.66	21.1m	^{70}Ge	2	thermal	0.002	32.4	1,5
	(n,2n)	-10.31	^{68}Ga	β^+,EC	2.920	68.3m	^{68}Zn	1.2	17	0.9	14600	1,7
										0.10	1620	23
	(n,p)	-0.12	^{69}Zn	β^-	0.901	55m	^{69}Ga	0.046	12	0.043	697	1
										0.017	275	7
										0.036	583	27
	(n,p*)	-0.12	$^{69}Zn^m$	IT	0.439	14h	$^{69}Zn^g$,$^{69}Ga^g$ (57h)	0.046	12	0.043	696 (696)	1
										0.021	340 (340)	7
	(n,α)	2.50	^{66}Cu	β^-	2.63	5.1m	^{66}Zn			0.010	292	7,27

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g)	Reference
^{71}Ga (39.8%)	(n,α)	6.52	^{72}Ga	β^-	4.00	14.1h	^{72}Ge	5	thermal	0.002	32.4	1,5
	(n,2n)	-9.30	^{70}Ga	β^-	1.66	21.1m	^{70}Ge	+		0.9	14600	1
										1.1	17000	23
	(n,p)	-2.02	^{71}Zn	β^-	2.61	2.4m	^{71}Ga	0.033	13	0.032	538	1
										0.005	81.0	7
	(n,p*)	-2.02	$^{71}Zn^m$	β^-	2.91	4.0h	^{71}Ga	0.023	13	0.020	334	1
										0.01	162	7
	(n,α)	0.93	^{68}Cu	β^-	4.6	30s	^{68}Zn			~0.06	972	7
	(n,nα)	-5	^{67}Cu	β^-	0.57	59h	^{67}Zn	+		0.004	64.8	1
^{70}Ga (20.55%)	(n,γ)	7.62	^{71}Ga	EC	0.23	11.4d	^{71}Ga	3.4	thermal	0.003	48.6	1,5
	(n,2n)	-11.53	^{69}Ga	EC,β^+	2.225	30h	^{69}Ga	0.9	18	0.54	8750	1,7
										0.65	10500	23
	(n,p)	-0.87	^{70}Zn	β^-	1.66	21.1m	^{70}Ga	0.17	10	0.10	1620	1,20
										0.077	1250	27
	(n,α)	2.96	^{67}Zn							——		
^{72}Ge (27.37%)	(n,2n)	-10.75	^{71}Ge	Ec	0.23	11.4d	^{71}Ga	+		0.73	11800	1
										0.84	13600	15
	(n,p)	-3.21	^{72}Ga	β^-	4.00	14.1h	^{72}Ge	0.060	13	0.065	1050	1
										0.032	518	7,27
	(n,α)	1.48	^{69}Zn	β^-	0.901	55m	$^{69}Ge^g$	0.008	14	0.008	130	1
	(n,α*)	1.48	$^{69}Zn^m$	IT	0.439	14.0h	$^{69}Ge^g$, $^{69}Ge^m$ (57%)	0.008	14	0.008	130 (130)	1
^{73}Ge (7.76%)	(n,2n)	-6.78	^{72}Ge							1.2		8
										1.05		15
	(n,p)	-0.77	^{73}Ga	β^-	1.55	4.9h	$^{73}Ge^m$, $^{73}Ge^g$ (0.53m)			0.021	340 (340)	7,27
										0.030	486 (486)	20
	(n,α)	3.91	^{70}Zn							0.00012		18
^{74}Ge (36.74%)	(n,γ)	6.49	^{75}Ge	β^-	1.20	82.0m	^{75}As	0.5	thermal	0.003	48.6	1,5
	(n,2n)	-10.20	^{73}Ge	β^-	2.61	2.4m	^{73}Ga			1.13	18300	15
	(n,p)	-4.72	^{74}Ga	β^-	5.5	7.9m	^{74}Ge			0.01	162	7,20
												27
	(n,α)	-0.44	^{71}Zn	β^-	2.61	2.4m	^{71}Ga	+		0.015	243	1
	(n,α*)	-0.44	$^{71}Zn^m$	β^-	2.91	4.0h	^{71}Ga	+		0.0035	56.7	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	Max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g) max.	Reference
^{76}Ge (7.67%)	(n,γ)	6.82	^{77}Ge	β^-	2.73	1.3h	^{77}As→^{77}Se (38.7%)	0.1	thermal	0.001	16.2 (16.2)	1,5
	(n,2n)	-9.44	^{75}Ge	β^-	1.20	82m	^{75}As			1.2	19400	1
	(n,2n$^{\alpha}$)	-9.44	^{75}Ge^m	IT	0.139	48s	^{75}Ge→^{75}As (82m)	1.2	15	1.0	16300 (16300)	7
	(n,p)	——	^{75}Ga	β^-	~7	32s	^{75}Ge			0.0046	79.4	20
	(n,nα)	-8	^{72}Zn	β^-	0.44	46.5h	^{72}Zn→^{72}Ga→^{72}Ge (98%)(24h)	+		7×10^{-4}	11.3 (11.3)	1
^{75}As (100%)	(n,γ)	7.33	^{76}As	β^-	2.97	26.5h	^{76}Se	5	thermal	0.003	48.6	1,6
	(n,n')	——	^{75}As^m	IT	0.304	17ms	^{75}As			0.13	2130	5
	(n,2n)	-10.24	^{74}As	β^+,EC β^-	2.564 1.36	17.9d	^{74}Ge ^{74}Se	1.2	16	1.1	17700	1,7
										1.11	1700	23
	(n,p)	-0.41	^{75}Ge	β^-	1.20	82m	^{75}As	0.02	14	0.02	324	1,27
	(n,p$^{\alpha}$)	-0.41	^{75}Ge^m	IT	0.139	48s	^{75}Ge→^{75}As (82m)	0.02	14	0.018	291 (291)	7
	(n,α)	1.20	^{72}Ga	β^-	4.00	14.1h	^{72}Ge	0.01	14.5	0.011	178	1,27
^{74}Se (0.87%)	(n,γ)	8.02	^{75}Se	EC	0.865	120d	^{75}As	30	thermal	0.003	24.5	1,6
	(n,2n)	-12.07	^{73}Se	EC,β^+	2.73	7.1h	^{73}As→^{73}Se^m→^{73}Se (87.1%)	~0.6	~18	0.26	4230 (2740)	1,7
	(n,2n$^{\alpha}$)	-12.07	^{73}Se^m	EC,β^+	2.8	42m	^{73}As→^{73}Se^m→^{73}Se (87.1%)	+		0.025	567 (360)	1
										0.2	3240 (2130)	7
	(n, p)	-8.57	^{74}As	β^+,EC β^-	2.564 1.36	17.9d	^{74}Ge ^{74}Se	0.1	~14	0.1	1610	1
										0.13	2000	20,27
^{76}Se (9.02%)	(n,2n)	-11.16	^{75}Se	EC	0.865	120d	^{75}As	+		0.73	5970	1
	(n,p)	-2.29	^{76}As	β^-	2.97	26.5h	^{76}Se	0.06	14	0.06	972	1
										0.050	955	20,27
	(n,α)	1.69	^{73}Ga							——		
^{77}Se (7.58%)	(n,2n)	-7.42	^{76}Se							0.93		15
	(n,p)	0.18	^{77}As	β^-	0.68	38.7h	^{77}Se			0.045	720	7
										0.095	892	20
										0.036	583	27
	(n,α)	4.47	^{74}Ge							——		

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 [illegible]	Radio-activity (Curie/g mol)	Reference
^{78}Se (23.52%)	(n,γ)	6.98	^{79}Se	β^-	0.154	6.5×10^4y	^{79}Br	0.06	thermal	[illegible]	0	1
	(n,γ*)	6.98	$^{79}Se^m$	IT	0.096	3.9m	$^{79}Se^g$,^{79}Br (6.5×10^4y)	0.4	thermal	[illegible]	32.4	1,5
	(n,2n)	-10.50	$^{77}Se^m$	IT	0.161	17.5s	^{77}Se	1.2	16	0.8	13000	7
										1.0	16300	15
	(n,p)	-3.49	^{78}As	β^-	4.3	91m	^{78}Se			0.021	340	1,27
										0.031	502	20
	(n,p*)	-3.49	$^{78}As^m$	——	——	6m	——	+		8×10^{-4}	13.0	1
	(n,α)	0.46	^{75}Ge	β^-	1.20	82m	^{75}As	+		0.006	97.0	1
	(n,α*)	0.46	$^{75}Ge^m$	IT	0.139	48s	$^{75}Ge^g$,^{75}As (82m)			0.0076	123	7
^{80}Se (49.82%)	(n,γ)	6.70	^{81}Se	β^-	1.50	1.06m	^{81}Br	0.53	thermal	0.002	32.4	1,5
	(2n,2n)	-9.98	^{79}Se	β^-	0.154	6.5×10^4y	$^{79}Br^g$	+		0.27	0.016	1
										1.2	0.069	15
	(n,2n*)	-9.98	$^{79}Se^m$	IT	0.096	3.9m	$^{79}Se^g$,$^{79}Br^g$ (6.5×10^4y)	1.4	14	0.09	1460	1
										0.8	13000	7
	(n,p)	-5.22	^{80}As	β^-	6.0	15.3s	^{80}Se			0.016	259	7
										0.0081	131	20
	(n,α)	-0.95	^{77}Ge	β^-	2.75	1.2h	^{77}As,^{77}Se (38.7h)	+		0.037	599 (599)	1
										0.006	97.2	7
	(n,α*)	-0.95	$^{77}Ge^m$	IT β^-	0.159 2.91	54s	$^{77}Ge^g$,^{77}As,^{77}Se ^{77}As,^{77}Se (38.7h)			0.006	97.2 (97.2)	7
^{82}Se (9.19%)	(n,γ)	5.93	^{83}Se	β^-	3.6	25m	^{83}Br,^{83}Kr,^{83}Rb,^{83}Kr (241h)(1.8h)	0.004	thermal	2×10^{-4}	3.24	1
	(n,γ*)	5.93	$^{83}Se^m$	β^-	3.82	70s	^{83}Br,^{83}Kr,^{83}Rb,^{83}Kr (241h)(1.8h)	0.05	thermal	0.002	42.4	1
	(n,2n)	-9.27	^{81}Se	β^-	1.50	18.6m	^{81}Br	+		0.09	1460	1
										0.3	4860	7
	(n,2n*)	-9.27	$^{81}Se^m$	IT	0.103	57m	$^{81}Se^g$,^{81}Br (18.6m)	+		1.45	23500 (23500)	1
	(n,p)	——	^{82}As							——		
	(n,α)	-2.55	^{79}Ge							——		
^{79}Br (50.52%)	(n,γ)	7.88	^{80}Br	(BC,β^+) β^-	1.871 2.01	17.6m	^{80}Se ^{80}Kr	10	thermal	0.001	16.2	1,5
	(n,γ*)	7.88	$^{80}Br^m$	IT	0.049	4.38h	$^{80}Br^g$,^{80}Se (17.6m) ^{80}Kr	2.7	thermal	0.001	16.2 (16.2)	1,5
	(n,2n)	-10.69	^{78}Br	(β^-) β^+,BC	0.70 3.57	6.5m	^{78}Kr ^{78}Se	~1.0	15	0.77	12500	1,7
										1.07	17300	23
	(n,p*)	0.64	$^{79}Se^m$	IT	0.096	3.9m	$^{79}Se^g$,$^{79}Br^g$ (6.5×10^4y)			0.01	162	7
	(n,α)	1.86	^{76}As	β^-	2.97	26.5h	^{76}Se	0.0135	14.5	0.013	211	1,27

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radio-activity (curie/g) max.	Reference
^{81}Br (49.48%)	(n,γ)	7.60	^{82}Br	β^-	3.092	35.3h	^{82}Kr	0.26	thermal	3×10^{-4}	4.86	1,5
	(n,γ*)	7.60	$^{82}Br^m$	IT	0.046	6.1m	$^{82}Br^g,^{82}Kr$ (35.34m)	3.0	thermal	0.003	48.6 (48.6)	1,5
	(n,2n)	-10.16	^{80}Br	EC,β^+ β^-	1.87 2.01	17.6m	^{80}Se ^{80}Kr	+		0.44	7138	1
	(n,2n*)	-10.16	$^{80}Br^m$	IT	0.049	4.38h	$^{80}Br^g,^{80}Se$ (7.5m) ^{80}Kr	0.8	16	0.7	11300 (11300)	1,7
	(n,p)	-0.81	^{81}Se	β^-	1.58	18.6m	^{81}Br	+		0.022	356	1
	(n,p*)	-0.81	$^{81}Se^m$	IT	0.103	57m	$^{81}Se^g,^{81}Br$ (18.6m)	+		0.022	356	1
	(n,α)	0.43	^{78}As	β^-	4.3	91m	^{78}Se	+		0.007	113	1,27
	(n,nα)	-6	^{77}As	β^-	0.68	8.7h	^{77}Se	+		0.005	81	1
^{84}Kr (56.9%)	(n,γ)	7.11	^{85}Kr	(IT),β^- β^-	0.97 0.67	4.4h 10.76y	^{85}Rb	0.10 ~0.06	thermal			6
	(n,2n)	-10.52	^{83}Kr							1.1		15
	(n,p)	-3.92	^{84}Br	β^-	4.7	31.8m	^{84}Kr			0.009	146	7
										0.0073	118	20
^{86}Kr (17.37%)	(n,2n)	-9.06	^{85}Kr	β^-	0.67	10.76y	$^{85}Rb^g$			1.3	452	15
	(n,2n*)	-9.06	$^{85}Kr^m$	β^- IT	0.97 0.305	4.4h	$^{85}Rb^m,^{85}Rb$ $^{85}Kr^g,^{85}Rb$ (10y)			0.35	5670	7
	(n,α)	-2.18	^{83}Se	β^-	3.6	25m	$^{83}Br^m,^{83}Br^g,^{83}Kr$ (2.41h)			0.0012	19.4	7
^{85}Rb (72.15%)	(n,γ)	8.65	^{86}Rb	β^-	1.76	18.7d	^{86}Sr	0.8	thermal	0.002	32	1,6
	(n,γ*)	8.65	$^{86}Rb^m$	IT	0.56	1.04m	$^{86}Sr^m,^{86}Sr$ (18d)	0.08	thermal	2×10^{-4}	3.24	1
	(n,2n)	-10.48	^{84}Rb	EC,β^+ β^-	2.680 0.886	33d	^{84}Kr ^{84}Sr	~1.2	16	0.7	11100	1,7
	(n,2n*)	-10.48	$^{84}Rb^m$	IT	0.464	20m	$^{84}Kr^g$ ^{84}Kr (33d) ^{84}Sr			0.7	11300	1
								0.5	18	0.35	5670	7
	(n,p*)	0.10	$^{85}Kr^m$	β^- IT	0.97 0.3050	4.4h	^{85}Rb $^{85}Kr^g,^{85}Rb$ (10y)	0.005	15.5	0.004	64.8	7
	(n,α)	0.99	^{82}Br	β^-	3.092	35.3h	^{82}Kr	+		0.06	972	1
								0.01	17.5	0.007	113	7,27
	(n,α*)	0.99	$^{82}Br^m$	IT (β^-)	0.046 3.138	6.1m	$^{82}Br^g,^{82}Kr$ (35h) ^{82}Kr	+		0.06	972	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g mol)	Reference
^{87}Rb (27.85%)	(n,γ)	6.08	^{88}Rb	β^-	5.2	17.8m	^{88}Sr	0.12	thermal	5×10^{-4}	8.1	1,6
	(n,2n)	-9.93	^{86}Rb	β^-	1.78	18.7d	^{86}Sr	+		0.58	9310	1
								1.2	16	1.0	16[illegible]0	7
	(n,2n^a)	-9.93	$^{86}Rb^m$	IT	0.56	1.04m	$^{86}Sr^g$,^{86}Sr (18d)	+		0.58	9400	1
	(n,p)	-3.11	^{87}Kr	β^-	3.89	76m	^{87}Rb,$^{87}Sr^g$ (50.8d,γ)			0.0040	77.8	1
										0.0019	30.8	20
	(n,α)	-1.21	^{84}Sr	β^-	4.7	31.8m	^{84}Kr	+		0.023	373	1
										0.002	32.4	7
	(n,α^a)	-1.21	$^{84}Sr^m$	β^-	~5.0	6m	^{84}Kr	+		0.023	373	1
										0.002	32.4	7
	(n,nα)	-8	^{83}Sr	β^-	0.97	2.43h	$^{83}Kr^m$,$^{83}Kr^g$ (1.9h)	+	+	0.0012	19.4	1
^{84}Sr (0.56%)	(n,γ)	8.53	^{85}Sr	EC	1.11	64d	Rb	0.4	thermal	0.001	11.9	1,5
	(n,γ^a)	8.53	$^{85}Sr^m$	IT EC	0.237 1.34	70m	$^{85}Sr^g$,^{85}Rb (64d) ^{85}Rb	0.65	thermal	0.001	16.2	1,5
	(n,2n)	-12.01	^{83}Sr	EC,β^+	2.21	32.4h	^{83}Rb,^{83}Kr (86d)			0.13	2110	1
								0.4~1.5	18			7
^{86}Sr (9.86%)	(n,γ^a)	8.43	$^{87}Sr^m$	IT	0.388	2.83h	^{87}Sr	0.8	thermal	0.002	32.4	1,5
	(n,2n)	-11.49	^{85}Sr	EC	1.11	64d	^{85}Rb			0.34	3590	1
								0.4	17			7
	(n,2n^a)	-11.49	$^{85}Sr^m$	IT EC	0.237 1.34	70m	$^{85}Sr^g$,^{85}Rb (64d) ^{85}Rb			0.34	5510	1
								0.4	17			7
	(n,p)	-0.99	^{86}Rb	β^-	1.78	18.7d	^{86}Sr	+		0.02	321	1
										0.04	642	7
	(n,p^a)	-0.99	$^{86}Rb^m$	IT	0.56	1.04m	$^{86}Sr^g$,^{86}Sr (18.6d)	+		0.02	324	1
										0.009	146	7
	(n,α^a)	1.12	$^{83}Kr^m$	IT	0.0418	1.86h	$^{83}Kr^g$			—		
^{87}Sr (7.02%)	(n,n')	—	$^{87}Sr^m$	IT	0.388	2.8y	^{87}Sr	0.33	5	0.1	1620	1
	(n,α)	3.21	^{84}Kr							—		
^{88}Sr (82.56%)	(n,γ)	6.36	^{89}Sr	β^-	1.463	53d	$^{89}Y^g$	1	thermal	0.002	26	1
								0.005	thermal			6
	(n,2n^a)	-11.11	$^{87}Sr^m$	IT (EC)	0.388 —	2.83h	^{87}Sr ^{87}Rb,^{87}Sr (50.8d,γ)	0.28	17	0.20	3240	1,7
	(n,p)	-4.52	^{88}Rb	β^-	5.2	17.8m	^{88}Sr	+		0.018	292	1,27
										0.0037	59.9	20
	(n,α)	-0.79	^{85}Kr	β^-	0.67	10.8y	$^{85}Rb^g$	+		0.27	69.37	1
										0.087	30.2	36
	(n,α^a)	-0.79	$^{85}Kr^m$	IT	0.305	4.4h	$^{85}Kr^g$,^{85}Rb (10y)	+		0.065	1050	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/mol)	References
^{89}Y (100%)	(n,γ)	6.86	^{90}Y	β^-	2.27	64h	$^{90}Zr^g$	1.28	thermal	0.002	32.4	1
	(n,γ*)	6.86	$^{90}Y^m$	IT	0.685	3.1h	$^{90}Y^g$→^{90}Sr (64h)	0.001	thermal	5×10^{-4}	8.1	1
	(n,2n)	-11.47	^{88}Y	EC,β^+	3.621	108d	^{88}Sr	+		0.75	6000	1
										1.06	9320	23
	(n,p)	-0.71	^{89}Sr	β^-	1.463	52d	$^{89}Y^g$	0.023	14.5	0.023	299	1
										0.036	336	20,27
	(n,α)	0.70	^{86}Rb	β^-	1.78	18.7d	^{86}Sr	+		0.0025	40.1	1
	(n,α*)	0.70	$^{86}Rb^m$	IT	0.56	1.04m	$^{86}Rb^g$→^{86}Sr (18d)	+		0.0025	40.5	1
^{90}Zr (51.46%)	(n,γ)	7.20	^{91}Zr					0.064	4.5×10^{-3}			5
	(n,2n)	-11.98	^{89}Zr	EC,β^+	2.834	78.4h	$^{89}Y^m$→^{89}Y	1.2	18	0.56	9070	1,7
	(n,2n*)	-11.98	$^{89}Zr^m$	IT (EC,β^+)	0.588 3.41	4.18m	$^{89}Zr^g$→^{89}Y (78h)	+		0.06	972	1
	(n,p)	-1.51	^{90}Y	β^-	2.27	64.2h	$^{90}Zr^g$	+		0.033	536	1
	(n,p*)	-1.51	$^{90}Y^m$	IT	0.685	3.1h	$^{90}Y^g$→^{90}Zn (64h)	+		0.011	178	1
								flat		0.045	720	7
	(n,α*)	1.75	$^{87}Sr^m$	IT	0.388	2.8h	$^{87}Sr^g$	+		0.0032	51.8	1
^{91}Zr (11.23%)	(n,2n)	-7.20	^{90}Zr							1.4 1.3		8,14 15
	(n,p)	-0.76	^{91}Y	β^-	1.545	59d	$^{91}Zr^g$			0.034	419	27
										0.06	650	1
	(n,p*)	-0.76	$^{91}Y^m$	IT	0.551	50m	$^{91}Y^g$→^{91}Zr (58d)			0.06	860	1
										0.048	200	7
	(n,α)	5.66	^{88}Sr							——		
	(n,np)	-9	^{90}Y	β^-	2.27	64.2h	$^{90}Zr^g$	+		0.004	64.8	1
	(n,np*)	-9	$^{91}Y^m$	IT	0.685	3.1h	$^{90}Y^g$→^{90}Zr (64h)	+		0.004	64.8 (47.5)	1
^{92}Zr (17.11%)	(n,γ)	6.76	^{93}Zr	β^-	0.090	1.5×10^6y	$^{93}Nb^m$→^{93}Nb (13.6y)	0.2	thermal	0.003	0	1
	(n,2n)	-8.66	^{91}Zr							1.3		8
										1.4		14
										1.5		15
	(n,p)	-2.84	^{92}Y	β^-	3.63	3.53h	^{92}Zr			0.019	308	22,27
										0.022	356	1
										0.024	389	20
	(n,α)	3.39	^{89}Sr	β^-	1.463	50.4d	$^{89}Y^g$	0.01	16	0.009	117	1, 7,27
	(n,np)	-9	^{91}Y	β^-	1.545	59d	$^{91}Zr^g$	+		5×10^{-4}	6.5	1
	(n,np*)	-9	$^{91}Y^m$	IT	0.55	50m	$^{91}Y^g$→$^{91}Zr^g$ (58d)	+		2×10^{-3}	3.24	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radio-activity (curie/g mol)	References
^{94}Zr (17.40%)	(n,γ)	6.48	^{95}Zr	β^-	1.121	65d	^{95m}Nb, ^{95}Nb (35d)	0.08	thermal	4×10^{-4}	4.75	1,5
	(n,2n)	-8.19	^{93}Zr	β^-	0.090	1.5×10^6y	^{93m}Nb, ^{93}Nb (13.6y)			1.4	0	14
								+		1.5	0	1
										1.8	0	15
	(n,p)	-4.22	^{94}Y	β^-	5.0	20.3m	^{94}Zr	+		0.005	81.0	1
										0.0085	137	20
										0.01	162	7,27
	(n,α)	2.07	^{91}Sr	β^-	2.67	9.7h	^{91}Y, ^{91}Zr (58d)	0.0065	16	0.0046	74.5 (54.6)	1,7 27
										0.0050	81.0	22
	(n,np)	-11	^{93}Y	β^-	2.09	10.2h	^{93}Zr, ^{93m}Nb, ^{93}Nb (1.5×10^6y)	+		0	0	1
^{96}Zr (2.80%)	(n,γ)	5.58	^{97}Zr	β^-	2.67	17h	^{97m}Nb, ^{97}Nb, ^{97}Mo (72m)	0.05	thermal	0.004	64.8 (64.8)	1,5
	(n,2n)	-7.83	^{95}Zr	β^-	1.12	65d	^{95m}Nb, ^{95}Nb (35d)	1.6	14	1.6	19000 (25500)	1,14
										1.46	17300	23
	(n,p)	-6.02	^{96}Y	β^-	6.9	2.3m	^{96}Zr	+		0.012	194	1
	(n,α)	0.17	^{93}Sr	β^-	4.8	8m	^{93}Y, ^{93}Zr, ^{93m}Nb (10.2h), ^{93}Nb	+		0.0035	56.7 (56.7)	1
										0.0026	42.1	27
^{93}Nb (100%)	(n,γ)	7.23	^{94}Nb	β^-	2.06	2×10^4y	^{94}Mo	0.1	thermal	5×10^{-5}	0	1
	(n,γ^a)	7.23	^{94m}Nb	IT (β^-)	0.0407 2.10	6.3m	^{94m}Nb, ^{94}Nb (8×10^3y), ^{94}Mo	1	thermal	5×10^{-4}	8.1	1
	(n,n')	—	^{93m}Nb	IT	0.0304	13.6y	^{93}Nb	1.2	8	0.3	82.5	1
	(n,2n+2n^a)	-8.83	^{92m}Nb^{g+m}	—	—	—	—			1.24		35
	(n,2n^a)	-8.83	^{92m}Nb	EC,β^+	2.14	10.1d	^{92}Nb	0.41	14	0.41	6440	2
	(n,p)	0.72	^{93}Zr	β^-	0.090	1.5×10^6y	^{93m}Nb, ^{93}Nb (13.6y)			0.040	0	26
								0.045	14	0.045	0	1
	(n,2p)	-8.08	^{92}Y	β^-	3.63	3.53h	^{92}Zr			<5×10^{-4}	<8.10	5
	(n,α)	4.91	^{90}Y	β^-	2.27	64.2h	^{90}Zr^g	0.009	15	0.009	146	1,27
	(n,α^a)	4.91	^{90m}Y	IT	0.685	3.1h	^{90m}Y, ^{90}Zr^g (64h)	+		0.005	81	1,22
								0.01	15	0.009	146	7
	(n,nα^a)	-1.95	^{89m}Y	IT	0.91	16s	^{89}Y^g			0.0025	40.5	5

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (Ci/kg mol)	References
^{92}Mo (15.86%)	(n,γ)	8.07	^{93}Mo	EC	0.42	>100Y	^{93m}Nb,^{93g}Nb (16y) ^{93g}Nb(STABLE)	0.3	thermal	0.002	0	1
	(n,γ*)	8.07	^{93}Mo^{m}	IT	2.428	6.9h	^{93g}Mo,^{93m}Nb (6.9h) ^{93g}Nb,^{93m}Nb	0.006	thermal	3×10^{-5}	0.486	1
	(n,7n)	-12.69	^{91}Mo	β^{+},(EC)	4.46	15.5m	^{91m}Nb,^{91}Zr (long)			0.145	2350	1
										0.158	2560	28
								~1.0	~20			7
	(n,2n*)	-12.69	^{91}Mo^{m}	EC,β^{+} IT	5.11 0.658	66s	^{91m}Nb,^{91}Zr ^{91m}Nb,^{91}Zr (55.5m)(long)	+		0.0145	235	1
	(n,p*)	0.43	^{92}Nb^{m}	EC,β^{+} β^{-}	2.01 0.35	10.1d	^{92}Zr ^{92}Mo	+		0.06	972	1
										0.15	2430	20
	(n,α)	3.69	^{89}Zr	EC,β^{+}	2.83	78.4h	^{89m}Y,^{89g}Y (16s)	+		0.016	259	1
										0.019	308	22
	(n,α*)	3.69	^{89}Zr^{m}	IT EC,β^{+}	0.588 3.41	4.2m	^{89m}Y,^{89g}Y (16s) ^{89}Zr	+		0.0054	87.5	1
										0.0094	152	22
	(n,np*)	~-8	^{91}Nb^{m}	IT (EC)	0.1045 1.2	62d	^{91m}Nb,^{91g}Nb (long) ^{91}Zr	+		0.028	451	1
^{94}Mo (9.12%)	(n,2n)	-9.67	^{93}Mo	EC	0.42	>100y	^{93m}Nb,^{93g}Nb (13.6y) ^{93g}Nb	+		0.56	<21.1	1
	(n,2n*)	-9.67	^{93}Mo^{m}	IT	2.428	6.9h	^{93m}Nb,^{93g}Nb (6.9y) ^{93g}Nb			0.56	9070	1
										0.003	48.6	7
	(n,p)	-1.26	^{94}Nb	β^{-}	2.06	2×10^{4}y	^{94}Mo	+		0.0054	0	1
	(n,p*)	-1.26	^{94}Nb^{m}	IT	0.0407	6.3m	^{94m}Nb,^{94}Mo (2×10^{4}y)	+		0.0054	87.5	1
	(n,α)	5.13	^{91}Zr							(0.05)		31
^{95}Mo (15.7%)	(n,2n)	-7.38	^{94}Mo							1.2		15
	(n,p)	-0.14	^{95}Nb	β^{-}	0.925	35d	^{95}Mo	+		0.024	359	1
	(n,p*)	-0.14	^{95}Nb^{m}	IT	0.235	90h	^{95m}Nb,^{95}Mo (35d)	+		0.024	309 (302)	1
	(n,α)	6.39	^{92}Zr							(0.0018)		31
	(n,np)	-9	^{94}Nb	β^{-}	2.06	2×10^{4}y	^{94}Mo	+		0.0025	0	1
	(n,np*)	-9	^{94}Nb^{m}	IT	0.0407	6.3m	^{94m}Nb,^{94}Mo (2×10^{4}y)	+		0.0025	40.5	1
^{96}Mo (16.5%)	(n,2n)	-9.15	^{95}Mo							1.4		15
	(n,p)	-2.41	^{96}Nb	β^{-}	3.15	23h	^{96}Mo			0.016	359	28
								+		0.024	309	1
										0.021	340	22,27
	(n,α)	3.99	^{93}Zr	β^{-}	0.090	1.5×10^{6}y	^{93m}Nb,^{93g}Nb (13.6y) ^{93g}Nb	+		0.01	0	1
	(n,np)	-9	^{95}Nb	β^{-}	0.925	35d	^{95}Mo	+		0.002	29.9	1
	(n,np*)	-9	^{95}Nb^{m}	IT	0.235	90h	^{95m}Nb,^{95}Mo (35d)	+		5×10^{-4}	8.1 (0.0)	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	Max. σ (barns)	Energy for max. σ (MeV)	σ at 14 MeV (barns)	Radioactivity (Ci/g)	Reference
^{97}Mo (9.45%)	(n,2n)	-6.82	^{96}Mo							1.5		15
	(n,p)	-1.15	^{97}Nb	β^-	1.93	72m	^{97}Mo	+		0.07	1130	1
										0.088	292	7,28
										0.086	259	22,27
	(n,p^a)	-1.15	^{97}Nb^m	IT	0.747	1.0m	^{97}Nb^g,^{97}Mo (72m)	+		0.007	113 (113)	1
	(n,α)	5.37	^{94}Zr							—		
	(n,np)	-10	^{96}Nb	β^-	3.15	23h	^{96}Mo	+		0.003	48.6	1
^{98}Mo (23.75%)	(n,γ)	5.92	^{99}Mo	β^-	1.37	67h	^{99}Tc-^{99}Ru (2×10^5y)	4.0	1.2×10^{-4}	0.005	81	1,5
	(n,2n)	-8.64	^{97}Mo							1.66		15
	(n,p)	-3.82	^{98}Nb	β^-	4.6	51.5m	^{97}Mo			0.0067	100	28
								+		0.01	142	1
										0.0014	152	20
	(n,α)	3.20	^{95}Zr	β^-	1.121	65d	^{95}Nb^g,^{95}Mo (35d) ^{95}Nb^m,^{95}Mo (90h,65d)			0.0001	95.4 (106)	22
	(n,np)	-9	^{97}Nb	β^-	1.93	72m	^{97}Mo	+		1×10^{-4}	1.62	1
	(n,np^a)	-9	^{97}Nb^m	IT	0.747	1m	^{97}Nb^g,^{97}Mo (72m)	+		1×10^{-4}	1.62	1
^{100}Mo (9.62%)	(n,γ)	5.39	^{101}Mo	β^-	2.82	14.6m	^{101}Tc-^{101}Ru (14d)	2.0	4×10^{-4}	0.006	97.2 (97.2)	1,5
	(n,2n)	-8.30	^{99}Mo	β^-	1.37	67h	^{99}Tc-^{99}Ru (2×10^5y)	2.3	16	2.3	37300	1
										1.5	24300	7,28
										1.7	27500	23
	(n,p)	-5.22	^{100}Nb	β^-	~6.1	(3.0m 11m)	^{100}Mo			—		
	(n,α)	2.39	^{97}Zr	β^-	2.67	17h	^{97}Nb^m,^{97}Nb^g,^{97}Mo (1m) (72m)	+		0.011	170 (170)	1
										0.025	400 (400)	7,28
Tc												
^{96}Ru (5.7%)	(n,γ)	8.04	^{97}Ru	EC	1.2	2.9d	^{97}Tc-^{97}Mo (2×10^6y)	0.2	[illegible]	0.002	32.4	1
	(n,2n)	-10.69	^{95}Ru	EC,β^+	2.35	1.7h	^{95}Tc^g,^{95}Mo (20h)	1.0	17	0.63	10000	1,7
										0.64	10400	23
	(n,p)	0.57	^{96}Tc	EC β^-	2.9 0.2	4.3d	^{96}Mo	+		0.062	1000	1
										0.15	2430	7,22 27
	(n,p^a)	0.57	^{96}Tc^m	IT	0.0344	50m	^{96}Tc^g,^{96}Mo (4.3d)	+		0.062	1000 (1000)	1
	(n,α)	6.30	^{93}Nb							—		
	(n,np)	-7	^{95}Tc	EC	1.66	20h	^{95}Mo	+		0.45	7290	1
										0.48	7700	22
	(n,np^a)	-7	^{95}Tc^m	EC,β^+	1.70	61d	^{95}Mo	+		0.052	617	1,22

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σm.e (barns)	Energy for σm.e (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g mol)	References
^{96}Ru (2.2%)	(n,2n)	-10.25	^{97}Ru	EC	1.2	2.9d	^{97}Tc-^{97}Mo (2×10^6y)	+		0.9	14000	1
										1.17	19000	23
	(n,p)	-0.92	^{96}Tc	β^-	1.7	1.5×10^6y	^{96}Ru			0.004	0	20
^{99}Ru (12.8%)	(n,p)	0.49	^{99}Tc	β^-	0.292	2.12×10^5y	^{99}Ru	+		0.015	0	1
	(n,p$^{\alpha}$)	0.49	$^{96}Tc^m$	IT	0.1427	6h	$^{99}Tc^m$-^{99}Ru (2×10^5y)	+		0.015	243	1
^{100}Ru (12.7%)	(n,2n)	-9.67	^{99}Ru							1.2		15
	(n,p)	-2.59	^{100}Tc	β^-	3.4	17s	^{100}Ru			0.0074	120	20
^{101}Ru (17.0%)	(n,2n)	-.681	^{100}Ru							1.3		15
	(n,p)	-0.05	^{101}Tc	β^-	1.63	14m	^{101}Ru	+		0.035	567	1
										0.0082	133	20
^{102}Ru (31.3%)	(n,γ)	6.23	^{103}Ru	β^-	0.74	39.6d	$^{103}Rh^m$-^{103}Rh (97%)	1.44	thermal	0.005	79.6	1,6
	(n,2n)	-9.22	^{101}Ru							1.3		15
	(n,p)	-3.72	^{102}Tc	β^-	4.4	5s	^{102}Ru			0.008	32.4	7
	(n,p$^{\alpha}$)	-3.72	$^{102}Tc^m$	β^-	~4.6	4.5m	^{102}Ru	+		0.0057	92.3	1
	(n,α)	2.50	^{99}Mo	β^-	1.37	67h	^{99}Tc-^{99}Ru (2×10^5y)			0.0021	34.0	37
^{104}Ru (18.3%)	(n,γ)	5.91	^{105}Ru	β^-	1.87 1.15	4.44h	^{105}Rh	0.211	thermal	0.008	130	1,5
	(n,2n)	-9.91	^{103}Ru	β^-	0.74	39.6d	^{103}Rh	+		2.3	36600	1
								1.5	15	1.4	22700	7,23
	(n,p)	-4.52	^{104}Tc	β^-	5.8	18m	^{104}Ru	+		0.0063	102	1
										0.0072	117	27
	(n,α)	1.06	^{101}Mo	β^-	2.82	14.6m	^{101}Tc-^{101}Ru (14m)	+		0.0025	40.5	1,27
^{103}Rh (100%)	(n,γ)	7.00	^{104}Rh	β^- (EC)	2.47 1.15	42s	^{104}Pd ^{104}Ru	220	1.3×10^{-6}	0.060	142	5
	(n,γ$^{\alpha}$)	7.00	$^{104}Rh^m$	IT (β^-)	0.129 2.60	4.41m	$^{104}Rh^m$-^{104}Pd (43%)^{104}Pd	30	1.3×10^{-6}	0.005	48.6	1
	(n,n')	——	$^{103}Rh^m$	IT	0.04	57m	^{103}Rh	1.3	6	0.3	4000	2
	(n,2n)	-9.31	^{102}Rh	EC,β^+ β^-	2.32 1.15	206d	^{102}Ru ^{102}Pd			0.38	2070	1
								0.65	13			7
	(n,2n$^{\alpha}$)	-9.31	$^{102}Rh^m$	EC,β^+ β^-	2.32 1.15	2.9y	^{102}Ru ^{102}Pd	0.55	18	0.38	474	1,7
	(n,p)	0.02	^{103}Ru	β^-	0.74	39.6d	^{103}Rh	+		0.015	214	1
										0.027	243	22,27
										0.0003	133	20
	(n,α)	3.48	^{100}Tc	β^-	3.4	17s	^{100}Ru			0.011	170	7,27

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σ at Thermal	Energy for σ at Thermal	σ at 14 MeV (Thermal)	Radioactivity (curie/mol)	Reference
^{102}Pd (0.8%)	(n,γ)	7.61	^{103}Pd	EC	0.56	17d	^{103}Pd^{m}→^{103}Rh (57%)	4.8	thermal	0.003	48.2	1
	(n,2n)	-10.59	^{101}Pd	EC,β^{+}	1.99	8.4h	^{101}Pd^{m}, ^{101}Rh, ^{101}Ru (15%)	1.2	14	1.05	17000	1,7
										0.44	30400	23
	(n,p)	-0.37	^{102}Rh	β^{-} EC,β^{+}	1.15 2.32	2.9y (206d)	^{102}Pd ^{102}Ru			0.046	(57.6 / 250)	20
^{104}Pd (9.3%)	(n,2n)	-10.82	^{103}Pd	EC	0.56	17d	^{103}Pd^{m}→^{103}Rh (57%)	+		1.3	20000	1
										1.1	17700	15
	(n,p)	-1.69	^{104}Rh	β^{-} (EC)	2.67 (1.15)	42s	^{104}Pd ^{104}Ru			0.003	48.6	7
	(n,p^{m})	-1.69	^{104}Rh^{m}	IT	0.129	4.4m	^{104}Rh^{m}→^{104}Pd (43%) ^{104}Ru	0.12	14	0.13	2110 (2129)	1
										0.03	486 (486)	7
^{105}Pd (22.23%)	(n,γ)	9.56	^{106}Pd									
	(n,2n)	-7.07	^{104}Pd							1.2		15
	(n,p)	0.22	^{105}Rh	β^{-}	0.565	35.9h	^{105}Pd			0.05	860	7
										0.037	509	22
	(n,p^{m})	0.22	^{105}Rh^{m}	IT	0.1294	45s	^{105}Rh^{m}→^{105}Pd (35.9%)			0.003	373 (373)	7
	(n,α)	6.33	^{102}Ru									
^{106}Pd (27.2%)	(n,γ)	6.54	^{107}Pd	β^{-}	0.035	7×10^{6}y	^{107}Ag	0.202	thermal			5
	(n,2n)	-9.56	^{105}Pd							1.3		15
	(n,p)	-2.76	^{106}Rh	β^{-}	3.54	30s	^{106}Pd			0.046	259	7
										0.026	389	22,27
	(n,p^{m})	-2.76	^{106}Rh^{m}	β^{-}	3.63	130m	^{106}Pd	+		0.0057	82.3	1
	(n,α)	3.00	^{103}Ru	β^{-}	0.74	39.5d	^{103}Rh			0.056	800	7,22
										0.0055	800	27
^{108}Pd (26.8%)	(n,γ)	6.15	^{109}Pd	β^{-}	1.115	13.5h	^{109}Ag	10	thermal	0.006	97.2	1
	(n,γ^{m})	6.15	^{109}Pd^{m}	IT	0.188	4.7m	^{109}Pd^{m}→^{109}Ag (13%)	0.3	thermal	2×10^{-4}	3.24 (3.24)	1
	(n,2n^{m})	-9.23	^{107}Pd^{m}	IT	0.21	22s	^{107}Pd^{m}→^{107}Ag (7×10^{6}y)			0.5	8100	7
	(n,p)	-3.72	^{108}Rh	β^{-}	4.5	17s	^{108}Pd			0.008	130	7
										0.0083	134	22
	(n,d)	-7.73	^{107}Rh	β^{-}	3.51	22m	^{107}Pd→^{107}Ag (7×10^{6}y)	+		0.0050	39.2	1
	(n,α)	2.95	^{105}Ru	β^{-}	1.87	4.44h	^{105}Rh→^{105}Pd (6.8%)	+		0.0025	40.5 (40.5)	1
										0.0027	43.7	27
	(n,np)	-10	^{107}Rh	β^{-}	1.51	22m	^{107}Pd→^{107}Ag (7×10^{6}y)	+		0.0035	56.7	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σ(n,γ) (barns)	Decay for σ(n,γ) (MeV)	σ at 14 MeV (barns)	Radioactivity (Ci/g)	Reference
^{110}Pd (13.5%)	(n,γ)	5.76	^{111}Pd	β^-	2.2	22m	$^{111}Ag \xrightarrow{\beta^-} {}^{111}Cd$ (0.25)	0.3	thermal	0.002	32.4	1
	(n,γ^m)	5.76	$^{111}Pd^m$	IT β^-	0.17 2.4	5.5h	$^{111}Ag \xrightarrow{\beta^-} {}^{111}Cd$ (0.25) $^{111}Ag \xrightarrow{\beta^-} {}^{111}Cd$ (0.25)	0.03	thermal	3×10^{-4}	4.06 (4.06)	1
	(n,2n)	-8.01	^{109}Pd	β^-	1.115	13.5h	^{109}Ag	+		1.9	30000	1
	(n,2n^m)	-8.01	$^{109}Pd^m$	IT	0.188	4.7m	$^{109}Ag \xrightarrow{\beta^-} {}^{109}Ag$ (13%)	+		0.95	15400	1
										0.5	8000	7
	(n,p)	-4.62	^{110}Rh	β^-	5.5	5s	^{110}Pd			—		
	(n,α)	1.02	^{107}Ru	β^-	3.2	4.2m	$^{107}Pd \xrightarrow{\beta^-} {}^{107}Ag$ (7×10^6y)			0.014	227	7
										0.003	48.5	3
										0.0012	19.4	27
^{107}Ag (51.35%)	(n,γ)	7.27	^{108}Ag	(β^+,EC) β^-	1.92 1.64	2.42m	^{108}Pd ^{108}Cd	35	thermal	0.005	81	1,5
	(n,γ^m)	7.27	$^{108}Ag^m$	IC (IT)	2.03 0.130	5.0y	^{108}Pd (90%) $^{108}Ag \xrightarrow{\beta^-} {}^{108}Cd$	1	thermal	2×10^{-4}	0.15 (0.15)	1
	(n,2n)	-9.55	^{106}Ag	EC,β^+ (β^-)	2.96 0.19	24m	^{106}Pd	0.72	15	0.69	11200	1
										1.0	16200	7
	(n,2n^m)	-9.55	$^{106}Ag^m$	EC,β^+ (β^-)	~3.3 ~0.5	8.4d	^{106}Pd	+		0.49	7940	1
	(n,p^m)	0.75	$^{107}Pd^m$	IT	0.21	21s	$^{107}Pd \xrightarrow{\beta^-} {}^{107}Ag$ (7×10^6y)			0.015	243	7
										0.030	486	20
	(n,α)	4.18	^{104}Rh	β^- (EC)	2.47 1.15	42s	^{104}Pd	0.0025	~12	0.0030	48.6	18
	(n,nα^m)	~-2	$^{103}Rh^m$	IT	0.040	57m	$^{103}Rh^g$			0.0010	29.2	1
^{109}Ag (48.65%)	(n,γ^m)	6.81	$^{110}Ag^m$	β^- (IT)	2.98 0.116	253d	^{110}Cd	3.5	thermal	2×10^{-4}	3.24	1,5
	(n,2n)	-9.19	^{108}Ag	EC,β^+ β^-	1.92 1.64	2.42m	^{108}Pd ^{108}Cd	+		0.9	14600	1
	(n,2n^m)	-9.19	$^{108}Ag^m$	IC (IT)	2.03 0.130	5y	^{108}Pd $^{108}Ag \xrightarrow{\beta^-} {}^{108}Cd$ (25%)	+		0.027	20.2 (20.2)	1
	(n,p)	-0.33	^{109}Pd	β^-	1.115	13.5h	$^{109}Pd \xrightarrow{\beta^-} {}^{109}Ag$ (46%)	flat	around 14	0.0060	110	1,7
	(n,p^m)	-0.33	$^{109}Pd^m$	IT	0.188	4.7m	$^{109}Pd \xrightarrow{\beta^-} {}^{109}Ag$ (13%)	+		0.0060	110	1
	(n,α^m)	3.29	$^{106m}Rh^m$	β^-	3.63	130m	^{106}Pd	+		0.03	486	1,5
	(n,nα)	~-3	^{105}Rh	β^-	0.565	35.9h	^{105}Pd	+		5×10^{-4}	8.1	1
^{106}Cd (1.215%)	(n,γ)	7.93	^{107}Cd	EC,β^+	1.417	6.5h	$^{107}Ag \xrightarrow{\beta^-} {}^{107}Ag$ (46%)	1	thermal	0.005	81.0	1,6
	(n,2n)	-10.92	^{105}Cd	β^+,EC	2.8	55m	$^{105}Ag \xrightarrow{\beta^-} {}^{105}Pd$ (46%)	1.3	16	0.7	11300 (10000)	1,7
										0.80	14400 (12700)	23
	(n,p)	~-18	^{106}Ag	EC,β^+	2.96	24m	^{106}Pd	+		0.038	616	1
								flat	~18	0.08	1300	7
	(n,p^m)	0.58	$^{106}Ag^m$	EC,β^+	3.3	8.4d	^{106}Pd	+		0.038	616	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σ(n,γ) (barns)	Energy for σ(n,γ) (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g mol)	Reference
^{106}Cd (0.875%)	(n,γ)	7.36	^{107}Cd	EC	0.168	453d	^{107m}Ag,^{107}Ag (44%)	2	thermal	0.006	80.7	1,5
	(n,2n)	-10.33	^{105}Cd	EC,β^+	1.417	6.5h	^{105}Ag,^{105}Ag (44%)	+		1.2	19400	1
										0.50	8080	21
										0.87	14100	23
	(n,p)	-0.86	^{106}Ag	β^- (EC,β^+)	1.64 1.92	2.42m	^{106}Cd ^{106}Pd			0.030	486	20
^{110}Cd (12.39%)	(n,γ^a)	6.98	^{111}Cd^m	IT	0.396	48.6m	^{111}Cd^g	0.1	thermal	2×10^{-4}	3.24	1,5
	(n,2n)	-9.08	^{109}Cd	EC	0.17	453d	^{109m}Ag,^{109}Ag (44%)	+		1.45	19500	1
										1.32	16400	23
	(n,p)	-2.11	^{110}Ag	β^-	2.87	24.4s	^{110}Cd			0.002	130	7
										0.004	227	20
	(n,p^a)	-2.11	^{110}Ag^m	β^- (IT)	2.99 0.12	253d	^{110}Cd	+		0.02	232	1
										0.027	313	21
	(n,α)	3.67	^{107}Pd							—		
^{111}Cd (12.75%)	(n,n')	—	^{111}Cd^m	IT	0.396	48.6m	^{111}Cd^g	0.33	4	0.15	2430	1
	(n,2n)	-6.98	^{110}Cd							1.3	21100	15
	(n,p)	-0.25	^{111}Ag	β^-	1.05	7.5d	^{111}Cd	+		0.012	194	1
										0.014	227	21
										0.016	259	20
	(n,p^a)	-0.25	^{111}Ag^m	IT	0.87	74s	^{111}Ag→^{111}Cd (7.5d)			0.012	194	1
	(n,α)	5.92	^{108}Pd							—		
^{112}Cd (24.07%)	(n,γ^a)	6.54	^{113}Cd^m	β^-	0.57	14y	^{113}In	5×10^{-2}	thermal	2×10^{-4}	0.053	1
	(n,2n^a)	-9.40	^{111}Cd^m	IT	0.396	48.6m	^{111}Cd^g	0.02	15	0.02	13300	1
	(n,p)	-3.22	^{112}Ag	β^-	4.01	3.2h	^{112}Cd	+		0.011	170	1,21
										0.015	243	22,27
	(n,α)	2.68	^{109}Pd	β^-	1.115	13.5h	^{109m}Ag,^{109}Ag (44%)	+		0.0012	19.4	1
										0.0025	40.5	7,21
	(n,α^a)	2.68	^{107}Pd^m	IT	0.180	4.7m	^{107}Pd,^{107}Ag (13.47h)	+		0.0012	19.4 (19.4)	1
^{113}Cd (12.26%)	(n,n')	—	^{113}Cd^m	β^-	0.57	14y	^{113}In	0.30	4	0.17	45.4	1
	(n,2n)	-6.54	^{112}Cd							1.5	401	15
	(n,p)	-1.23	^{113}Ag	β^-	2.00	5.3h	^{113}Cd			0.008	130	1,20, 21
										0.013	211	27

Nuclide (abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g)	Reference
^{114}Cd (28.86%)	(n,γ)	6.15	^{115}Cd	β^-	1.45	53.5h	$^{115}_{48}Cd \rightarrow ^{115}_{49}In$ (6.5%) $^{115}_{48}Cd \rightarrow ^{115}_{49}In$ (6×10^{14}y)	0.3	thermal	0.005	81.0	1,5
	(n,γ^m)	6.15	^{115}Cd^m	β^-	1.65	43d	$^{115}_{48}Cd \rightarrow ^{115}_{49}In$ (6×10^{14}y)	0.14	thermal	0.002	13.9	1,6
	(n,2n^m)	-9.04	^{113}Cd^m	β^-	0.57	14y	^{113}In	+		0.06	230	1
	(n,p)	-4.22	^{114}Ag	β^-	4.6	4.5s	^{114}Cd			0.003	48.6	7,20
	(n,α)	1.66	^{111}Pd	β^-	2.2	22s	$^{111}_{46}Pd \rightarrow ^{111}_{47}Ag$ (74%) (7.5%) $\rightarrow ^{111}$Cd	+		5×10^{-4}	8.10	1,21
	(n,α^m)	1.66	^{111}Pd^m	IT β^-	0.17 2.4	5.5h	$^{111}_{46}Pd \rightarrow ^{111}_{47}Ag$ (28%) (2.4%) + $\rightarrow ^{111}$Cd ^{111}Ag	+		1.3×10^{-3} 2×10^{-4}	2.11 3.24	1 21
^{116}Cd (7.58%)	(n,γ)	5.77	^{117}Cd	β^-	2.52	2.4h	$^{117}_{48}Cd \rightarrow ^{117}_{49}In$ (64%)	2	thermal	0.005	81.0	1,6
	(n,γ^m)	5.77	^{117}Cd^m	β^-	2.65	3.4h	$^{117}_{48}Cd \rightarrow ^{117}_{49}In$ (64%)	0.05	thermal	1×10^{-4}	1.62	1
	(n,2n)	-8.70	^{115}Cd	β^-	1.45	53.5h	$^{115}_{48}Cd \rightarrow ^{115}_{49}In$ (6.5%)(4m) $\rightarrow ^{115}$In	0.03	14	0.03	13400	1
										0.06	13000	21
	(n,2n^m)	-8.70	^{115}Cd^m	β^-	1.65	43d	$^{115}_{48}Cd \rightarrow ^{115}_{49}In$ (6×10^{14}y)	0.03	15.5	0.02	13400	1
										0.73	10000	21
	(n,p)	-5.52	^{116}Ag	β^-	6.1	2.5m	^{116}Cd			0.0054	87.5	7
										0.0014	22.7	29
										2×10^{-4}	3.24	21
	(n,α)	——	^{113}Pd	β^-	3.5	1.4m	$^{113}_{46}Pd \rightarrow ^{113}_{47}Ag \rightarrow ^{113}Cd$ (5.3%)			5×10^{-4}	8.1 (8.1)	21
										0.0011	17.8	27
^{113}In (4.23%)	(n,γ)	7.31	^{114}In	(EC,β^+) β^-	1.44 1.986	72s	^{114}Cd ^{114}Sn	3	thermal	0.004	36.2	1,5
	(n,γ^m)	7.31	^{114}In^m	IT (EC)	0.1916 1.63	50d	$^{114}_{48}Cd \rightarrow ^{114}_{49}In$ (72%) ^{114}Cd	0.1	thermal	0.005	65.0	1,5
	(n,n')	——	^{113}In^m	IT	0.393	100m	$^{113}_{49}In^m$	1	5	0.33	5350	1
	(n,2n)	-9.42	^{112}In	EC,β^+ β^-	2.39 0.66	14m	^{112}Cd ^{112}Sn			0.79	12000	1
										0.3	4060	7
	(n,2n^m)	-9.42	^{112}In^m	IT	0.156	20.7m	$^{112}_{49}In \rightarrow ^{112}$Cd (72%) $\rightarrow ^{112}$Sn			0.79	12000 (12000)	1
								1.5	15	1.4	22700 (22700)	7
	(n,p)	0.49	^{113}Cd							0.51		20
^{115}In (95.77%)	(n,γ^m)	6.70	^{116}In^m	β^-	3.30	54m	^{116}Sn	157	thermal	0.002	32.4	1,5
	(n,n')	——	^{115}In^m	IT (β^-)	0.335 0.82	6.5h	$^{115}_{49}In \rightarrow ^{115}_{50}Sn$ (6×10^{14}y) ^{115}Sn(SR)	0.33	6	0.06	972	2
	(n,2n)	-9.03	^{114}In	(EC,β^+) β^-	1.44 1.986	1.2m	^{114}Cd ^{114}Sn	0.38	14.5	0.38	6160	1
	(n,2n^m)	-9.03	^{114}In^m	IT (EC)	0.1916	50d	$^{114}_{49}In \rightarrow ^{114}_{50}Sn$ (6×10^{14}y) ^{114}Cd	1.35	14.5	1.5	19000	1
	(n,p)	-0.67	^{115}Cd	β^-	1.45	53.5h	$^{115}_{48}Cd \rightarrow ^{115}_{49}In$ (6.5%) $\rightarrow ^{115}$Sn	+		0.007	113	1
										0.017	275	7
	(n,p^m)	-0.67	^{115}Cd^m	β^-	1.65	43d	$^{115}_{48}Cd \rightarrow ^{115}_{49}In$ (6×10^{14}y)	+		0.007	97.5	1
	(n,α)	2.68	^{112}Ag	β^-	4	3.2h	^{112}Cd	+		0.0025	40.5	1,27

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curies/g)	References
^{112}Sn (0.95%)	(n,γ)	7.74	^{113}Sn	EC	1.02	115d	$^{113}In^{g}$, $^{115}In^{g}$ (4.3%)	0.9	thermal	0.004	33.7	1,5
	(n,γ^m)	7.74	$^{113}Sn^{m}$	IT (EC)	0.079 1.10	20m	$^{113}In^{g}$, ^{115}In (115m) $^{113}Sn^{g}$, $^{115}In^{g}$	0.4	thermal	0.002	32.4	1,5
	(n,2n)	-10.00	^{111}Sn	EC,β^{+}	2.52	35m	^{111}In, $^{111}In^{g}$ (2.8d), ^{111}Cd	(1.3	16)	1.35	21000 (325000)	1,(7)
										1.40	34100 (341000)	23
	(n,p)	0.12	^{112}In	EC,β^{+} β^{-}	2.30 0.66	14m	^{112}Cd ^{112}Sn	+		0.12	1940	1
	(n,p^m)	0.12	$^{112}In^{m}$	IT	0.136	20.7m	$^{112}In^{g}$, ^{112}Cd (14m) ^{112}Sn	+		0.12	1940	1
	(n,α)	5.54	^{109}Cd	EC	0.16	453d	$^{109}In^{g}$, $^{109}Ag^{g}$ (40s)	+		0.0006	7.16	1
^{114}Sn (0.65%)	(n,2n)	-10.32	^{113}Sn	EC	1.02	115d	$^{112}In^{g}$, $^{112}In^{g}$ (20.7m)	+		0.35	2030	1
										1.5	12000	7
										1.55	13000	23
	(n,2n^m)	-10.32	$^{113}Sn^{m}$	IT (EC)	0.079 1.10	20m	$^{113}In^{g}$, ^{115}In (115m) ^{113}In	+		1.05	17700 (8050)	1
	(n,p)	-1.20	^{114}In	(EC,β^{+}) β^{-}	1.44 1.906	1.2m	^{114}Cd ^{114}Sn			0.050	940	20
^{116}Sn (14.24%)	(n,γ^m)	6.94	$^{117}Sn^{m}$	IT	0.317	14d	$^{117}Sn^{g}$	0.006	thermal	5×10^{-4}	0.08	1,6
	(n,2n)	-9.57	^{115}Sn							1.3		15
	(n,p)	-2.49	^{116}In	β^{-}	3.33	14s	^{116}Sn			0.011	178	7
	(n,p^m)	-2.49	$^{116}In^{m}$	β^{-}	3.4	54m	^{116}Sn	+		0.005	1540	1
	(n,α^m)	3.17	$^{113}Cd^{m}$	β^{-}	0.57	14y	^{113}In	+		0.0027	0.072	1
^{117}Sn (7.57%)	(n,2n)	-6.94	^{116}Sn							1.4		15
	(n,p)	-0.68	^{117}In	β^{-}	1.47	44m	^{117}Sn	+		0.014	211	1
										0.016	250	22,27
										0.024	300	20
	(n,p^m)	-0.68	$^{117}In^{m}$	β^{-} IT	1.78 0.314	1.93h	^{117}Sn ^{117}In, ^{117}Sn (44m)	+		0.0065	105 (105)	1
	(n,α)	5.27	Cd							——		
^{118}Sn (24.01%)	(n,γ^m)	6.49	$^{119}Sn^{m}$	IT	0.089	250d	$^{119}Sn^{g}$	0.01	thermal	5×10^{-5}	0.232	1,6
	(n,2n^m)	-9.33	$^{117}Sn^{m}$	IT	0.317	14d	$^{117}Sn^{g}$	+		1.2	19400	1
	(n,p^m)	-3.42	$^{118}In^{m}$	β^{-}	4.3	4.4m	^{118}Sn	+		0.0075	122	1
	(n,α)	2.09	^{115}Cd	β^{-}	1.45	53.5h	$^{115}In^{g}$, ^{115}Sn (90m) $^{115}In^{g}$	+		0.5×10^{-4}	13.8	1
	(n,α^m)	2.09	$^{115}Cd^{m}$	β^{-}	1.65	43d	$^{115}In^{g}$, ^{115}Sn (8×10^{14}y)	+		0.5×10^{-4}	11.8	1
										3×10^{-4}	4.18	7
	(n,np)	~-10	^{117}In	β^{-}	1.47	44m	^{117}Sn	+		7.5×10^{-4}	12.2	1
	(n,np^m)	~-10	$^{117}In^{m}$	IT β^{-}	0.314 1.78	1.93h	$^{117}In^{g}$, ^{117}Sn (44m) ^{117}Sn	+		4×10^{-4}	6.48	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g)	References
^{119}Sn (8.58%)	(n,2n)	-6.49	^{118}Sn							1.8		8
										1.6		15
	(n,p)	-1.57	^{119}In	β^-	2.5	2.1m	^{119}Sn	+		0.0065	105	1,27
										0.0086	42.1	7
	(n,p^m)	-1.57	$^{119}In^m$	β^- (IT)	2.8 0.30	18m	^{119}Sn ^{119}In,^{119}Sn (2.1m) (5d)	+		0.0065	105 (105)	1
										0.0086	42.1 (42.1)	7
	(n,α)	4.30	^{116}Cd							——		
	(n,np^m)	~-10	$^{118}In^m$	β^-	4.3	4.4m	^{118}Sn	+		0.080	146	1
										0.085	81.0	5
^{120}Sn (32.97%)	(n,γ)	6.18	^{121}Sn	β^-	0.383	27h	$^{121}Sb^g$	0.14	thermal	0.003	48.6	1,6
	(n,γ^m)	6.18	$^{121}Sn^m$	β^-	0.39	76y	$^{121}Sb^m$,$^{121}Sb^g$ (5.5m)	0.001	thermal	4×10^{-5}	0.002	1,6
	(n,2n^m)	-9.10	$^{119}Sn^m$	IT	0.089	250d	$^{119}Sn^g$	+		1.4	6510	1
	(n,p)	-4.82	^{120}In	β^-	5.3	46s	^{120}Sn			0.004	64.8	7,27
	(n,p^m)	-4.82	$^{120}In^m$	β^-	5.6	32s	^{120}Sn			<0.001	<36.2	5
	(n,α)	0.96	^{117}Cd	β^-	2.52	2.4h 3.4h	^{117}In→^{117}Sn (44m)			——		
^{122}Sn (4.71%)	(n,γ)	5.95	^{123}Sn	β^-	1.42	125	^{123}Sb	0.001	thermal	5×10^{-5}	0.300	1,6
	(n,γ^m)	5.95	$^{123}Sn^m$	β^-	1.45	40m	^{123}Sb	0.16	thermal	0.002	48.6	1,6
	(n,2n)	-8.00	^{121}Sn	β^-	0.383	27h	^{121}Sb	+		0.9	14600	1
	(n,2n^m)	-8.00	$^{121}Sn^m$	β^-	0.39	76y	^{121}Sb	+		0.9	44.3	1
^{124}Sn (5.94%)	(n,γ)	5.73	^{125}Sn	β^-	2.34	9.4d	^{125}Sb→^{125}Te (2.7y)	0.004	thermal	8×10^{-5}	1.30	1,6
	(n,γ^m)	5.73	$^{125}Sn^m$	β^-	2.36	9.7m	^{125}Sb→^{125}Te (2.7y)	0.2	thermal	0.003	48.6	1,6
	(n,2n)	-8.49	^{123}Sn	β^-	1.42	125d	^{123}Sb	0.92	14	0.92	7320	1
	(n,2n^m)	-8.49	$^{123}Sn^m$	β^-	1.45	40m	^{123}Sb	0.92	14	0.92	1490	1
^{121}Sb (57.25%)	(n,γ)	6.81	^{122}Sb	(BC,β^+) β^-	1.62 1.972	2.8d	^{122}Sn ^{122}Te	6.5	thermal	0.003	48.6	1,5
	(n,γ^m)	6.81	$^{122}Sb^m$	IT	0.162	4.2m	$^{122}Sb^m$→^{122}Sn (2.8d)→^{122}Te	0.055	thermal	3×10^{-5}	0.486	1,5
	(n,2n)	-9.25	^{120}Sb	β^+,BC (β^-)	2.69 0.99	15.9m	^{120}Sn ^{120}Te	1.1	15	1.1	17000	1
	(n,2n^m)	-9.25	$^{120}Sb^m$	BC	≈3.4	5.8d	^{120}Sn			1.1	17000	1
								0.7	17	0.5	8100	7
	(n,p)	0.40	^{121}Sn	β^-	0.383	27h	^{121}Sb			0.0022	35.6	7
	(n,α)	3.51	^{118}In	β^-	4.2 4.3	5m 4.4m	^{118}Sn			——		

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σ a.o (barns)	Energy for σ a.o (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g)	Reference
^{123}Sb (42.75%)	(n,γ)	6.47	^{124}Sb	β^-	2.916	60d	^{124}Te	3	thermal	0.003	36.7	1
	(n,γ^m)	6.47	$^{124}Sb^m$	β^- IT	2.92 0.010	93s	^{124}Sb $^{124}Sb^g$,^{124}Te (60d)	0.035	thermal	2×10^{-3}	0.038	1,5
	(n,2n)	-8.97	^{122}Sb	(EC,β^+) β^-	1.62 1.972	2.8d	^{122}Sn ^{122}Te	1.4	16	1.3	21300	1,7
	(n,2n^m)	-8.97	$^{122}Sb^m$	IT	0.162	4.2m	$^{122}Sb^g$,^{122}Sn (60d) ^{122}Te	+		1.3	21300	1
										0.6	9720	7
	(n,p)	-8.63	^{123}Sn	β^-	1.42	129d	^{123}Sb			0.0046	35.8	27
										0.0018	14.3	7
	(n,α)	1.92	^{120}In	β^-	5.3	46s	^{120}Sn			—		
^{120}Te (0.09%)	(n,γ)	7.26	^{121}Te	EC	1.29	17d	^{121}Sb	2.8	thermal	0.004	64.3	1,5
	(n,γ^m)	7.26	$^{121}Te^m$	IT EC,β^+	0.2939 1.58	154d	$^{121}Te^g$,^{121}Sb (17d) ^{121}Sb	0.34	thermal	8×10^{-4}	5.47 (13)	1,5
	(n,2n)	-10.29	^{119}Te	EC,β^+	2.294	15.9h	^{119}Sb → ^{119}Sn (38h)	+		0.8	13000 (13000)	1
	(n,2n^m)	-10.29	$^{119}Te^m$	EC	2.5	4.7d	^{119}Sb → ^{119}Sn (38h)	+		0.8	13000 (13000)	1
^{122}Te (2.46%)	(n,γ^m)	6.93	$^{123}Te^m$	IT	0.2475	117d	$^{123}Te^g$ (1.2×10^{13}y)	1	thermal	0.001	8.42	1
	(n,2n)	-9.79	^{121}Te	EC	1.29	17d	^{121}Sb	+		0.32	5150	1
										0.7	11300	7
	(n,2n^m)	-9.79	$^{121}Te^m$	IT EC,(β^+)	0.2939 1.58	154d	$^{121}Te^g$,^{121}Sb (17d) ^{121}Sb	+		1.3	8000 (7670)	1
										0.7	4790	7
	(n,p)	-1.20	^{120}Sb	β^- (EC)	1.972 1.62	2.68d	^{120}Te ^{120}Sn			0.014	227	7,27
^{124}Te (4.61%)	(n,γ^m)	6.58	$^{125}Te^m$	IT	0.1449	58d	$^{125}Te^g$	0.04	thermal	1×10^{-4}	1.22	1,5
	(n,2n^m)	-9.42	$^{123}Te^m$	EC	0.06	117d	$^{123}Sb^g$	+		0.87	7330	1
	(n,p)	-2.12	^{124}Sb	β^-	2.916	60d	^{124}Te	+		0.147	1710	1,5
										0.009	110	7,27
	(n,p^m)	-2.12	$^{124}Sb^m$	IT β^-	0.010 2.92	1.55m	$^{124}Sb^g$,^{124}Te (60d) ^{124}Te	+		0.00439	69.7	1,5
										<6×10^{-4}	<9.72	7
	(n,α)	4.34	^{121}Sn	β^-	0.383	27y	^{121}Sb	+		0.0032	51.8	1,5
										7.6×10^{-4}	12.3	7
	(n,α^m)	4.34	$^{121}Sn^m$	β^-	0.45	76y	^{121}Sb	+		0.0032	0.016	1
^{126}Te (18.71%)	(n,γ)	6.38	^{127}Te	β^-	0.69	9.4h	^{127}I	0.9	thermal	0.003	48.6	1,5
	(n,γ^m)	6.38	$^{127}Te^m$	IT	0.0087	109d	$^{127}Te^g$,^{127}I (44d)	0.135	thermal	2×10^{-4}	1.75	1,5
	(n,2n^m)	-9.11	$^{125}Te^m$	IT	0.1449	58d	$^{125}Te^g$	+		0.9	21000	1
	(n,p)	-2.95	^{126}Sb	β^-	3.7	12.4d	^{126}Te			0.0016	25.9	7
	(n,p^m)	-2.95	$^{126}Sb^m$	β^- (IT)	~3.7	19m	^{126}Te			0.0045	72.9	7
	(n,α)	3.30	^{123}Sn	β^-	1.42	129d	^{123}Sb	+		4.8×10^{-4}	3.82	1
	(n,α^m)	3.30	$^{123}Sn^m$	β^-	1.45	40m	^{123}Sb	+		4.8×10^{-4}	7.70	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (Curie/mol)	References
^{128}Te (31.79%)	(n,γ)	6.09	^{129}Te	β$^-$	1.48	69m	^{129}I→^{129}Xe (1.7×10^{7}y)	0.135	thermal	0.002	32.4	1,5
	(n,γ*)	6.09	^{129}Te^m	β$^-$	1.50	34d	^{129}I→^{129}Xe (69m)	0.014	thermal	2×10^{-4}	2.97	1,5
	(n,2n)	-8.77	^{127}Te	β$^-$	0.69	9.4h	^{127}I	0.8	15	0.79	12000	1,7
	(n,2n*)	-8.77	^{127}Te^m	IT	0.0087	109d	^{127}Te→^{127}I (9.4h)	0.8	15	0.79	12000 (12000)	1,7
	(n,p)	-3.50	^{128}Sb	β$^-$	4.3	9h	^{128}Te	+		0.0023	37.5	1,27
										0.0013	21.1	7
	(n,p*)	-3.50	^{128}Sb^m	β$^-$	4.4	21m	^{128}Te	+		0.0657	185	1
										0.001	16.2	7
	(n,α)	2.55	^{125}Sn	β$^-$	2.36	9.4d	^{125}Sb→^{125}Te	0.427	14	0.427	60001	1
										0.0011	17.8	27
	(n,α*)	2.55	^{125}Sn^m	β$^-$	2.36	9.7m	^{125}Sb→^{125}Te (2.7y)	0.427	14	0.427	6000 (551)	1
	(n,np)	~-9.3	^{127}Sb	β$^-$	1.6	93h	^{127}Te→^{127}I (9.4h)	+		2.4×10^{-4}	3.09	1
^{130}Te (34.49%)	(n,γ)	5.92	^{131}Te	β$^-$	2.28	25m	^{131}I→^{131}Xe (8d)	0.22	thermal	0.002	32.4 (32.4)	1,5
	(n,γ*)	5.92	^{131}Te^m	β$^-$	2.46	30h	^{131}I→^{131}Xe (8d)	0.04	thermal	3×10^{-4}	4.86	1
	(n,2n)	-8.41	^{129}Te	β$^-$	1.48	69m	^{129}I→^{129}Xe (1.7×10^{7}y)	0.6	14	0.6	9720	1
										0.9	14600	7
	(n,2n*)	-8.41	^{129}Te^m	β$^-$	1.50	34d	^{129}I→^{129}Xe (1.7×10^{7}y)	0.6	14	0.6	8910	1
										0.9	13400	7
	(n,p)	-4.22	^{130}Sb	β$^-$	5	33m	^{130}Te	+		0.0024	38.9	1,5
										6×10^{-4}	9.72	7
	(n,p*)	-4.22	^{130}Sb^m	β$^-$	5	7m	^{130}Te	+		0.0147	227	1,5
										6×10^{-4}	9.72	7
	(n,α)	1.81	^{127}Sn	β$^-$	3.2	2.1h	^{127}Sb→^{127}Te (9.3h)→^{127}I	+		3×10^{-4}	4.86	1
	(n,α*)	1.81	^{127}Sn^m	β$^-$	3.1	4m	^{127}Sb→^{127}Te (9.3h)→^{127}I	+		3×10^{-4}	4.83	1
	(n,np)	~-9.5	^{129}Sb	β$^-$	2.5	4.3h	^{129}Te→^{129}I (69m)→^{129}Xe	+		1.5×10^{-4}	2.42	1
^{127}I (100%)	(n,γ)	6.83	^{128}I	(EC,β$^+$) β$^-$	1.36 2.14	25m	^{128}Te ^{128}Xe	60	3.6×10^{-5}	0.0025	40.5	5
	(n,2n)	-9.16	^{126}I	EC,β$^+$ β$^-$	2.190 1.251	13d	^{126}Te ^{126}Xe	1.3	16	1.3	21100	1,2 7
										1.66	26900	23
	(n,p)	0.09	^{127}Te	β$^-$	0.69	9.4h	^{127}I	+		0.016	259	1
	(n,p*)	0.09	^{127}Te^m	IT	0.0087	109d	^{127}Te→^{127}I (9.4h)	+		0.016	140	1
										0.005	43.7	7
	(n,α)	4.28	^{124}Sb	β$^-$	2.916	60d	^{124}Te	+		5.5×10^{-4}	6.013	1
										0.0015	18.3	7,27
	(n,α*)	4.28	^{124}Sb^m	IT β$^-$	0.060 3.01	1.55m	^{124}Sb→^{124}Te (60d) ^{124}Te	+		6.3×10^{-4}	10.2 (7.71)	1
			^{124}Sb	β$^-$	3.0	20m	^{124}Te			0.0015	24.3	7

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g)	References
^{132}Xe (26.9%)	(n,2n^a)	-8.94	$^{131}Xe^m$	IT	0.16398	11.8d	$^{131}Xe^g$			0.77	12300	7
	(n,p)	-2.80	^{132}I	β^-	3.56	2.4h	^{132}Xe			0.0825	40.5	7
										0.0067	109	27
^{133}Cs (100%)	(n,γ)	6.89	^{134}Cs	β^-	2.062	2.05y	^{134}Ba	90	6×10^{-6}	0.002	3.47	1,5
	(n,γ^a)	6.89	$^{134}Cs^m$	IT	0.138	2.9h	$^{134}Cs^g \rightarrow ^{134}Ba$ (2y)	10	6×10^{-6}	2×10^{-4}	3.24	1
	(n,2n)	-8.98	^{132}Cs	EC (β^-)	2.89 1.2	6.5d	^{132}Xe ^{132}Ba	1.45	15	1.4	22700	1,7
										1.57	25400	23
	(n,p)	0.36	^{133}Xe	β^-	0.427	5.27d	^{133}Cs	+		0.0085	138	1
										0.015	249	7
	(n,p^a)	0.36	$^{133}Xe^m$	IT	0.2328	2.26d	$^{133}Xe^g \rightarrow ^{133}Cs$ (5d)	+		0.0085	138 (138)	1
	(n,α)	4.45	^{130}I	β^-	2.99	12.4h	^{130}Xe	+		0.0012	19.4	1
										0.002	32.4	22,27
	(n,np)	——	^{132}Xe							0.003	48.6	5
^{130}Ba (0.10%)	(n,γ)	7.49	^{131}Ba	EC	1.16	12d	$^{131}Cs \rightarrow ^{131}Xe$ (9.7d)	1.1	thermal	0.002	32.4 (32.4)	1,5
	(n,γ^a)	7.49	$^{131}Ba^m$	IT	0.18	15m	$^{131}Ba \rightarrow ^{131}Cs$ (12d) $\rightarrow ^{131}Xe$	2.52	thermal	5×10^{-4}	8.1 (8.1)	1,5
	(n,2n)	-10.22	^{129}Ba	EC,β^+	2.65	2.9h	$^{129}Cs \rightarrow ^{129}Xe$ (32h)	+		1.6	25900 (25900)	1
										1.37	22200 (22200)	23
^{132}Ba (0.097%)	(n,γ)	7.19	^{133}Ba	EC	0.486	7.2y	^{133}Cs	8.5	thermal	0.002	1.04	1,5
	(n,γ^a)	7.19	$^{133}Ba^m$	IT	0.286	38.9h	$^{133}Ba^g \rightarrow ^{133}Cs$ (7y)	0.3	thermal	8×10^{-5}	1.30	1
	(n,2n)	-9.70	^{131}Ba	EC	1.16	12d	$^{131}Cs \rightarrow ^{131}Xe$ (9.7y)	+		0.09	14400 (346)	1
										0.16	2590 (62.2)	7
	(n,2n^a)	-9.80	$^{131}Ba^m$	IT	0.18	15m	$^{131}Ba \rightarrow ^{131}Cs$ (12d) $\rightarrow ^{131}Xe$			0.09	14400 (14400)	1
^{134}Ba (2.42%)	(n,γ^a)	6.98	$^{135}Ba^m$	IT	0.268	28.7h	$^{135}Ba^g$	0.16	thermal	5×10^{-5}	0.810	1,5
	(n,2n)	-9.46	^{133}Ba	EC	0.486	7.2y	^{133}Cs	+		0.85	442	1
	(n,2n^a)	-9.46	$^{133}Ba^m$	IT	0.286	38.9h	$^{133}Ba^g \rightarrow ^{133}Cs$ (7.2y)	+		0.85	13000 (338)	1
	(n,p)	1.28	^{134}Cs	β^-	2.059	2.05y	^{134}Ba	+		0.03	52.0	1
	(n,p^a)	-1.28	$^{134}Cs^m$	IT	0.138	2.9h	$^{134}Cs^g \rightarrow ^{134}Ba$ (2y)	+		0.03	486	1
^{136}Ba (7.81%)	(n,γ^a)	6.90	$^{137}Ba^m$	IT	0.6616	2.55m	$^{137}Ba^g$	0.012	thermal	0.005	81.0	1,5
	(n,2n^a)	-9.11	$^{135}Ba^m$	IT	0.268	28.7h	$^{135}Ba^g$	+		0.68	11800	1
	(n,p)	-1.77	^{136}Cs	β^-	2.54	13d	^{136}Ba	+		0.042	680	1
										0.008	130	27
	(n,α)	4.40	^{133}Xe	β^-	0.427	5.27d	^{133}Cs			——		

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σa.c (barns)	Energy for σa.c (MeV)	σ at 14 MeV (barns)	Radioactivity (Ci/g)	References
^{137}Ba (11.32%)	(n,n')	——	$^{137}Ba^m$	IT	0.6616	2.55m	$^{137}Ba^g$	0.6	3.5	0.3	4860	1
	(n,2n)	-6.90	^{136}Ba							1.74		15
	(n,p)	-0.39	^{137}Cs	β^-	1.176	30y	$^{137}Ba^m \to 137Ba^g$ $137Ba^g$	+		0.06	7.48	1
	(n,α)	6.04	^{134}Xe							——		
^{138}Ba (71.66%)	(n,γ)	4.72	^{139}Ba	β^-	2.30	82.9m	^{139}La	0.5	thermal	1×10^{-6}	0	1,5
								0.35	thermal	0.0013	0	5
	(n,2n')	-0.61	$^{137}Ba^m$	IT	0.6616	2.55m	$^{137}Ba^g$	+		1.2	15400	1
	(n,p)	-4.62	^{138}Cs	β^-	4.83	32.2m	^{138}Ba	+		0.0019	30.8	1
										0.0038	61.6	22,27
	(n,α)	3.86	^{135}Xe	β^-	1.16	9.2h	$^{135}Cs \to 135Ba$ (3×10^6y)	+		0.0125	282	1
										0.0036	58.3	7
										0.0020	32.4	22
	(n,n')	3.88	$^{135}Xe^m$	IT	0.527	15.6m	$^{135}Xe^g \to 135Cs$ (9h) $\to 135Ba$	+		0.0125	203 (203)	1
										5.5×10^{-4}	8.9 (8.9)	7,22
^{138}La (0.0089%)	(n,2n)	-7.32	^{137}La	EC	0.5	6×10^4y	^{137}Ba	1.95	14.5	1.95	0.122	1
^{139}La (99.911%)	(n,γ)	5.16	^{140}La	β^-	3.769	40.2h	^{140}Ce	8.2	thermal	0.002	32.4	1,5
	(n,2n)	-8.78	^{138}La	β^- EC	0.99 1.78	1.12×10^{11}y	^{138}Ce ^{138}Ba			1.7	0	15
	(n,p)	-1.48	^{139}Ba	β^-	2.30	82.9m	^{139}La	+		0.0033	53.5	1
										0.0048	77.8	27
	(n,α)	4.82	^{136}Ce	β^-	2.54	13d	^{136}Ba	+		0.002	32.4	1,27
^{136}Ce (0.193%)	(n,γ)	7.64	^{137}Ce	EC,(β^+)	1.2	9h	$^{137}La \to 137Ba$ (6×10^4y)	8	thermal	0.002	32.4	1
	(n,γ')	7.64	$^{137}Ce^m$	IT	0.255	34.4h	$^{137}Ce^g \to 137La$ (9h) $\to 137Ba$	1	thermal	2×10^{-4}	3.29 (3.29)	1,5
	(n,2n)	-10.01	^{135}Ce	EC	2.1	17.2h	$^{135}Ce \to 135Ba$ (19h)	+		3.7	27600	1
										1.32	21400	23
^{138}Ce (0.250%)	(n,γ)	7.45	^{139}Ce	EC	0.27	140d	^{139}La	1.1	thermal	0.002	14.7	1,5
	(n,2n)	-9.57	^{137}Ce	EC,(β^+)	1.2	9h	$^{137}La \to 137Ba$ (6×10^4y)	+		0.9	14600	1
	(n,2n')	-9.57	$^{137}Ce^m$	IT	0.255	34.4h	$^{137}Ce^g \to 137La$ (6×10^4y) $\to 137Ba$	+		0.9	14600	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	Max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (Ci/mole)	Reference
^{140}Ce (88.48%)	(n,γ)	5.43	^{141}Ce	β^-	0.581	33d	^{141}Pr	0.6	thermal	0.003	44.6	1,5
	(n,2n)	-9.20	^{139}Ce	EC	0.27	140d	^{139}La	+		2.5	18300	1
										0.4	2940	7
	(n,2n*)	-9.20	$^{139}Ce^m$	IT	0.746	55s	$^{139}Ce \xrightarrow{\gamma} {}^{139}La$ (140d)	1.4	13.5	1.2	19400 (8810)	7
	(n,p)	-2.98	^{140}La	β^-	3.769	40.2h	^{140}Ce	+		0.0095	154	1
	(n,α)	5.34	$^{137}Ba^m$	IT	0.6616	2.55m	$^{137}Ba^g$			0.0095	154	1
								~0.01	~14	~0.01	162	7
^{142}Ce (11.04%)	(n,γ)	5.18	^{143}Ce	β^-	1.44	33h	$^{143}Pr \xrightarrow{\beta^-} {}^{143}Nd$ (13.6d)	0.95	thermal	0.008	130 (130)	1,5
	(n,2n)	-7.16	^{141}Ce	β^-	0.58	33d	^{141}Pr	2.05	12.5	1.8	26700	1,23
	(n,p)	-3.74	^{142}La	β^-	4.51	92m	^{142}Ce	+		0.006	97.2	1
	(n,α)	6.09	^{139}Ba	β^-	2.30	82.9m	^{139}La	+		0.0065	105	1
										0.0060	97.2	22
	(n,np)	~-9	^{141}La	β^-	2.43	3.9h	$^{141}Ce \xrightarrow{\beta^-} {}^{141}Pr$ (33d)	+		0.5×10^{-4}	13.8 (12.6)	1
^{141}Pr (100%)	(n,γ)	5.84	^{142}Pr	β^-	2.16	19.2h	^{142}Nd	12	thermal	0.003	48.6	1,5
	(n,2n)	-9.40	^{140}Pr	EC,β^+	3.34	3.39m	^{140}Ce	1.9	15	1.75	20400	1,23
	(n,p)	0.20	^{141}Ce	β^-	0.581	33d	^{141}Pr	+		0.010	163	27
										0.0033	49.0	1
										0.0063	93.6	22
	(n,α)	6.15	^{138}La	EC β^-	1.78 0.99	1.12×10^{11}y	^{138}Ba ^{138}Ce			0.003	C	5
^{142}142 (27.13%)	(n,γ)	6.13	^{143}Nd					~18	thermal			6
	(n,2n)	-9.81	^{141}Nd	EC,β^+	1.80	2.5h	^{141}Pr	+		2.2	35600	5
								1.8	17	1.6	25900	7
	(n,2n*)	-9.81	$^{141}Nd^m$	IT	0.755	1.05m	$^{141}Nd \xrightarrow{\gamma} {}^{141}Pr$ (2.5h)	+		0.65	10500 (10500)	1
	(n,p)	-1.38	^{142}Pr	β^-	2.16	19.2h	^{142}Nd	+		0.011	178	1
	(n,α)	6.64	^{139}Ce	EC	0.27	140d	^{139}La	+		0.002	14.7	5
	(n,α*)	6.64	$^{139}Ce^m$	IT	0.746	55s	$^{139}Ce \xrightarrow{\gamma} {}^{139}La$ (9.3m)			0.01	162	5
^{143}Nd (12.20%)	(n,2n)	-6.13	^{142}Nd							1.5		15
	(n,p)	-0.15	^{143}Pr	β^-	0.933	13.6d	^{143}Nd	+		0.01	162	1
^{144}Nd (23.87%)	(n,γ)	5.76	^{145}Nd					~5.0	thermal			6
	(n,2n)	-7.82	^{143}Nd							1.7		15
	(n,p)	-2.21	^{144}Pr	β^-	2.909	17.3m	^{144}Nd			0.0098	159	27
	(n,α)	7.33	^{141}Ce	β^-	0.581	33d	^{141}Pr	+		0.013	193	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/mol)	References
^{146}Nd (17.18%)	(n,γ)	5.30	^{147}Nd	β⁻	0.50	11.1d	^{147}Pm	1.8	thermal	0.006	97.2	1,6
	(n,2n)	-7.57	^{145}Nd							2.0		15
	(n,p)	-3.30	^{146}Pr	β⁻	0.933	13.6d	^{146}Nd			0.0053	86.0	27
	(n,α)	6.34	^{143}Ce	β⁻	1.44	33h	^{143}Pr→^{143}Nd (13.6d)	+		0.006	64.8	1
^{148}Nd (5.72%)	(n,γ)	5.07	^{149}Nd	β⁻	1.67	1.8h	^{149}Pm→^{149}Sm (53h)	3	thermal	0.003	48.6 (48.6)	1,5
	(n,2n)	-7.32	^{147}Nd	β⁻	0.90	11.1d	^{147}Pm	3.1	12	2.6	42100	1
										1.6	25900	7
										1.95	31600	23
	(n,p)	-4.12	^{148}Pr	β⁻	4.5	2m	^{148}Nd	+		0.0026	42.1	1
	(n,α)	5.37	^{145}Ce	β⁻	2.6	3m	^{145}Pr→^{145}Nd (6h)	+		0.0036	58.3	1
^{150}Nd (5.60%)	(n,γ)	5.31	^{151}Nd	β⁻	2.4	12m	^{151}Pm→^{151}Sm (28h)→^{151}Eu	1.8	thermal	0.005	81.0 (81.0)	1,5
	(n,2n)	-7.36	^{149}Nd	β⁻	1.67	1.8h	^{149}Pm→^{149}Sm (53h)	3.1	12	2.7	43700	1
										1.7	27500	7
Pm										2.01	32600 (32600)	23
^{144}Sm (3.16%)	(n,γ)	6.76	^{145}Sm	EC	0.46	340d	^{145}Pm→^{145}Nd (17y)	0.7	thermal	0.003	10.7	1,5
	(n,2n)	-10.55	^{143}Sm	EC,β⁺	3.3	8.9m	^{143}Pm→^{143}Nd (0.73y)	+		0.68	11000 (3680)	1
								1.8	18	1.5	24300 (7680)	7
	(n,2n*)	-10.55	^{143}Sm^{m}	IT	0.748	66s	^{143}Sm^{g}→^{143}Pm (8.9m)→^{143}Nd	+		0.68	11000 (11000)	1
	(n,α)	7.97	^{141}Nd	EC,(β⁺)	1.80	2.5h	^{141}Pr			0.011	178	7
^{147}Sm (15.07%)	(n,2n)	-6.37	^{146}Sm							1.3		15
	(n,p)	0.56	^{147}Pm	β⁻	0.225	2.62y	^{147}Sm (α emitter)	+		0.012	16.3	1
^{150}Sm (7.47%)	(n,γ)	5.59	^{151}Sm	β⁻	0.076	87y	^{151}Eu	102	thermal	0.08	3.44	1,5
	(n,2n)	-7.99	^{149}Sm							1.8		15
^{152}Sm (26.63%)	(n,γ)	5.87	^{153}Sm	β-	0.801	47h	^{153}Eu	210	thermal	0.009	146	1,5
	(n,2n)	-8.27	^{151}Sm	β-	0.076	87y	^{151}Eu	2.05	14	2.05	88.1	1
	(n,p)	-2.62	^{152}Pm	β-	3.5	4m	^{152}Sm	+		0.003	48.6	1
	(n,α)	5.28	^{149}Nd	β-	1.67	1.8h	^{149}Pm→^{149}Sm (53h)	+		0.008	130 (130)	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g)	References
^{154}Sm (22.53%)	(n,γ)	5.81	^{155}Sm	β⁻	1.65	23m	^{156}Sm→^{155}Gd (1.8y)	5.5	thermal	0.008	130 (16.6)	1,6
	(n,2n)	-7.98	^{153}Sm	β⁻	0.801	47h	^{153}Eu	2.1	13.5	2.0	32400	1
										1.63	26400	23
	(n,p)	-3.22	^{154}Pm	β⁻	≈2.2	2.5m	^{154}Sm	+		0.0020	45.4	1
	(n,α)	4.10	^{151}Nd	β⁻	2.4	12m	^{151}Pm→^{151}Sm (28h)→^{151}Eu	+		0.0075	122 (122)	1
^{151}Eu (47.77%)	(n,γ)	6.31	^{152}Eu	EC,β⁺ β⁻	1.857 1.82	12y	^{152}Sm ^{152}Gd (α emitter)	6000	thermal	0.005	1.56	1
	(n,γ^m)	6.31	^{152}Eu^m	EC,β⁺ β⁻	1.9 2.3	9.3h	^{152}Sm ^{152}Gd	3100	thermal	0.002	32.4	5
	(n,2n)	-7.98	^{150}Eu	EC	≈2.3	5y	^{150}Sm	0.61	14	0.61	456	1
	(n,2n^m)	-7.98	^{150}Eu^m	EC,β⁺ β⁻	2.25 1.010	12.6h	^{150}Sm ^{150}Gd (α emitter)	0.61	14	0.61	9000	1
	(n,p)	0.71	^{151}Sm	β⁻	0.076	87y	^{151}Eu			—		
	(n,α^m)	7.87	^{148}Pm^m	(IT) β⁻	0.1372 2.62	42d	^{148}Sm			0.019	267	7
^{153}Eu (52.23%)	(n,γ)	6.44	^{154}Eu	β⁻	1.978	16y	^{154}Gd	390	thermal	0.009	2.10	1,5
	(n,2n)	-8.56	^{152}Eu	EC,β⁺ β⁻	1.857 1.82	12y	^{152}Sm ^{152}Gd (α emitter)	+		0.76	237	1
	(n,2n^m)	-8.56	^{152}Eu^m	EC,β⁺ β⁻	1.90 2.3	9.3h	^{152}Sm ^{152}Gd	+		0.76	12300	1
	(n,p)	-0.02	^{153}Sm	β⁻	0.80	47h	^{153}Eu	+		0.006	91.2	1
	(n,α)	5.83	^{150}Pm	β⁻	3.43	2.7h	^{150}Sm	+		0.007	113	1
^{152}Gd (0.20%)	(n,γ)	6.49	^{153}Gd	EC	0.243	242d	^{153}Eu	100	thermal	0.008	38.2	1,5
	(n,2n)	-8.60	^{151}Gd	EC	0.4	120d	^{151}Eu	2.0	14	2.0	16400	2
										1.3	10600	15
^{154}Gd (2.15%)	(n,2n)	-8.66	^{153}Gd	EC	0.243	242d	^{153}Eu	2.05	14	2.05	9000	1
										1.90	9000	23
^{155}Gd (14.72%)	(n,2n)	-6.45	^{154}Gd							2.1		8
										1.8		15
	(n,p)	0.54	^{155}Eu	β⁻	0.248	1.81y	^{155}Gd	+		0.012	23.3	1
^{156}Gd (20.47%)	(n,γ)	6.37	^{157}Gd					11.5	thermal			5
	(n,2n)	-8.53	^{155}Gd							2.1		8
										2.0		15
	(n,p)	-1.67	^{156}Eu	β⁻	2.45	15d	^{156}Gd			—		
	(n,α)	5.67	^{153}Sm	β⁻	0.801	47h	^{153}Eu	+		0.0029	47.0	1
										0.0005	138	7

Nuclide (abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g) est	References
^{157}Gd (15.68%)	(n,2n)	-6.37	^{156}Gd							2.1		8
										2.0		15
	(n,p)	-0.58	^{157}Eu	β^-	1.36	15.2h	^{157}Gd			0.0095	154	1
^{158}Gd (24.87%)	(n,α)	5.95	^{155}Gd	β^-	0.95	18h	^{155}Tb	3.5	thermal	0.004	64.8	1,5
	(n,2n)	-7.93	^{157}Gd							2.2		8,15
	(n,p)	-2.65	^{158}Eu	β^-	3.5	46m	^{158}Gd			0.0015	24.3	26
	(n,α)	5.16	^{155}Sm	β^-	1.64	23m	^{155}Eu			0.0034	48.9	7
^{160}Gd (21.90%)	(n,γ)	5.63	^{161}Gd	β^-	2.0	3.7m	^{161}Tb→^{161}Dy (6.9d)	0.77	thermal	0.01	162 (162)	1,5
	(n,2n)	-7.45	^{159}Gd	β^-	0.95	18h	^{159}Tb	2.2	12.5	1.9	30000	1
										1.53	24000	23
	(n,p)	-3.62	^{160}Eu	β^-	3.6	4.5m	^{160}Gd^g			—		
	(n,α)	—	^{157}Sm	β^-	2.83	8m (83m)	^{157}Eu→^{157}Gd (15h)	+		0.0017	27.5 (27.5)	1
^{159}Tb (100%)	(n,γ)	6.38	^{160}Tb	β^-	1.827	72.1d	^{160}Dy	50	thermal	0.01	112	1
	(n,2n)	-8.14	^{158}Tb	EC β^-	1.20 0.95	1.2×10^{2}y	^{158}Gd ^{158}Dy	+		0.26	0.810	1
	(n,2n^4)	-8.14	^{158}Tb^m	IT	0.110	11s	^{158}Gd→^{158}Dy (8.7y)			0.16	2590 (0.596)	5
	(n,p)	-0.17	^{159}Gd	β^-	0.95	18h	^{159}Tb	+		0.00185	30.0	1
	(n,α)	6.22	^{156}Eu	β^-	2.45	15d	^{156}Gd	+		0.00185	30.0	1
^{156}Dy (0.0524%)	(n,2n)	-9.44	^{155}Dy	EC	0.9	10.2h	^{155}Tb→^{155}Gd (5.3d)	+		1.0	16200	1
										1.1	17800	15
										1.9	30800 (30800)	7
^{158}Dy (0.0902%)	(n,γ)	6.83	^{159}Dy	EC	0.38	144d	^{159}Tb	96	thermal	0.01	71.9	1,5
	(n,2n)	-9.06	^{157}Dy	EC	1.1	8.1h	^{157}Tb→^{157}Gd (150y)	+		2.0	32400 (50.0)	1
^{160}Dy (2.294%)	(n,2n)	-8.58	^{159}Dy	EC	0.38	144d	^{159}Tb	2.1	14.5	2.1	15100	1
										2.06	14800	23
^{161}Dy (18.88%)	(n,2n)	-6.45	^{160}Dy							2.2		8
										2.0		15
^{162}Dy (25.53%)	(n,γ)	6.27	^{163}Dy					160	thermal			5
	(n,2n)	-8.19	^{161}Dy							2.1		8,15
	(n,p)	-1.68	^{162}Tb	β^-	2.8	7.5m 2.2h	^{162}Dy			—		
	(n,α)	6.05	^{159}Gd	β^-	0.95	18h	^{159}Tb	+		0.003	48.6	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/mol)	Reference
^{163}Dy (24.97%)	(n,γ)	7.65	^{164}Dy					125	thermal			5
	(n,2n)	-6.27	^{162}Dy							2.2		8
										2.1		15
	(n,p)	-0.90	^{163}Tb	β^-	1.68	6.9h	^{163}Dy	+		0.0034	38.9	1
	(n,p*)	-0.90	^{163}Tb^m	β^-	—	7m	^{163}Dy	+		0.0034	38.9	1
	(n,α)	7.23	^{160}Gd							—		
^{164}Dy (28.18%)	(n,γ)	5.72	^{165}Dy	β^-	1.30	139m	^{165}Ho	600	thermal	0.01	162	1,5
	(n,γ*)	5.72	^{165}Dy^m	IT (β^-)	0.108 1.40	1.26m	^{165}Dy$\xrightarrow{\beta}$^{165}Ho (146m)	2200	thermal	0.001	16.2 (16.2)	1,5
	(n,2n)	-7.65	^{163}Dy							2.2		8
										2.3		15
	(n,p)	-2.56	^{164}Tb	β^-	3.8	23h	^{164}Dy			—		
	(n,α)	5.21	^{161}Gd	β^-	2.0	3.7m	^{161}Tb$\rightarrow$^{161}Dy (6.9d)	+		0.0036	50.3 (50.3)	1
^{165}Ho (100%)	(n,γ)	6.24	^{166}Ho	β^-	1.847	26.9h	^{166}Er	64	thermal	0.01	162	1,5
	(n,2n)	-7.99	^{164}Ho	EC β^-	1.11 1.03	39m	^{164}Dy ^{164}Er			2.3	37300	1
								0.8	14	0.8	13000	7
	(n,2n*)	-7.99	^{164}Ho^m	—	—	24m	?	1.0	14	1.0	16200	7
	(n,p)	-0.51	^{165}Dy	β^-	1.30	139m	^{165}Ho	+		0.04	648	1,24
	(n,p*)	-0.51	^{165}Dy^m	IT (β^-)	0.108	1.26m	^{165}Dy$\xrightarrow{\beta}$^{165}Ho (146m)	+		0.001	16.2 (16.2)	1
	(n,α)	6.46	^{162}Tb	β^-	2.8	7.5m	^{162}Dy			0.0012	19.4	7
^{162}Er (0.126%)	(n,γ)	6.91	^{163}Er	EC,β^+	1.21	75m	^{163}Ho	10	10^{-4}	0.01	162	1
	(n,2n)	-9.21	^{161}Er	EC,β^+	2.4	3.1h	^{161}Ho$\rightarrow$^{161}Dy (2.5h)	2.05	14.5	2.05	33300 (33300)	1
										1.95	31600	23
^{164}Er (1.56%)	(n,γ)	6.66	^{165}Er	EC	0.37	10.3h	^{165}Ho^g	10	10^{-4}	0.01	162	1
	(n,2n)	-8.86	^{163}Er	EC, β^+	1.2	75m	^{163}Ho^g	2.1	14.5	2.1	34000	1
^{166}Er (33.41%)	(n,γ)	6.44	^{167}Er					45	thermal			5
	(n,γ*)	6.44	^{167}Er^m	IT	0.2078	2.3s	^{167}Er	15	thermal			5
	(n,2n)	-8.47	^{165}Er	EC	0.37	10.3h	^{165}Ho^g	+		0.96	13600	1
										2.0	32400	7,23
	(n,p)	-1.08	^{166}Ho	β^-	1.847	26.9h	^{166}Er			0.081	178	26
	(n,α)	7.09	^{163}Dy							—		

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σa,o (barns)	Energy for σa,o (MeV)	σ at 24 keV (barns)	Radioactivity (curie/g)	References
^{167}Er (22.94%)	(n,γ)	7.77	^{168}Er					650	thermal			5
	(n,2n)	-6.44	^{166}Er							2.0		15
	(n,p)	-0.19	^{167}Ho	β$^-$	1.0	3.1h	^{167}Er	+		0.0024	38.9	1,27
	(n,α)	8.31	^{164}Dy							—		
^{168}Er (27.07%)	(n,γ)	6.08	^{169}Er	β$^-$	0.340	9.4d	^{169}Tm	5	10^{-6}	0.01	162	1
	(n,2n^a)	-7.77	^{167}Er^m	IT	0.2078	2.3s	^{167}Er^g	1.0	14	1.0	16200	7
										0.19	3080	5
	(n,p)	-1.99	^{168}Ho	β$^-$	3.3	3.3m	^{168}Er	+		0.0017	27.5	1
	(n,α)	6.26	^{165}Dy	β$^-$	1.3	139m	^{165}Ho	+		5×10^{-6}	8.1	1
	(n,α^a)	6.26	^{165}Dy^m	IT (β$^-$)	0.108 1.6	1.26m	^{165}Dy,^{165}Ho (146m)	+		9×10^{-6}	14.6 (14.6)	1
^{170}Er (14.90%)	(n,γ)	5.68	^{171}Er	β$^-$	1.490	7.52h	^{171}Tm	10	thermal	0.01	162	1,5
	(n,2n)	-7.26	^{169}Er	β$^-$	0.34	9.4d	^{169}Tm	2.2	12.5	2.0	32400	1
										1.06	30100	23
	(n,p)	-2.92	^{170}Ho	β$^-$	4.2	45s	^{170}Er			0.0018	29.2	5,27
	(n,α)	—	^{167}Dy	β$^-$	3.3	4.4m	^{167}Ho→^{167}Er (3.1h)	+		9×10^{-6}	14.6 (14.6)	1,27
^{169}Tm (100%)	(n,γ)	6.59	^{170}Tm	EC β$^-$	0.5 0.967	130d	^{170}Er ^{170}Yb	130	thermal	0.01	77.4	1,6
	(n,2n)	-8.06	^{168}Tm	EC	1.72	85d	^{168}Er	~1.0	~14	1.9	18210	1,7
										2.05	20900	23
	(n,p)	0.43	^{169}Er	β$^-$	0.340	9.4d	^{169}Tm			0.010	162	26
	(n,α)	7.44	^{166}Ho	β$^-$	1.847	26.9d	^{166}Er			—		
^{168}Yb (0.140%)	(n,γ)	6.87	^{169}Yb	EC	1.2	33d	^{169}Tm	5200	thermal	0.01	150	1
	(n,2n)	-9.06	^{167}Yb	EC,β$^+$	1.96	18m	^{167}Tm^m (9.5d) →^{167}Er^g	2.2	14	2.2	35600 (35600)	1
										1.5	24300	15
^{170}Yb (3.03%)	(n,2n)	-8.47	^{169}Yb	EC	1.2	33d	^{169}Tm	1.6	14	1.6	26100	1
	(n,2n^a)	-8.47	^{169}Yb^m	IT	0.0343	46s	^{169}Yb^g,^{169}Tm (33d)	0.54	14	0.54	8730 (8130)	1
^{171}Yb (14.31%)	(n,2n)	-6.62	^{170}Yb							1.9		1
^{172}Yb (21.82%)	(n,2n)	-8.02	^{171}Yb							2.8		15
	(n,p)	-1.09	^{172}Tm	β$^-$	1.80	63.6h	^{172}Yb			0.0063	102	30
^{173}Yb (16.13%)	(n,2n)	-6.37	^{172}Yb							2.1		15
	(n,p)	-0.54	^{173}Tm	β$^-$	1.32	8.2h	^{173}Yb			0.0042	60.0	30

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σa.σ (barns)	Energy for σa.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g mat)	References
^{174}Yb (30.84%)	(n,γ)	5.82	^{175}Yb	β⁻	0.467	101h	^{175}Lu	55	thermal	0.01	162	1,5
	(n,2n)	-7.47	^{173}Yb							2.2		15
	(n,p)	-2.28	^{174}Tm	β⁻	2.5	5.5m	^{174}Yb			0.002	32.4	26,30
	(n,α)	6.41	^{171}Er	β⁻	1.490	7.52h	^{171}Tm			0.2×10^{-4}	13.3	30
^{176}Yb (12.73%)	(n,γ)	5.56	^{177}Yb	β⁻	1.48	1.9h	^{177}Lu→^{177}Hf (6.7d)	20	thermal	0.009	146	1,5
	(n,2n)	-6.88	^{175}Yb	β⁻	0.467	101h	^{175}Lu	2.1	13	1.75	20400	1
										1.70	20000	23
	(n,p)	-3.36	^{176}Tm	β⁻	4.2	1.5m	^{176}Yb			5.5×10^{-4}	8.91	30
	(n,α)	5.58	^{173}Er	β⁻	2.5	1.4m	^{173}Tm→^{173}Yb (8.2h)			3.3×10^{-4}	5.35 (5.35)	30
^{175}Lu (97.40%)	(n,γ^g)	6.29	^{176}Lu	β⁻	1.31	3.7h	^{176}Hf	23	thermal	0.002	32.4	1,5
	(n,2n)	-7.66	^{174}Lu	EC	1.5	3.6y	^{174}Yb	1.6	14.5	1.6	1640	1
	(n,2n^m)	-7.66	^{174}Lu^m	EC IT	1.7 0.1708	140d	^{174}Yb ^{174}Lu^g→^{174}Yb (3.6y)	1.6	14.5	1.6	11500	1
										0.65	4600	7
	(n,p)	0.31	^{175}Yb	β⁻	0.467	101h	^{175}Lu	+		0.002	32.4	1
	(n,α)	7.87	^{172}Tm	β⁻	1.08	63.6h	^{172}Yb			——		
^{176}Lu (2.60%)	(n,γ)	7.07	^{177}Lu	β⁻	0.497	6.7d	^{177}Hf	2100	thermal	0.01	162	1,5
	(n,γ^m)	7.07	^{177}Lu^m	β⁻ IT	1.467 0.9702	155d	^{177}Yb→^{177}Lu^g (57h) ^{177}Lu^g	1	thermal	1×10^{-3}	0.066	1,5
	(n,n')	——	^{176}Lu^m	β⁻	1.31	3.7h	^{176}Hf	0.29	4	0.08	1300	1
	(n,2n)	-6.29	^{175}Lu							2.3		8
	(n,3n)	-13.95	^{174}Lu	EC	1.5	3.6y	^{174}Yb	+		0.15 at 15MeV	156	1
	(n,3n^m)	-13.95	^{174}Lu^m	EC IT	1.7 0.1708	140d	^{174}Yb ^{174}Lu^g→^{174}Yb (3.6y)	+		0.15 at 15MeV	1000	1
^{174}Hf (0.18%)	(n,γ)	6.85	^{175}Hf	EC	0.59	70d	^{175}Lu	390	thermal	0.01	112	1,5
	(n,2n)	-8.59	^{173}Hf	EC	>2	23.6h	^{173}Lu→^{173}Yb (1.4y)	+		1.6	25900 (4270)	1
										0.06	13000	5,7
^{176}Hf (5.15%)	(n,2n)	-8.09	^{175}Hf	EC	0.59	70d	^{175}Lu	2.2	14	2.2	24600	1
										2.27	25000	23
										2	22700	5
^{177}Hf (18.60%)	(n,2n)	-6.38	^{176}Hf							2.3		8
										1.9		15

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/mol)	Reference
^{176}Hf (27.08%)	(n,γ^{g})	6.38	^{179}Hf^{m}	IT	0.378	18.6s	^{179}Hf^{g}	50	thermal			5
	(n,2n)	-7.63	^{177}Hf							2.3		8
										2.2		15
	(n,p)	-1.47	^{176}Lu	β^{-}	2.25	38m	^{176}Hf^{g}			0.0017	27.6	37
	(n,p^{g})	-1.47	^{176}Lu^{m}	β^{-}	2.65	20m	^{176}Hf^{g}→^{176}Hf^{g} (4.3s)			0.0018	16.2	37
	(n,α)	7.91	^{173}Yb	β^{-}	0.467	101h	^{173}Lu	+		0.0006	25.9	1
										0.002	32.4	5
^{178}Hf (13.78%)	(n,γ^{g})	7.38	^{180}Hf^{m}	IT	1.1422	5.5h	^{180}Hf^{g}	0.34	thermal	1×10^{-4}	1.62	1,5
	(n,2n^{g})	-6.18	^{176}Hf^{m}	IT	0.148	4.3s	^{176}Hf^{g}			0.8	13000	7
^{180}Hf (35.44%)	(n,γ)	5.69	^{181}Hf	β^{-}	1.023	42.5d	^{181}Ta	12.6	thermal	0.01	140	1,5
	(n,n$'$)	—	^{180}Hf^{m}	IT	1.1422	5.5h	^{180}Hf^{g}	0.07	5	0.02	334	1
	(n,2n^{g})	-7.39	^{179}Hf^{m}	IT	0.378	18.6s	^{179}Hf^{g}			0.6	9720	7
	(n,p)	-2.52	^{180}Lu	β^{-}	3.3	2.5m	^{180}Hf			0.0014	22.7	26
	(n,α)	6.86	^{177}Yb	β^{-}	1.40	1.9h	^{177}Lu→^{177}Hf (6.7d)	+		0.0021	34.0 (34.0)	1
										0.0022	35.6	5
^{181}Ta (100%)	(n,γ)	6.06	^{182}Ta	β^{-}	1.811	115d	^{182}W	2000	3.8×10^{-5}			1
	(n,2n^{g})	-7.64	^{180}Ta^{m}	IC β^{-}	0.9 0.70	8.1h	^{180}Hf ^{180}W	1.1	13	1.1	17000	1
	(n,3n)	-14.22	^{179}Ta	EC	0.115	600d	^{179}Hf	+		0.2 at 15MeV	424	1
	(n,p)	-0.26	^{181}Hf	β^{-}	1.053	42.5d	^{181}Ta	+		0.002	28.0	1,27
	(n,α)	7.41	^{178}Lu	β^{-}	2.25	38m	^{178}Hf^{g}	+		0.001	16.2	1
										0.0003	4.86	37
	(n,n^{g})	7.41	^{178}Lu^{m}	β^{-}	2.6	20m	^{178}Hf^{m}→^{178}Hf^{g} (4.3s)	+		0.0012	19.4	7,18
										0.00014	22.7	37
^{180}W (0.135%)	(n,γ)	6.65	^{181}W	EC	0.19	140d	^{181}Ta	10	thermal	0.009	66.0	
	(n,2n)	-8.49	^{179}W	EC	1.2	38m	^{179}Ta→^{179}Hf (600d)	+		1.3	21180 (2760)	1
	(n,2n^{g})	-8.49	^{179}W^{m}	IT	0.2218	5.2m	^{179}W^{g}→^{179}Ta (38m) (600d) →^{179}Hf	+		0.42	6000	1
^{182}W (26.4%)	(n,γ)	6.19	^{183}W					20	thermal			5
	(n,2n)	-8.05	^{181}W	EC	0.19	140d	^{181}Ta	2.3	14	2.3	16900	1
										2.23	16400	23
	(n,p)	-1.02	^{182}Ta	β^{-}	1.811	115d	^{182}W			0.0023	32.2	7
	(n,α)	7.09	^{179}Hf							—		

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	σ(n,γ) (barns)	σ(n,γ) for σ(n,γ) (MeV)	σ at 14 MeV (barns)	Radioactivity (Ci/mg)	Reference
^{183}W (14.4%)	(n,2n)	-6.19	^{182}W							2.35		8
										2.0		15
	(n,3n)	-14.25	^{181}W	EC	0.19	140d	^{181}Ta	+		0.4 at 15MeV	2940	1
	(n,p)	-0.29	^{183}Ta	β^-	1.07	5.1d	^{183}W	+		0.0028	45.4	1
^{184}W (30.6%)	(n,γ)	5.75	^{185}W	β^-	0.429	75d	^{185}Re	1.8	thermal	0.005	54.8	1,5
	(n,γ*)	5.75	$^{185}W^m$	IT	0.368	1.6m	^{185m}Re (75d)	0.02	thermal	3×10^{-5}	0.486	1,5
	(n,2n*)	-7.41	$^{183}W^m$	IT	0.309	5.3s	$^{183}W^g$		13	0.8	13000	7
	(n,p)	-2.25	^{184}Ta	β^-	2.75	8.7h	^{184}W	+		0.0036	90.7	1
	(n,α)	7.37	^{181}Hf	β^-	1.023	42.5d	^{181}Ta	+		0.0034	47.5	1
	(n,d+pn)	—	^{183}Ta	β^-	1.07	5.1d	^{183}W			0.0018	29.2	5
^{186}W (28.4%)	(n,γ)	5.47	^{187}W	β^-	1.31	23.9h	^{187}Re	38	thermal	0.005	81.0	1,5
	(n,2n)	-7.20	^{175}W	β^-	0.429	75d	^{185}Re	1.1	12	0.8	8760	1
										2.2	24100	7
	(n,2n*)	-7.20	$^{185}W^m$	IT	0.368	1.6m	^{185m}Re (75d)	1.1	12	0.0	13000	1
										0.5	8100	7
	(n,p)	-3.12	^{186}Ta	β^-	3.7	10m	^{186}W			0.0014	22.7	1
								~0.025	~30			7
	(n,α)	6.30	^{183}Hf	β^-	2.2	65m	^{183m}Ta (5.1d) ^{183}W	+		0.0014	22.7 (22.7)	1
	(n,np)	—	^{185}Ta	β^-	2.0	50m	^{185m}Ta (75d) ^{185}Re	+		3×10^{-4}	4.86 (3.29)	1
^{186}Os (37.07%)	(n,γ)	6.18	^{187}Os	β^- (EC)	1.071 0.54	70h	^{187}Os ^{187}W	105	thermal	0.000	130	1,5
	(n,2n)	-7.79	^{184}Os	EC	1.6	38s	^{184}W	2.25	12	2.25	32500	1
										1.91	27600	5
	(n,2n*)	-7.79	$^{184}Os^m$	EC IT	0.1880	169d	^{184}W ^{184m}Os ^{184}W (58d)	0.047	12	0.046	293	1
										0.26	1660	7
	(n,2n+*)	-7.79	$^{183}Os^m$	—	—	2.2d	—			1.1	17000	5
	(n,p)	0.36	^{185}W	β^-	0.429	75d	^{185}Re			—		
	(n,α)	8.28	^{183}Ta	β^-	1.011	115d	^{183}W			0mb from NR-11571(1962)		
^{187}Re (62.93%)	(n,γ)	5.87	^{188}Re	β^-	2.116	16.7h	^{188}Os	73	thermal	0.005	81.0	1,5
	(n,γ*)	5.87	$^{188}Re^m$	IT	0.172	18.7m	^{188m}Re ^{188}Os	1.3	thermal	3×10^{-4}	4.86	1,5
	(n,2n)	-7.37	^{186}Re	β^- (EC)	1.071 0.54	90h	^{186}Os ^{186}W	1.7	13	1.7	27500	1
										1.43	23200	23
	(n,p)	-0.59	^{187}W	β^-	1.31	23.9h	^{187}Re	+		0.0033	53.5	1
										0.0030	63.2	5,27
	(n,α)	7.18	^{184}Ta	β^-	2.75	8.7h	^{184}W	+		9.2×10^{-4}	14.9	1
										0.4×10^{-4}	15.2	5,27

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/mk)	References
^{184}Os (0.018%)	(n,γ)	6.67	^{185}Os	EC	0.982	94d	^{185}Re	200	thermal	0.008	76.9	1
	(n,2n)	-8.06	^{183}Os	EC	2.0	12h	^{183}Re→^{183}W (71d)	+		1.3	21100	1
	(n,2n^{a})	-8.06	^{183}Os^{m}	IT EC	0.1707 2.2	9.9h	^{183}Re→^{183}Re (12h)→^{183}W ^{183}Re→^{183}W (71d)	+		0.43	6970	1
^{186}Os (1.59%)	(n,2n)	-8.27	^{185}Os	EC	0.982	94d	^{185}Re	2.25	14	2.25	21400	1
										1.8	17300	15
^{187}Os (1.64%)	(n,2n)	-6.30	^{186}Os							1.9		15
^{188}Os (13.3%)	(n,γ^{a})	5.92	^{189}Os^{m}	IT	0.03061	5.7h	^{189}Os^{g}	0.9	10^{-4}	5×10^{-4}	0.10	2
	(n,3n)	-7.99	^{187}Os							2.8		15
	(n,p)	-1.34	^{188}Re	β^{-}	2.116	16.7h	^{188}Os	+		0.0042	60.0	1
	(n,p^{a})	-1.34	^{188}Re^{m}	IT	0.1720	18.7m	^{188}Re^{g}→^{188}Os	+		0.0042	60.0	1
^{189}Os (16.1%)	(n,γ^{a})	7.79	^{190}Os^{m}	IT	1.706	9.9m	^{190}Os^{g}	100	10^{-4}	5×10^{-3}	0.001	1
	(n,n')	—	^{189}Os^{m}	IT	0.03061	5.7h	^{189}Os^{g}	3.5	4	1.0	36300	1
	(n,3n)	-5.92	^{187}Os							2.1		15
	(n,p^{a})	-0.23	^{189}Re^{m}	—	—	2.8h	—			0.002	32.4	7
^{190}Os (26.4%)	(n,γ)	5.76	^{191}Os	β^{-}	0.310	15d	^{191}Ir	6	thermal	0.003	48.4	1,5
	(n,γ^{a})	5.76	^{191}Os^{m}	IT	0.0742	13h	^{191}Os^{g}→^{191}Ir (15d)	8.5	thermal	0.003	48.6	1,5
	(n,n')	—	^{190}Os^{m}	IT	1.706	9.9m	^{190}Os^{g}	0.0175	5	0.005	81.0	1
	(n,2n^{a})	-7.79	^{189}Os^{m}	IT	0.0300	5.7h	^{189}Os^{g}	1.15	13	1.15	18600	1
	(n,p)	-2.40	^{190}Os	β^{-}	3.1	2.8m	^{190}Os			0.0020	32.4	27
	(n,α)	6.84	^{187}W	β^{-}	1.32	23.9h	^{187}Re→^{187}Os (4×10^{10}y)	+		4.7×10^{-4}	7.61	1,27
^{192}Os (41.0%)	(n,γ)	5.39	^{193}Os	β^{-}	1.132	31h	^{193}Ir	1.6	thermal	0.005	81.0	1,6
	(n,2n)	-7.56	^{191}Os	β^{-}	0.310	15d	^{191}Ir	1.15	14	1.15	18600	1
										2	19200	7
	(n,2n^{a})	-7.56	^{191}Os^{m}	IT	0.0742	13h	^{191}Os^{g}→^{191}Ir (15d)	1.15	14	1.15	18600	1
	(n,p)	—	^{192}Re	β^{-}	3.1	6s	^{192}Os			7×10^{-4}	113	26
	(n,α)	5.24	^{189}W	β^{-}	2.5	11.5	^{189}Re→^{189}Os (24h)			—		

Nuclide (Abundance)	Type of Radiation	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radio-activity (curie/mg)	References
^{191}Ir (38.5%)	(n,γ)	6.20	^{192}Ir	EC β^-	1.2 1.453	74.2d	^{192}Os ^{192}Pt	300	thermal	0.002	21.9	1,5
	(n,γ*)	6.20	$^{192}Ir^m$	IT	0.0508	1.4m	$^{192}Ir^g$ (94%) ^{192}Pt ^{192}Os	640	thermal	0.002	32.4	1,5
	(n,2n)	-8.12	^{190}Ir	EC	2.1	11d	^{190}Os	2.0	14	2.0	30400	1
	(n,2n*)	-8.12	$^{190}Ir^m$	IT	0.0363	1.2h	$^{190}Ir^g$→^{190}Os (13%)	+		0.37	5090	1
	(n,p)	0.47	^{191}Os	β^-	0.310	15d	^{191}Ir			—		
	(n,α)	7.96	^{188}Re	β^-	2.116	16.7h	^{188}Os	+		0.0020	29.2	1
	(n,α*)	7.96	$^{188}Re^m$	IT	0.1730	18.7m	$^{188}Re^g$→^{188}Os (96.7%)	+		2×10^{-4}	3.24	1
^{193}Ir (61.5%)	(n,γ)	6.07	^{194}Ir	β^-	2.24	17.4h	^{194}Pt	110	thermal	0.005	81.0	1,5
	(n,n')	—	$^{193}Ir^m$	IT	0.0082	12d	$^{193}Ir^g$	1.15	5	0.3	4060	1
	(n,2n)	-7.77	^{192}Ir	EC β^-	1.2 1.453	74.5d	^{192}Os ^{192}Pt	1.15	14	1.15	12600	1
										2.0	21900	7
	(n,2n*)	-7.77	$^{192}Ir^m$	IT	0.161	>5y	$^{192}Ir^g$ (94%) ^{192}Os ^{192}Pt	0.59	14	0.39	< 441	1
	(n,p)	-0.35	^{193}Os	β^-	1.132	31h	^{193}Ir	+		0.0025	40.5	1,27
	(n,α)	6.64	^{190}Re	β^-	3.1	2.8m	^{190}Os			—		
^{190}Pt (0.012%)	(n,γ)	6.45	^{191}Pt	EC	0.8	3d	^{191}Ir	200	thermal	0.000	130	1
	(n,2n)	-8.81	^{189}Pt	EC	1.6	10.9h	^{189}Ir→^{189}Os (15%)	2.25	14	2.25	36400 (36400)	1
										1.7	27500	15
^{192}Pt (0.78%)	(n,γ)	6.25	^{193}Pt	EC	0.05	<500y	^{193}Ir	10	thermal	0.003	>0.022	1
	(n,γ*)	6.25	$^{193}Pt^m$	IT	0.148	4.3d	$^{193}Pt^g$→^{193}Ir (<500y)	10	thermal	0.003	48.6	1
	(n,2n)	-8.66	^{191}Pt	EC	0.8	3d	^{191}Ir	+		2.3	37300	1
										2.0	32.4	25
^{194}Pt (32.8%)	(n,γ*)	6.12	$^{195}Pt^m$	IT	0.2593	4.1d	$^{195}Pt^g$	0.2	10^{-4}	5×10^{-4}	6.48	1
	(n,2n)	-8.37	^{193}Pt	EC	0.05	<500y	^{193}Ir	+		1.15	>0.60	1
	(n,2n*)	-8.37	$^{193}Pt^m$	IT	0.1481	4.3d	$^{193}Pt^g$→^{193}Ir	+		1.15	18600	1
	(n,p)	-1.46	^{194}Ir	β^-	2.24	17.4h	^{194}Pt	+		0.0034	55.1	1
										0.0043	69.7	25
	(n,α)	7.28	^{191}Os	β^-	0.310	15d	^{191}Ir	+		5×10^{-4}	8.07	1
	(n,α*)	7.28	$^{191}Os^m$	IT	0.0742	13h	$^{191}Os^g$→^{191}Ir (1.5%)	+		5×10^{-4}	8.10	1

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radio-activity (curie/g)	
^{195}Pt (33.7%)	(n,γ)	7.92	^{196}Pt					27	thermal			6
	(n,n')	——	$^{195}Pt^{m}$	IT	0.2593	4.1d	$^{195}Pt^{g}$	0.29	4	0.08	1300	1
	$(n,2n)$	-6.12	^{194}Pt							2.4		8
										2.1		15
	(n,p)	-0.15	^{195}Ir	β^-	1.0	4.2h	^{195}Pt	+		0.0026	42.1	1
										0.0029	47.0	5,27
	(n,α)	8.71	^{192}Os							——		
^{196}Pt (25.4%)	(n,γ)	5.85	^{197}Pt	β^-	0.75	18h	^{197}Au	1	thermal	0.003	48.6	1
	(n,γ^{a})	5.85	$^{197}Pt^{m}$	IT (β^-)	0.399 1.15	80m	$^{197}Pt^{g} \rightarrow ^{197}Au$ (18h) ^{197}Au	0.06	thermal	3×10^{-4}	4.86	1
	$(n,2n^{a})$	-7.92	$^{195}Pt^{m}$	IT	0.2593	4.1d	$^{195}Pt^{g}$	+		1.2	19400	1
										0.46	7430	7
	(n,p)	-2.39	^{196}Ir	β^-	3.48	120m	^{196}Pt			0.0011	17.8	25
	(n,α)	6.38	^{193}Os	β^-	1.132	31h	^{193}Ir	+		5.2×10^{-4}	8.42	1,27
^{198}Pt (7.23%)	(n,γ)	5.56	^{199}Pt	β^-	1.68	30m	$^{199}Au \rightarrow ^{199}Hg$ (3.2d)	5	thermal	0.082	32.4 (32.4)	1
	$(n,2n)$	-7.56	^{197}Pt	β^-	0.75	18h	^{197}Au	2.8	14	2.8	45400	1
										1.1	17800	7
	$(n,2n^{a})$	-7.56	$^{197}Pt^{m}$	IT (β^-)	0.2593 1.15	80m	$^{197}Pt^{g} \rightarrow ^{197}Au$ (18h) ^{197}Au	1.4	14	1.4	22700	1
										1.0	16200	25
^{197}Au (100%)	(n,γ)	6.51	^{198}Au	β^-	1.374	2.7d	^{198}Hg	26000	5×10^{-6}			1,5
	(n,n')	——	$^{197}Au^{m}$	IT	0.4095	7.2s	$^{197}Au^{g}$	(En'=9	~14 MeV)	0.2	3240	1
	$(n,2n)$	-8.08	^{196}Au	EC, β^+ β^-	1.48 0.684	6.18d	^{196}Pt ^{196}Hg	2.25	14	2.25	36500	1
	$(n,2n^{a})$	-8.08	$^{196}Au^{m}$	IT	0.5955	9.7h	$^{196}Au^{g} \rightarrow ^{196}Pt$ (6d) ^{196}Hg	0.15	16	0.15	2430	1,25
	(n,p)	0.04	^{197}Pt	β^-	0.75	18h	^{197}Au	+		0.0018	29.2	1
								0.006	18			7
	(n,p^{a})	0.04	$^{197}Pt^{m}$	IT β^-	0.399 1.15	80m	$^{197}Pt^{g} \rightarrow ^{197}Au^{g}$ (18h) $^{197}Au^{g} \rightarrow ^{197}Au^{g}$ (7.2s)			1.8×10^{-4}	2.92	1
	(n,α)	6.98	^{194}Ir	β^-	2.24	17.4h	^{194}Pt	+		2.5×10^{-4}	4.05	1
										5×10^{-4}	8.10	18,27
^{196}Hg (0.146%)	(n,γ)	6.98	^{197}Hg	EC	0.42	65h	^{197}Au	2900	thermal	0.005	81.0	1,5
	(n,γ^{a})	6.98	$^{197}Hg^{m}$	IT EC	0.2993 0.72	24h	$^{197}Hg^{g} \rightarrow ^{197}Au^{g}$ (65h) $^{197}Au^{g} \rightarrow ^{197}Au^{g}$ (7.2s)	125	thermal	3×10^{-4}	4.86	1,5
	$(n,2n)$	-8.75	^{195}Hg	EC	1,5	9.5h	$^{195}Au \rightarrow ^{195}Pt$ (183d)	+		0.58	9800	1
										0.36	5830	25
	$(n,2n^{a})$	-8.75	$^{195}Hg^{m}$	EC IT	1.7 0.176	40h	$^{195}Au \rightarrow ^{195}Pt$ $^{195}Hg^{m} \rightarrow ^{195}Au$ (9.7h) (183d) $\rightarrow ^{195}Pt$	+		1.75	28400	1,25

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radio-activity (curie/mg)	References
^{196}Hg (10.02%)	(n,γ*)	6.65	$^{199}Hg^{m}$	IT	0.533	43m	$^{199}Hg^{g}$	0.2	10^{-4}	4×10^{-4}	6.48	1
	(n,2n)	-8.30	^{197}Hg	EC	0.42	65h	^{197}Au	+		0.47	7610	1
										1.1	14300	7,25
	(n,2n*)	-8.30	$^{197}Hg^{m}$	IT EC	0.2993 0.72	24h	$^{197}Hg^{g} \rightarrow ^{197}Au^{g}$ (16h) $^{197}Au^{m} \rightarrow ^{197}Au^{g}$ (7.2s)	+		1.9	30800	1
										0.98	14600	7,25
	(n,p)	-0.59	^{196}Au	β^-	1.374	2.70d	^{196}Hg			0.0047	76.1	7,25 27
^{198}Hg (16.84%)	(n,n')	——	$^{198}Hg^{m}$	IT	0.533	43m	$^{198}Hg^{g}$	0.25	3	0.20	3240	1
										0.13	2110	25
	(n,2n)	-6.65	^{197}Hg							2.0		15
	(n,p)	0.32	^{198}Au	β^-	0.46	3.15d	^{198}Hg			0.0023	37.3	25
^{199}Hg (23.13%)	(n,γ)	6.23	^{201}Hg					<60	thermal			6
	(n,2n*)	-8.03	$^{198}Hg^{m}$	IT	0.533	43m	$^{198}Hg^{g}$	+		1.2	19400	1
										0.79	12800	25
	(n,p)	-1.42	^{199}Au	β^-	2.2	48.4m	^{199}Hg	+		0.0038	61.6	1,27
	(n,α)	6.55	^{197}Pt	β^-	0.75	18h	^{197}Au	+		0.0018 at 15MeV	29.2	1,27
										2×10^{-4}	3.24	7
	(n,α*)	6.55	$^{197}Pt^{m}$	IT β^-	0.309 1.15	80m	$^{197}Pt^{m} \rightarrow ^{197}Au^{g}$ (18h) $^{197}Au^{m} \rightarrow ^{197}Au^{g}$ (7.2s)			0.0018 at 15MeV	29.2	1
^{201}Hg (13.12%)	(n,2n)	-6.23	^{200}Hg							2.2		15
	(n,p)	-0.72	^{201}Au	β^-	1.5	26m	^{201}Hg	+		0.0019	30.8	1,27
^{202}Hg (29.80%)	(n,γ)	5.99	^{203}Hg	β^-	0.492	46.9d	^{3}Tl	4.5	thermal	0.003	48.5	1,5
	(n,2n)	-7.76	^{201}Hg							2.3		15
	(n,p)	-2.72	^{202}Au	β^-	3.5	29s	^{202}Hg			——		
	(n,α)	5.71	^{199}Pt	β^-	1.68	31m	$^{199}Au \rightarrow ^{199}Hg$ (3.2d)			0.001	16.2 (16.2)	7,27
^{204}Hg (6.85%)	(n,γ)	5.67	^{205}Hg	β^-	1.6	5.5m	^{205}Tl	0.5	thermal	2×10^{-4}	3.24	1
	(n,2n)	-7.49	^{203}Hg	β^-	0.492	46.9d	^{203}Tl	2.4	14	2.4	33400	1
										2.10	29500	23
										2.08	28100	25

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radioactivity (curie/g) max	Reference
^{203}Tl (29.50%)	(n,γ)	6.66	^{204}Tl	β^- (EC)	0.765 0.34	3.8y	^{204}Pb ^{204}Hg	40	2.5×10^{-6}	0.003	2.95	1,5
	(n,2n)	-7.72	^{202}Tl	EC	1.22	12d	^{202}Hg	1.35	14	1.35	21900	1
										1.75	28400	23,25
	(n,p)	0.29	^{203}Hg	β^-	0.492	46.9d	^{203}Tl	+		0.027	365	1
	(n,α)	7.20	^{200}Au	β^-	2.2	48.4m	^{200}Hg			0.0022	35.6	7,25
										3.7×10^{-6}	5.51	5
^{205}Tl (70.50%)	(n,γ)	6.50	^{206}Tl	β^-	1.524	4.19m	^{206}Pb	0.5	3×10^{-3}	0.002	3.24	1,5
	(n,2n)	-7.54	^{204}Tl	β^- (EC)	0.765 0.34	3.8y	^{204}Pb ^{204}Hg	2.45	14	2.43	2430	1
										1.93	1900	23
	(n,p)	-0.75	^{203}Hg	β^-	1.6	5.5m	^{203}Tl	+		0.0025	40.5	1
										5.7×10^{-6}	0.091	25
	(n,α)	5.68	^{202}Au	β^-	3.5	29s	^{202}Hg			0.001	16.2	7
^{204}Pb (1.48%)	(n,γ)	6.73	^{205}Pb	EC	0.035	3×10^7y	^{205}Tl	0.8	thermal	0.003	0	1
	(n,n')	—	$^{204}Pb^m$	IT	2.186	66.9m	$^{204}Pb^g$	2.7	8	0.18	2930	1
										0.051	826	25
	(n,2n)	-8.40	^{203}Pb	EC	0.9	52.1h	^{203}Tl	1.8	14	1.8	29200	1,25
	(n,2n')	-8.40	$^{203}Pb^m$	IT	0.825	6s	$^{203}Pb^g$,^{203}Tl (52.1h)	1.2	14.5	1.2	19400	7
^{206}Pb (23.6%)	(n,γ)	6.74	^{207}Pb					0.038	1.7×10^{-2}			5
	(n,2n)	-8.08	^{205}Pb	EC	0.035	3×10^7y	^{205}Tl	+		2.4	0	1
										2.7	0	21
	(n,2n')	-8.08	$^{205}Pb^m$	IT	1.013	4ms	$^{205}Pb^g$			1.1	17000	7
	(n,p)	-0.75	^{206}Tl	β^-	1.524	4.19m	$^{206}Pb^g$			—		
	(n,α)	7.14	^{203}Hg	β^-	0.492	46.9d	^{203}Tl	+		0.0023	31.1	1
	nonelastic	—	—							2.5		5
^{207}Pb (22.6%)	(n,γ)	7.37	^{208}Pb					0.709	thermal			5
	(n,2n)	-6.74	^{206}Pb							2.5		8
										2.2		15
	(n,p)	-0.65	^{207}Tl	β^-	1.43	4.79m	^{207}Pb			—		
	(n,α)	7.09	^{204}Hg							—		

Nuclide (Abundance)	Type of Reaction	Reaction Q-value (MeV)	Reaction Product	Type of Decay	Decay Q-value (MeV)	Half Life	Decay Product	max.σ (barns)	Energy for max.σ (MeV)	σ at 14 MeV (barns)	Radio-activity (curie/g) max.	Reference
^{208}Pb (52.3%)	(n,γ)	3.94	^{209}Pb	β⁻	0.64	3.3h	^{209}Bi	0.000	10^{-3}	0.003	48.6	1
	(n,2n*)	-7.37	^{207}Pb^{m}	IT	1.633	0.80s	^{207}Pb^{g}	1.8	15	1.6	23900	7
	(n,p)	-4.21	^{208}Tl	β⁻	4.994	3.1m	^{208}Pb	+		9.5×10^{-4}	15.4	1
										4.6×10^{-4}	7.45	25
	(n,α)	6.19	^{205}Hg	β⁻	1.6	5.5m	^{205}Tl			0.0015	24.3	24
	nonelastic		—							2.6		5
^{209}Bi (100%)	(n,γ)	4.60	^{210}Bi	β⁻	1.160	5.014	^{210}Po (α emitter)	0.06	10^{-2}	0.0015	24.3	1
	(n,γ*)	4.60	^{210}Bi^{m}	α (β⁻)	5.312 1.328	3×10^{6}y	^{206}Tl ^{210}Po	0.06	10^{-2}	0.0015	0	1
	(n,n')	—	^{209}Bi^{excit}					(En'~9	~14 MeV)	0.14		5
	(n,2n)	-7.45	^{208}Bi	EC	2.87	3.7×10^{7}y	^{208}Pb	2.5	13.5	2.5	0	1
										2.2	0	23
	(n,p)	0.14	^{209}Pb	β⁻	0.64	3.30h	^{209}Bi			0.001	16.2	7
	(n,α)	9.63	^{206}Tl	β⁻	1.524	4.2m	^{206}Pb			0.001	16.2	7,18
	nonelastic	—	—					flat ~15 MeV		2.5		5
Po, At, Rn, Fr, Ra, Ac												
^{232}Th (100%)	(n,γ)	4.79	^{233}Th	β⁻	1.246	22.2m	^{233}Pa (27d) ^{233}U	1000	2×10^{-4}	0.005	81.0	1
	(n,2n)	-6.43	^{231}Th	β⁻	0.38	25.5h	^{231}Pa	1.85	10	1.5	24300	1
										1.16	18000	23
Pa												
^{238}U (99.28%)	(n,γ)	4.80	^{239}U	β⁻	1.28	23.5m	^{239}Np (2.3d) ^{239}Pu	10000	8×10^{-6}	0.001	16.2	1
	(n,2n)	-6.14	^{237}U	β⁻	0.517	6.75d	^{237}Np	1.65	10	0.9	14600	1
										0.70	11300	23

Appendix

Nuclei and nuclear reactions, cross sections of which are not available at 14 MeV are as the followings.

(n,2n) reactions

^{25}Mg, ^{26}Mg, ^{30}Si

(n,p) reactions

^{82}Se, ^{100}Mo, ^{110}Pd, ^{151}Eu, ^{156}Gd, ^{160}Gd, ^{162}Dy, ^{164}Dy, ^{185}Re, ^{191}Ir, ^{202}Hg, ^{206}Pb, ^{207}Pb

(n,α) reactions

^{70}Ge, ^{76}Se, ^{77}Se, ^{82}Se, ^{86}Sr, ^{87}Sr, ^{91}Zr, ^{97}Mo, ^{96}Ru, ^{105}Pd, ^{110}Cd, ^{111}Cd, ^{117}Sn, ^{119}Sn, ^{120}Sn, ^{121}Sb, ^{123}Sb, ^{136}Ba, ^{137}Ba, ^{163}Dy, ^{166}Er, ^{167}Er, ^{169}Tm, ^{175}Lu ^{182}W, ^{192}Os, ^{192}Ir, ^{195}Pt, ^{207}Pb

In this Appendix, only those isotopes, abundance of which are important in consideration, are chosen to be listed.

Errata

	Wrong	Correct
p.1, L.29	two digits	two signigicant digits
p.3, L.3	as follows.	as follows after averaging over the emission angle.
p.3, Eq.2	$+ \frac{M}{M+m_n} E_n$	$+ \frac{M - m}{M+m_n-m} E_n$
p.3, Eq.4	$(1+ \frac{m_n}{M})(-Q)$	$(1 + \frac{m_n}{M-m})(-Q)$
p.28, L.14	(2n, 2n)	(n, 2n)