1 Half-life, Q-value and Decay mode

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

2 α Emissions

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

3 Electron Emissions

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

4 Photon Emissions

4.1 X-Ray Emissions

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

4.2 Gamma Transitions and Emissions

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

5 References

L.Meitner, Phys. Zeitschr. 19 (1918) 257
(Half-life)
F.Asaro, F.Stephens Jr., I.Perlman, Phys. Rev. 92 (1953) 1495
(Alpha-particle energies, alpha-particle emission probabilities, gamma-ray emission probabilities, internal conversion coefficients)
H.W.Kirby, G.R.Grove, D.L.Timma, Phys. Rev. 102 (1956) 1140
(Half-life)
C.W.Mays, D.R.Atherton, R.D.Lloyd, D.O.Clark, Report COO-225, Utah Univ. (1962) 90
(Half-life)
M.O.Costa, M.R.S.Grade, Port. Phys. 4 (1966) 267
(Conversion-electron emission probabilities, internal conversion coefficients)

Surrey Univ. /A.L. Nichols

J.Dalmasso, C.Marsol, Compt. Rend. Acad. Sci. (Paris) Ser. B 267 (1968) 1366
(Gamma-ray energies)
C.L.Duke, W.L.Talbert Jr., Phys. Rev. 173 (1968) 1125
(Internal conversion coefficients)
A.Peghaire, Nucl. Instrum. Methods 75 (1969) 66
(Alpha-particle emission probabilities, gamma-ray emission probabilities, internal conversion coefficients)
S.A.Baranov, V.M.Shatinskii, V.M.Kulakov, Y.F.Rodionov, Sov. J. Nucl. Phys. 11 (1970) 515
(Alpha-particle energies, alpha-particle emission probabilities)
D.L.Spenny, A.A.Bartlett, Report COO-535-620, Utah Univ. (1970) 102
(L- and M-subshell ratios)
K.C.Jordan, G.W.Otto, R.P.Ratay, J. Inorg. Nucl. Chem. 33 (1971) 1215
(Half-life)
B.Grennberg, A.Rytz, Metrologia 7 (1971) 65
(Alpha-particle energies)
S.A.Baranov, A.G.Zelenkov, V.M.Kulakov, Proc. Advisory Group Meeting on Transactinium Nucl. Data, Karlsruhe, Vol.III, IAEA-186, IAEA, Vienna (1976) 249
(Alpha-particle energies, alpha-particle emission probabilities)
F.P.Larkins, At. Data Nucl. Data Tables 20 (1977) 311
(Auger-electron energies)
W.Kurcewicz, N.Kaffrell, N.Trautmann, A.Plochocki, J.Zylicz, M.Matul, K.Strycznewicz, Nucl. Phys. A289 (1977) 1
(Gamma-ray energies, Gamma-ray emission probabilities)
W.Kurcewicz, E.Ruchowska, N.Kaffrell, N.Trautmann, Nucl. Instrum. Methods 146 (1977) 613
(Gamma-ray energies)
W.Kurcewicz, E.Ruchowska, N.Kaffrell, T.Bjoernstad, G.Nyman, Nucl. Phys. A356 (1981) 15
(908.28-keV gamma-ray emission probability)
S.Sadasivan, V.M.Raghunath, Nucl. Instrum. Methods 196 (1982) 561
(Gamma-ray emission probabilities)
R.J.Gehrke, V.J.Novick, J.D.Baker, Int. J. Appl. Radiat. Isotop. 35 (1984) 581
(Gamma-ray emission probabilities)
A.Rytz, At. Data Nucl. Data Tables 47 (1991) 205
(Alpha-particle energies, alpha-particle emission probabilities)
M.P.Unterweger, D.D.Hoppes, F.J.Schima, Nucl. Instrum. Methods Phys. Res. A312 (1992) 349
(Half-life)
R.Bonetti, C.Chiesa, A.Guglielmetti, C.Migliorino, A.Cesana, M.Terrani, Nucl. Phys. A556 (1993) 115
(Cluster decay)
T.Babeliowsky, G.Bortels, Appl. Radiat. Isot. 44 (1993) 1349
(Alpha-particle emission probabilities)
G.Ardisson, M.Hussonnois, Radiochim. Acta 70/71 (1995) 123
(Cluster decay)
E.Schönfeld, H.Janssen, Nucl. Instrum. Methods Phys. Res. A369 (1996) 527
(K-x ray, L-x ray, Auger electrons)
A.Artna-Cohen, Nucl. Data Sheets 80 (1997) 227
(Nuclear structure, energies)
S.P.Tretyakova, V.L.Mikheev, Nuovo Cim. 110A (1997) 1043
(Cluster decay)
Y.A.Akovali, Nucl. Data Sheets 84 (1998) 1
(Alpha decay, r0 parameter)
E.Schönfeld, G.Rodloff, Report PTB-6.11-98-1, Braunschweig (1998)
(Auger electrons)
E.Schönfeld, G.Rodloff, Report PTB-6.11-1999-1, Braunschweig (1999)
(X-ray emission probabilities)
M.P.Unterweger, Appl. Radiat. Isot. 56 (2002) 125
(Half-life)
I.M.Band, M.B.Trzhaskovskaya, C.W.Nestor Jr., P.O.Tikkanen, S.Raman, At. Data Nucl. Data Tables 81 (2002) 1
(Theoretical ICC)
S.Raman, C.W.Nestor Jr., A.Ichihara, M.B.Trzhaskovskaya, Phys. Rev. C66 (2002) 044312
(Theoretical ICC)

Surrey Univ. /A.L. Nichols

G.Audi, A.H.Wapstra, C.Thibault, Nucl. Phys. A729 (2003) 337
(Q)
M.-M.Bé, V.P.Chechev, R.Dersch, O.A.M.Helene, R.G.Helmer, M.Herman, S.Hlavác, A.Marcinkowski, G.L.Molnár, A.L.Nichols, E.Schönfeld, V.R.Vanin, M.J.Woods, in Update of X Ray and Gamma Ray Decay Data Standards for Detector Calibration and Other Applications Vol. 1, STI/PUB/1287, IAEA, Vienna (2007)
(Half-life)
T.Kibédi, T.W.Burrows, M.B.Trzhaskovskaya, P.M.Davidson, C.W.Nestor Jr., Nucl. Instrum. Methods Phys. Res. A589 (2008) 202
(Theoretical ICC)

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