

⁷⁶Br – Comments on evaluation of decay data by A. L. Nichols

Evaluated: April - November 2015

Erratum (April 2017): As a consequence of an unfortunate oversight, a number of references originating from the same laboratory were not considered during the course of the 2015 evaluation: 2004Li62, 2004Sh17, 2005Sh59, 2007Ch89 and 2013Sh07. See the Addendum at the end of this document for further details.

Evaluation Procedures

Limitation of Relative Statistical Weight Method (LWM) and other analytical techniques were applied to obtain averaged data throughout the evaluation. The uncertainty assigned to the average value was always greater than or equal to the smallest uncertainty of the *values* used to calculate the average.

Decay Scheme

⁷⁶Br ($T_{1/2} = 16.1$ hours) decays 100% by electron capture/ β^+ decay ($Q(\text{EC}) = 4963$ (9) keV) to various excited nuclear levels and the ground state of ⁷⁶Se (stable). A reasonably well-defined decay scheme was derived from the gamma-ray measurements of 1969Dz01, 1971Dz08, 1974Na17 and 1975VyZX consisting of 42 EC/24 β^+ transitions and 161 gamma-ray transitions (along with 511-keV annihilation radiation and six unplaced gamma-ray emissions). Weighted mean relative emission probabilities were calculated for a significant number of the gamma rays, while equivalent data for the remaining gamma transitions were adopted primarily from the more comprehensive measurements of 1969Dz01 or 1974Na17. All relative emission probabilities were defined in terms of the 559.10-keV gamma ray (100%).

Nuclear Data

⁷⁶Br is viewed as a potentially suitable β^+ emitter for application in positron emission tomography (PET).

Half-life

The experimental results of 1959Gi46, 1960Bu22 and 1971La01 were adopted to give a weighted-mean half-life of 16.1 (2) hours based on the limitation of relative statistical weight method (LWM), with the uncertainty adjusted from ± 0.13 to ± 0.2 to align with the smallest uncertainty of the values used in the weighted-mean calculations.

Reference	Half-life (h)
1952Fu04	17.2*
1955Th01	17.5*
1959Gi46	16.1 ± 0.2
1960Bu22	16.3 ± 0.3
1963Sa26	$15.7 \pm 0.2^\dagger$
1971La01	16.1 ± 0.2
Recommended value	$16.1 \pm 0.2^\ddagger$

* Uncertainty not specified – not included in weighted mean analysis of the data set.

[†] Assignment to decay of 585- and 1745-keV β^+ emissions by 1963Sa26 judged to be inappropriate, and excluded from the weighted analysis.

[‡] Recommended uncertainty adjusted from ± 0.13 to ± 0.2 to align with the smallest uncertainty of the values used to calculate the weighted-mean value.

Limitation of relative statistical weight method (LWM), normalised residual method (NRM), Rajeval technique and bootstrap method were considered in the analysis of the data set.

Analytical method	Half-life (h)	$\chi^2/(N-1)$	$\chi^2/(N-1)_{\text{critical}}$
LWM	16.14 (13) \rightarrow 16.1 (2)	0.18	4.61
NRM	16.14 (13)	0.18	3.00
Rajeval	16.14 (13)	0.18	–
Bootstrap	16.15 (9)	0.19	–

A half-life value of (16.1 ± 0.2) hours is recommended, as quantified by the LWM-NRM-Rajeval analytical procedures, with the uncertainty defined on the basis of the smallest experimental uncertainty.

Half-life of parent ⁷⁶Kr

The ⁷⁹Br(p,4n)⁷⁶Kr reaction and 100% EC/β⁺ decay of ⁷⁶Kr is a major production route for ⁷⁶Br. Therefore, the half-life of parent ⁷⁶Kr has also been evaluated on the basis of the measurements of 1954Ca03, 1955Th01, 1963Da04 and 1973Pa02. Only the measured half-lives and uncertainties of 1963Da04 and 1973Pa02 were adopted to give a weighted mean half-life of 14.8 (1) hours based on the limitation of relative statistical weight method (LWM).

Reference	Half-life (h)
1954Ca03	9.7 ± 0.5 [†] From decay curve over three to four half-lives.
1955Th01	10.0 ± 0.5 [†] ⁷⁶ Br yield curve over 120 hours. ~ 10.5* Decay curve of electromagnetically-separated mixture of ⁷⁶ Kr + ⁷⁶ Br. ~ 19* Decay rate of 511-, 560- and 660-keV γ rays. ~ 30* Decay rate of 1860-keV γ ray.
1963Do04	14.8 ± 0.1 Periodic parent-daughter separations – decay curve over six half-lives.
1973Pa02	14.6 ± 0.2 Decay rates of most prominent γ rays.
Recommended value	14.8 ± 0.1

* Uncertainty not specified – not included in the weighted mean analysis.

[†] Judged to be an outlier, and therefore excluded from the weighted analysis.

Limitation of relative statistical weight method (LWM) and normalised residual method (NRM) were considered in the analysis of the data set.

Analytical method	Half-life (h)	χ ² /(N-1)	χ ² /(N-1) _{critical}
LWM	14.76 (9)	0.80	6.63
NRM	14.76 (9)	0.80	3.84

A half-life value of (14.8 ± 0.1) hours for the half-life of ⁷⁶Kr is recommended, as quantified by the LWM-NRM analytical procedures, with the uncertainty defined on the basis of the smallest experimental uncertainty.

Q value

Q_{EC}-value for ⁷⁶Br EC decay of 4963 (9) keV was adopted from Wang *et al.* (2012Wa38).

Gamma-ray energies and emission probabilities

Energies

The well-defined nuclear level energies of 1995Si03 were used to calculate the gamma transition energies and their uncertainties, and these data were adjusted to account for gamma recoil in the formulation of recommended gamma-ray emission energies and uncertainties. Greater confidence was placed on this approach because of the more wide-ranging origins of the gamma transition data even though the energies of a significant number of gamma-ray emissions have been directly measured by 1974MuZB and 1974Na17, and 1969Dz01, 1971Dz08 and 1971Lao01 to a lesser extent. The spectral compilation of 1974HeYW originates from ENSDF as defined in 1998, and has been included for direct comparison rather than as part of the overall evaluation process.

The half-life for the 559.10-keV nuclear level was determined from a weighted-mean analysis of B(E2) measurements by 1956Te26, 1962St02, 1968Ga13, 1970AgZV, 1974Ba80, 1975NeZR and 1977Le11, and further calculation. Half-lives for the 1216.15-, 1330.86- and 1787.65-keV nuclear levels were adopted directly from 1974Ba80. Significant doubts arose when attempting to allocate half-lives to the 1122.28-, 1688.96- and 2429.09-keV nuclear levels: a somewhat inexact half-life was calculated for the 1122.28-keV 0⁺ nuclear level based on the B(E2(2₁⁺ → 0₂⁺))/B(E2(0₁⁺ → 2₁⁺)) ratio derived by 1964By02, while no numerical values were assigned to the 1688.96- and 2429.09-keV levels.

Adopted energies, spins and parities for the nuclear levels of ⁷⁶Se (1995Si03).

Nuclear level number	Nuclear level energy (keV)	Spin and parity	Half-life
0	0.0	0 +	stable
1	559.102 (5)	2 +	12.22 (17) ps
2	1122.283 (7)	0 +	9 (4) ps
3	1216.147 (7)	2 +	3.4 (1) ps
4	1330.860 (8)	4 +	1.52 (4) ps
5	1688.962 (7)	3 +	
6	1787.648 (8)	2 +	8 ⁺⁷ ₋₃ ps
7	2127.215 (8)	(2) +	
8	2170.554 (12)	(0 +)	
9	2374.2 (6)*		
10	2429.095 (11)	3 –	
11	2514.663 (13)	(2) +	
12	2630.8 (5)	(1, 2)	
13	2655.32 (4)	1 (–) [§]	
14	2669.88 (4)	2 –	
15	2858.1 (20)*		
16	2950.53 (5)	1 +, 2 +	
17	3069.75 (4)	(1, 2) +	
18	3160.07 (6)	(2)	
19	3268.8 (4) [‡]	(2 –, 3 –, 4 –)	
20	3351.54 (7)	(1, 2) +	
21	3441.5 (2) [‡]	(1 +, 2 +, 3 +)	
22	3459.40 (8)	(2 +)	
23	3556.46 (8)	(1, 2)	
24	3604.08 (8)	1 +, 2 +	
25	3622.2 (20)*		
26	3669.5 (10)*		
27	3913.0 (10)*		
28	3929.1 (6)	(1, 2)	
29	3970.6 (4)	(1 +, 2 +)	
30	3998.4 (10)*		
31	4019.3 (5)		
32	4064 (4)*		
33	4084.3 (2)	(1, 2)	
34	4173.1 (9)	(1, 2)	
35	4199.6 (4)	(1, 2)	
36	4210 (1)*		
37	4215.5 (2)	(1 +, 2 +)	
38	4328.7 (10)*		
39	4416 (2)*		
40	4436.9 (10)	(1, 2)	
41	4455.2 (30)*		
42	4492 (3)*		
43	4605.8 (7)	(1 +, 2 +)	
44	4621.5 (20)*		

* Energy of nuclear level derived from proposed incorporation of previously unplaced gamma-ray emissions into the extended decay scheme.

[‡] Nuclear level assignment based originally on studies of other related nuclear processes, and introduced in the proposed ⁷⁶Br decay scheme to explain observation of specific previously unplaced gamma-ray emissions.

[§] Spin and parity of 1(–) adopted directly from the γ - γ angular correlation and nuclear orientation studies of 1976Ba15, 1980Ka36, 1987Su05 and 1989Za03.

Emission probabilities

While all of the main gamma-ray emissions have been consistently detected and quantified over the years from 1969 to 1975 (1969Dz01, 1971Dz08, 1971La01, 1974MuZB, 1974Na17 and 1975VyZX), significant difficulties were posed by the disparate nature of many of the lower-intensity gamma rays, particularly those observed by some laboratories but not by others. Whenever possible, weighted-mean relative gamma-

ray emission probabilities have been determined from these studies, with the greater emphasis placed on the gamma-ray measurements and resulting decay schemes proposed by 1971Dz01, 1971Dz08, 1974Na17 and 1975VyZX, backed-up by 1974MuZB and the confirmatory nature of the equivalent At-76 decay-data studies of 1971FuZP. All of the relative emission probabilities were suitably refined and quantified in terms of the emission probability of the 559.10-keV gamma ray fixed arbitrarily to 100 (100%).

Considerable effort has been expended to incorporate many previously unplaced γ -ray transitions in the proposed decay scheme. A rather large number of gamma-ray emissions were effectively tabulated as unobserved by 1971La01 when expressed as possessing relative emission probabilities of < 0.3 (i.e. $< 0.3\%$). While such gamma rays were individually considered for possible placement in the proposed decay scheme, many of these higher-energy emissions were rejected as a consequence of their lack of detection by others (1050 (10), 1074 (1), 1088 (1), 1689.5 (10), 1873 (1), 1997 (1), 2555 (2), 3625 (5), 3860 (5), 3940 (5), 4010 (5), 4030 (5), 4140 (5), 4420 (5) and 4570 (5) keV). Issues associated with a lack of compatibility with other equivalent studies also resulted in setting aside gamma-ray emissions with energies of 984, 1457, 1566 (1), 1585, 1946, 2389 and 2947 (2) keV observed by 1969Dz01 and/or 1971Dz08; 1342 (1), 1489 (1), 2890 (2) and 2990 (2) keV observed by 1971La01; and 575.1 (2), 1069.1 (8) and 3356 (3) keV observed by 1974MuZB. Two specific gamma-ray emissions can be attributed to a sum peak ($559.1 + 511 = 1070.1$ keV (1069.1 keV)) and a single escape peak ($1853.6 - 511 = 1342.6$ keV (1342 keV)), although both transitions can also be discarded from the proposed decay scheme for other reasons.

A number of gamma-ray emissions observed in various spectroscopic studies of the EC/ β^+ decay of ⁷⁶Br have been identified as doublets: 399.87 (6) and 401.01 (9) keV, 941.8 (5) and 942.53 (4), 1429.0 (2) and 1429.24 (8) keV, and 1770.42 (8) and 1770.5 (4) keV. Individual relative emission probabilities for these gamma rays were determined from consideration of the relative emission probabilities of the other gamma rays depopulating the same nuclear level, along with the fractional relative emission probabilities of equivalent depopulating gamma rays from adjacent nuclear levels with similar decay properties. As evolved, the proposed decay scheme implies the existence of two E0 gamma transitions and one E2+M1(+E0) gamma transition: 657.045 (9)-keV E2+M1(+E0) gamma transition depopulates the 1216.147 (7)-keV level \rightarrow 559.102 (5)-keV level ($2^+ \rightarrow 2^+$); 1122.283 (7)-keV E0 gamma transition depopulates the 1122.283 (7)-keV level \rightarrow 0.0-keV level ($0^+ \rightarrow 0^+$); and 2170.554 (12)-keV (E0) gamma transition depopulates the 2170.554-keV level \rightarrow 0.0-keV level ($(0^+) \rightarrow 0^+$). Corresponding gamma-ray emissions for these three transitions would be 657.042, 1122.274 and 2170.521 keV, respectively. However, all three emissions involve high degrees of internal conversion that pose problems in quantifying and locating these data correctly in the existing DDEP data file.

Problems were experienced in attempting to achieve population-depopulation balance of the 1330.86-keV nuclear level of ⁷⁶Se. This difficulty was alleviated in a reasonable manner by assuming zero EC/ β^+ decay to this level on the basis of spin-parity considerations ($1^- \rightarrow 4^+$), and introducing an unobserved 114.7-keV E2 gamma emission with the necessary relative emission probability to ensure complete depopulation of the 1330.860-keV level to the 1216.147-keV level ($4^+ \rightarrow 2^+$). A noteworthy number of the lower-energy gamma-ray emissions observed satisfactorily by 1974MuZB were judged to merit inclusion within the proposed ⁷⁶Br decay scheme, although the uncertainties in their relative emission probabilities had not been quantified: 210.1, 281/281.4, 309.4 and 318.0 keV. While their relative emission probabilities were adopted directly from the measurements of 1974MuZB, the recommended uncertainties constitute only considered estimates.

Gamma transition energies, and measured and recommended gamma-ray energies.

E _{GT} (keV) [#]	E _γ (keV)								
	1952Fu04	1955Th01	1959Gi46	1963Sa26	1969Dz01	1971Dz08	1971La01	1974HeYW 1998 ENSDF	1974MuZB
γ _{4,3} 114.7 (1)	–	–	–	–	–	–	–	–	–
γ _{26,22} 210.1 (10)	) 250 (12)	–	–	220	–	–	–	209.7 (2)	209.7 (2)
γ _{36,28} 281 (1))	–	–	–	–	–	–	–	–
γ _{21,18} 281.4 (2)	)	–	–	290	–	–	–	281.4 (2)	281.4 (2)
γ _{38,31} 309.4 (4)	) 330 (15)	–	–	–	–	–	–	309.2 (2)	309.2 (2)
γ _{26,20} 318.0 (10)	)	–	–	–	–	–	–	318.4 (2)	318.4 (2)
γ _{5,4} 358.102 (11)	) 370 (20)	–	–	340	–	357 (1)	–	358.0 (3)	357.9 (3)
γ _{17,14} 399.87 (6)	)	) 400	–	–	) 400 (2)	) 400	–	) 399.5 (2)	) 399.4 (2)
γ _{20,16} 401.01 (9)))	–	–))	–))
γ _{7,5} 438.253 (11)	420 (20)	)	–	–	–	–	440.0 (5)	438.0 (3)	438.0 (5)
γ _{6,4} 456.788 (11)	–	–	–	–	–	–	–	457.3 (5)	–
γ _{5,3} 472.815 (10)	–	–	–	–	472 (1)	–	473.0 (5)	472.89 (6)	472.8 (2)
γ _{18,14} 490.19 (7)	–	–	–	–	490 (2)	490	487.0 (5)	489.9 (2)	490.1 (2)
γ _{14,8} 499.33 (4)	–	–	–	–	–	498 (1)	–	498.0 (10)	–
γ _{18,13} 504.75 (7)	–	–	–	–	–	504 (1)	–	505.0 (5)	–
– annihilation radiation	–	–	511	–	511	511	–	511.006	–
γ _{-1,1} 546.5 (5) ^A	–	–	–	–	–	–	–	546.5 (5)	–
γ _{1,0} 559.102 (5)	–	560	560 (10)	560	559 (1)	559.2 (5)	559.5 (5)	559.09 (5)	559.0 (1)
γ _{2,1} 563.181 (9)	–	–	–	–	–	563 (1)	–	563.20 (5)	563.0 (2)
γ _{6,3} 571.501 (11)	–	–	–	–	–	572 (1)	572.0 (5)	571.4 (5)	571.0 (5)
– –	–	–	–	–	–	–	–	–	575.1 (2)
γ _{26,17} 599.8 (10)	–	–	–	–	599 (1)	–	600.0 (5)	598.9 (2)	598.7 (2)
γ _{32,22} 605 (4)	–	–	–	–	605 (1)	605	–	604.5 (3)	604.4 (8)
γ _{43,29} 635.2 (8)	–	–	–	–	636 (2)	636	–	636.0 (10)	–
γ _{10,6} 641.447 (14)	–	–	) 650 (5)	–	–	641 (1)	–	641.0 (10)	–
γ _{3,1} 657.045 (9)	–	) 660	)	660	657 (1)	657.0 (5)	657.0 (5)	657.02 (5)	657.2 (2)
γ _{6,2} 665.365 (11)	–	)	–	–	665 (2)	–	666.0 (5)	665.1 (1)	665.6 (5)
γ _{20,14} 681.66 (8)	680 (35)	–	–	–	682 (1)	682	683.0 (5)	681.4 (2)	681.3 (5)
γ _{20,13} 696.22 (8)	–	–	–	–	698 (2)	697	696.0 (5)	695.9 (9)	[695 (2)]
γ _{11,6} 727.015 (15)	–	–	–	–	727 (2)	728	726.0 (5)	727.40 (10)	727.1 (3)
γ _{18,10} 730.98 (6)	–	–	–	–	730 (2)	731	–	730.5 (2)	730.6 (3)
γ _{10,5} 740.133 (13)	) 750 (40)	–	) 750 (20)	–	740 (1)	740	–	740.3 (8)	–
γ _{4,1} 771.758 (10)	)	–	)	770	773 (2)	773	773.0 (5)	771.8 (2)	771.8 (2)
γ _{22,14} 789.52 (9)	–	–	–	–	790 (1)	790	788.0 (5)	789.1 (2)	790.4 (10)

E _{GI} (keV) [#]	E _γ (keV)								
	1952Fu04	1955Th01	1959Gi46	1963Sa26	1969Dz01	1971Dz08	1971La01	1974HeYW 1998 ENSDF	1974MuZB
γ _{7,4} 796.355 (11)	—	—	—	—	797 (2)	—	—	797.0 (20)	—
γ _{22,13} 804.08 (9)	—	—	—	—	804 (1)	804	802.0 (5)	803.5 (2)	803.5 (5)
γ _{39,24} 812.1 (8)	—	—	—	—	—	—	—	812.5 (5)	—
γ _{20,11} 836.88 (7)	—	—	) 850 (20)	) 830	) 838 (2)	837	832.0 (5)	836.4 (2)	836.1 (3)
γ _{30,18} 838.3 (10)	—	—		)	)	838	—	—	—
γ _{13,6} 867.67 (4)	—	—		860	867 (1)	—	868.0 (5)	867.6 (2)	—
γ _{14,6} 882.23 (4)	—	—	—	—	882 (2)	882 (1)	883.0 (5)	882.3 (2)	882.3 (8)
γ _{23,14} 886.58 (9)	—	—	—	—	886 (2)	885 (1)	—	886.2 (2)	885.7 (10)
γ _{17,8} 899.20 (4)	—	—	—	—	—	897 (1)	—	897.0 (10)	[898.0 (10)]
γ _{23,13} 901.14 (9)	—	—	—	—	903 (1)	903	—	901.0 (7)	—
γ _{7,3} 911.068 (11)	—	—	—	—	913 (2)	912	—	913.0 (20)	—
γ _{20,10} 922.45 (7)	—	—	—	—	—	923	—	—	—
γ _{24,14} 934.20 (9)	—	—	—	—	937 (2)	—	—	934.2 (10)	—
γ _{42,23} 936 (3)	—	—	—	—	—	—	—	—	—
γ _{12,5} 941.8 (5)	)	—	—	—	) 943 (1)	) 943	—	) 942.3 (5) D	) 942.2 (8)
γ _{17,7} 942.54 (4)	) 960 (50)	—	—	—))	—))
γ _{14,5} 980.92 (4)	)	—	—	990	981 (1)	981	982.0 (5)	980.9 (2)	980.8 (6)
—	—	—	—	—	—	984	—	—	—
γ _{22,10} 1030.31 (8)	—	—	—	—	1030 (2)	1030 (1)	1026 (1)	1029.9 (5)	1029.5 (5)
γ _{18,7} 1032.86 (6)	—	—	—	—	1033 (2)	1033 (1)	—	1032.6 (5)	1032.3 (5)
γ _{35,18} 1039.5 (4)	—	—	—	—	1040 (2)	1040	—	1040.7 (10)	—
—	—	—	—	—	—	—	1050 (1)	—	—
γ _{38,19} 1060 (1)	—	—	—	—	1060 (2)	—	—	1060.0 (20)	—
—	—	—	—	—	—	—	—	—	1069.1 (8)
—	—	—	—	—	—	—	1074 (1)	—	—
—	—	—	—	—	—	—	1088 (1)	—	—
γ _{2,0} 1122.283 (7)	—	—	—	—	—	—	—	1122.3 (3)	—
γ _{5,1} 1129.860 (9)	—	—	) 1140 (30)	) 1140	1130 (1)	1130	1130 (1)	1129.85 (6)	1129.7 (3)
γ _{43,22} 1146.4 (7)	—	—	)	)	1145 (2)	1145	—	1145.0 (20)	—
γ _{9,3} 1158.1 (6)	—	—	—	—	1158 (2)	—	—	1158.2 (5)	—
γ _{16,6} 1162.88 (5)	—	—	—	—	1161 (2)	1161	1161 (1)	1161.0 (20)	—
γ _{20,8} 1180.99 (7)	—	—	—	—	1180 (2)	1180	—	1179.0 (10)	1180.1 (10)
γ _{25,10} 1193.1 (20)	)	—	—	—	1193 (2)	—	—	1193.0 (20)	—
γ _{10,3} 1212.948 (13)	) 1210 (60)	) 1220	) 1210 (10)	) 1220	1213 (2)	1213 (1)	—	1213.1 (1)	1212.8 (4)
γ _{3,0} 1216.147 (7)	)	)	)	)	1216 (1)	1216 (1)	1216.5 (10)	1216.10 (5)	1216.0 (3)

E _{GI} (keV) [#]	E _γ (keV)								
	1952Fu04	1955Th01	1959Gi46	1963Sa26	1969Dz01	1971Dz08	1971La01	1974HeYW 1998 ENSDF	1974MuZB
γ _{20,7} 1224.33 (7)	—	)	—	)	—	—	—	1224.3 (5)	—
γ _{6,1} 1228.546 (10)	—	)	—	)	1229 (1)	1229	1229 (1)	1228.65 (6)	1228.4 (3)
γ _{43,20} 1254.3 (7)	—	—	—	—	1253 (2)	1253	—	1253.0 (20)	—
γ _{21,8} 1270.9 (20)	—	—	—	—	1271 (2)	—	—	1271.0 (20)	1270.8 (10)
γ _{17,6} 1282.10 (4)	—	—	—	—	1280 (2)	1280	—	1280.0 (20)	—
γ _{22,8} 1288.85 (8)	—	—	—	—	1288 (1)	1288	—	1288.0 (10)	—
γ _{11,3} 1298.516 (15)	—	—	—	—	1298 (2)	—	—	1298.0 (20)	—
γ _{29,14} 1300.7 (4)	—	—	—	) 1320	1302 (2)	1301 (1)	—	1300.5 (8)	—
γ _{10,2} 1306.812 (13)	—	—	—	)	—	1308 (1)	—	1308..0 (10)	—
γ _{29,13} 1315.3 (4)	—	—	—	)	—	—	—	1315.0 (10)	—
γ _{13,4} 1324.46 (4)	—	—	—	)	1324 (2)	1324	—	1324.0 (20)	—
—	—	—	—	—	—	—	1342 (1)	—	—
γ _{18,6} 1372.42 (6)	—	—	1370 (20)	—	1372 (2)	1372	) 1379 +	1372.1 (2)	1371.7 (8)
γ _{17,5} 1380.79 (4)	—	—	—	—	1381 (1)	1381	) 1383	1380.53 (8)	1380.2 (5)
γ _{33,13} 1429.0 (2)	—	—	—	) 1420	) 1428 (1)	) 1430	—	) 1429.1 (2) D	—
γ _{23,7} 1429.25 (8)	—	—	—)))	—)	—
γ _{13,3} 1439.17 (4)	—	—	—	)	1439 (1)	1440	1440 (1)	1439.4 (2)	1439.2 (5)
γ _{14,3} 1453.73 (4)	—	—	—	—	1454 (1)	1454	1455 (1)	1454.08 (10)	1453.6 (5)
—	—	—	—	—	—	1457	—	—	—
γ _{44,18} 1461.4 (20)	—	—	—	—	1461 (2)	—	—	1461.0 (20)	—
γ _{18,5} 1471.11 (6)	—	—	1470 (20)	1480	1471 (1)	1471	1472 (1)	1471.13 (7)	1470.9 (5)
—	—	—	—	—	—	—	1489 (1)	—	—
γ _{31,11} 1504.6 (5)	—	—	—	—	1503 (2)	1503	—	1504.1 (5)	—
γ _{13,2} 1533.03 (4)	—	—	) 1530?	—	1532 (2)	1533	—	1532.0 (20)	—
γ _{43,17} 1536.1 (7)	—	—	)	—	1538 (2)	1538	—	1538.0 (20)	—
γ _{37,13} 1560.2 (2)	—	—	—	1550	1559 (1)	—	1561 (1)	1560.0 (5)	1559.6 (10)
—	—	—	—	—	—	1566 (1)	) 1571 (1)	—	—
γ _{7,1} 1568.113 (10)	—	—	—	—	1568 (1)	1569 (1)	)	1568.47 (8)	1568.1 (5)
—	—	—	—	—	—	1585	—	—	—
γ _{8,1} 1611.452 (13)	—	—	—	—	1613 (2)	1613	—	1611.9 (5)	1611.7 (5)
γ _{15,3} 1642.0 (20)	—	—	1630?	1640	1642 (3)	—	—	1642.0 (30)	—
γ _{33,10} 1655.2 (2)	—	—	—	—	—	—	—	1654.7 (5)	—
γ _{20,5} 1662.58 (7)	—	—	—	—	1661 (2)	1663	1660 (1)	1661.0 (20)	—
γ _{22,6} 1671.75 (8)	—	—	—	—	1672 (1)	1672	1674 (1)	1672.4 (5)	—
—	—	—	—	—	—	—	1689.5 (10)	—	—

$E_{\text{GT}}(\text{keV})^{\#}$	$E_{\gamma}(\text{keV})$								
	1952Fu04	1955Th01	1959Gi46	1963Sa26	1969Dz01	1971Dz08	1971La01	1974HeYW 1998 ENSDF	1974MuZB
$\gamma_{27,8}$ 1742.4 (10)	—	—	—	—	1743 (2)	—	—	1741.9 (10)	—
$\gamma_{22,5}$ 1770.44 (8)	—	—	) 1760?	—	) 1770 (2)	) 1771	) 1772 (1)	) 1769.9 (5) D	) 1770 (2)
$\gamma_{35,10}$ 1770.5 (4)	—	—)	—)))))
$\gamma_{6,0}$ 1787.648 (8)	—	—	—	1780	1788 (1)	—	1788 (1)	1787.8 (5)	1787.7 (5)
$\gamma_{28,7}$ 1801.9 (6)	—	—	—	—	—	—	—	1802.0 (20)	—
$\gamma_{9,1}$ 1815.1 (6)	—	—	—	—	—	—	—	1815.0 (20)	—
$\gamma_{25,6}$ 1834.6 (20)	—	—	—	) 1840	1834 (1)	—	—	1833.8 (8)	—
$\gamma_{17,3}$ 1853.60 (4)	—	) 1860	1860 (10)	)	1853 (1)	1853	1852 (1)	1853.67 (5)	1853.0 (5)
$\gamma_{10,1}$ 1869.993 (12)	—	)	—	—	1868 (1)	1868	—	1868.4 (10)	1870.5 (20)
— —	—	—	—	—	—	—	1873 (1)	—	—
$\gamma_{26,6}$ 1881.9 (10)	—	—	—	—	1883 (2)	—	1883 (1)	1883.0 (20)	—
$\gamma_{39,11}$ 1901 (2)	—	—	—	—	1901 (2)	—	—	1901.0 (20)	1902.9 (10)
$\gamma_{18,3}$ 1943.92 (6)	—	—	—	—	1944 (1)	1944	1942 (1)	1944.2 (5)	1944.0 (8)
— —	—	—	—	—	—	1946	—	—	—
$\gamma_{11,1}$ 1955.561 (14)	—	—	—	—	1956 (1)	1957	1958 (1)	1956.1 (5)	1956.0 (8)
$\gamma_{43,12}$ 1975.0 (9)	—	—	—	—	1976 (1)	1978	—	1976.0 (10)	—
$\gamma_{44,12}$ 1990.7 (21)	—	—	—	—	1991 (2)	—	—	1991.0 (20)	—
— —	—	—	—	—	—	—	1997 (1)	—	—
$\gamma_{34,7}$ 2045.9 (9)	—	—	—	—	—	—	—	2046.1 (10)	—
$\gamma_{12,1}$ 2071.7 (5)	—	—	—	) 2100	2071 (2)	2071	—	2071.3 (15)	2073.0 (15)
$\gamma_{36,7}$ 2082 (1)	—	—	—	)	2082 (2)	—	—	2082.0 (20)	2080.0 (15)
$\gamma_{13,1}$ 2096.22 (4)	—	—	2100 (20)	)	2096 (1)	2096	2097 (2)	2096.73 (11)	2095.8 (5)
$\gamma_{14,1}$ 2110.78 (4)	—	—	—	)	2111 (1)	2111	2112 (2)	2111.23 (11)	2110.2 (5)
$\gamma_{7,0}$ 2127.215 (8)	—	—	—	)	2127 (2)	2127	—	2127.2 (8)	2126.8 (10)
$\gamma_{20,3}$ 2135.39 (7)	—	—	—	)	2135 (1)	2138	2130 + 2133 (2)	2135.60 (10)	2134.5 (10)
$\gamma_{-1,2}$ 2170.0 (20) ^Δ	—	—	—	—	2170 (2)	2172	—	2170.0 (20)	—
$\gamma_{8,0}$ 2170.554 (12)	—	—	—	—	—	—	—	—	—
$\gamma_{29,6}$ 2183.0 (4)	—	—	—	—	2184 (1)	2184	2183 (2)	2183.5 (10)	—
$\gamma_{20,2}$ 2229.26 (7)	—	—	—	—	2228 (2)	2229	—	2227.7 (20)	—
$\gamma_{-1,3}$ 2235.0 (20) ^Δ	—	—	—	—	2235 (2)	—	—	2235.0 (20)	—
$\gamma_{15,1}$ 2299.0 (20)	—	—	—	—	2299 (2)	—	—	2299.0 (20)	2298.0 (15)
$\gamma_{30,5}$ 2309.4 (10)	—	—	—	—	2308 (2)	—	—	2309.6 (10)	2309.0 (10)
$\gamma_{23,3}$ 2340.31 (8)	—	—	—	2340	2338 (2)	2338	—	2338.0 (20)	—
— —	—	—	—	—	—	2389	—	—	—
$\gamma_{16,1}$ 2391.43 (5)	—	—	2390 (20)	—	2392 (1)	2391	2389 (2)	2391.25 (10)	2390.6 (5)

$E_{\text{GT}}(\text{keV})^{\#}$	$E_{\gamma}(\text{keV})$								
	1952Fu04	1955Th01	1959Gi46	1963Sa26	1969Dz01	1971Dz08	1971La01	1974HeYW 1998 ENSDF	1974MuZB
$\gamma_{35,6}$ 2412.0 (4)	—	—	—	—	—	—	—	2411.8 (20)	—
$\gamma_{10,0}$ 2429.095 (11)	—	—	—	2420	2428 (2)	2429	2432 (2)	2429.0 (20)	—
$\gamma_{24,2}$ 2481.80 (8)	—	—	—	—	2480 (2)	2480	—	2483.0 (12)	—
$\gamma_{17,1}$ 2510.65 (4)	—	—	—	2500	2508 (1)	2510	2509 (2)	2510.79 (16)	2509.8 (5)
$\gamma_{26,2}$ 2547.2 (10)	—	—	—	—	—	—	—	2546.7 (20)	—
—	—	—	—	—	—	—	2555 (2)	—	—
$\gamma_{18,1}$ 2600.97 (6)	—	—	2600 (50)	—	2599 (1)	2602	—	2601.25 (15)	2601.0 (6)
$\gamma_{12,0}$ 2630.8 (5)	—	—	—	) 2640	2627 (2)	2627	—	2627.0 (20)	—
$\gamma_{13,0}$ 2655.32 (4)	—	—	—		2655 (3)	2655	2656 (2)	2658.0 (20)	—
$\gamma_{31,4}$ 2688.4 (5)	—	—	—	—	—	—	—	2690.0 (15)	—
$\gamma_{28,3}$ 2713.0 (6)	—	—	—	—	2714 (3)	2714	—	2714.0 (30)	—
$\gamma_{29,3}$ 2754.5 (4)	—	—	—	—	2757 (3)	2757	—	2757.0 (30)	—
$\gamma_{20,1}$ 2792.44 (7)	—	—	2780 (20)	2780	2793 (1)	2793	2790 (2)	2792.69 (8)	2792.9 (10)
$\gamma_{-1,4}$ 2837.0 (30) ^Δ	—	—	—	—	2837 (3)	—	—	2837.0 (30)	—
$\gamma_{32,3}$ 2848 (4)	—	—	—	—	2844 (3)	2849	—	2844.0 (30)	—
—	—	—	—	—	—	—	2890 (2)	—	—
$\gamma_{22,1}$ 2900.30 (8)	—	—	—	) 2920	2900 (2)	2901	—	2900.50 (10)	2901.5 (15)
—	—	—	—		2947 (2)	—	—	—	—
$\gamma_{16,0}$ 2950.53 (5)	—	—	) 2970 (20)	) —	2949 (2)	2951	2949 (2)	2950.53 (6)	2950.7 (10)
$\gamma_{35,3}$ 2983.5 (4)	—	—	)		2982 (3)	2982	—	2981.5 (30)	[2981 (3)]
—	—	—	—	—	—	—	2990 (2)	—	—
$\gamma_{23,1}$ 2997.36 (8)	—	—	—	—	2997 (2)	2998	—	2997.34 (9)	2997.0 (15)
$\gamma_{24,1}$ 3044.98 (8)	—	—	—	) 3060	—	3047	—	3045.0 (10)	—
$\gamma_{25,1}$ 3063.1 (20)	—	—	—		3064 (2)	—	—	3064.0 (20)	—
$\gamma_{17,0}$ 3069.75 (4)	—	—	—		3072 (3)	3069	—	3072.0 (30)	—
$\gamma_{37,2}$ 3093.2 (2)	—	—	—	—	—	—	3090 (2)	3093.2 (2)	—
$\gamma_{18,0}$ 3160.07 (6)	—	—	—	) 3250 +	3158 (2)	3160	3154 (2)	3159.0 (2)	—
$\gamma_{20,0}$ 3351.54 (7)	—	—	—	) 3320	3351 (2)	3352	3349 (2)	3351.8 (10)	3350.0 (15)
—	—	—	—	—	—	—	—	—	3356 (3)
$\gamma_{28,1}$ 3370.0 (6)	—	—	—	3360	3368 (2)	3368	—	3370.0 (10)	—
$\gamma_{29,1}$ 3411.5 (4)	—	—	—	—	3410 (3)	3414	—	3411.3 (5)	3410.0 (20)
$\gamma_{32,1}$ 3505 (4)	—	—	—	—	3508 (3)	3506	—	3508.0 (30)	—
$\gamma_{33,1}$ 3525.2 (2)	—	—	) 3570 (30)	) 3560	3525 (2)	—	—	3525.2 (5)	3525.0 (20)
$\gamma_{24,0}$ 3604.08 (8)	—	—	)		3604 (3)	3606	3600 (5)	3603.98 (8)	3604.0 (15)
—	—	—	—	—	—	—	3625 (5)	—	—

E _{GT} (keV) [#]	E _γ (keV)								
	1952Fu04	1955Th01	1959Gi46	1963Sa26	1969Dz01	1971Dz08	1971La01	1974HeYW 1998 ENSDF	1974MuZB
γ _{35,1} 3640.5 (4)	—	—	—	—	3638 (2)	3639	—	3638.7 (5)	3637.6 (20)
— —	—	—	—	—	—	—	3860 (5)	—	—
γ _{40,1} 3877.8 (10)	—	—	—	3850	3881 (3)	3881	3873 (5)	3881.0 (30)	—
γ _{-1,5} 3892.0 (20) ^Δ	—	—	—	—	3893 (3)	—	—	3892.0 (20)	—
γ _{27,0} 3913.0 (10)	—	—	—	) 3920)	—	—	3910 (5)	3913.5 (10)	—
γ _{28,0} 3929.1 (6)	—	—	—		3930 (3)	3932	—	3929.2 (7)	[3930 (5)]
— —	—	—	—	—	—	—	3940 (5)	—	—
γ _{-1,6} 3963.5 (10) ^Δ	—	—	) 3970 (30))	—	3964 (3)	—	—	3963.5 (10)	—
γ _{29,0} 3970.6 (4)	—	—		—	3971 (3)	3973	—	3971.0 (20)	—
— —	—	—	—	—	—	—	4010 (5)	—	—
γ _{31,0} 4019.3 (5)	—	—	—	—	4023 (3)	—	—	4020.3 (10)	—
— —	—	—	—	—	—	—	4030 (5)	—	—
γ _{43,1} 4046.7 (7)	—	—	—	—	4045 (3)	4050	—	4044.0 (20)D	[4045 (3)]
γ _{32,0} 4064 (4)	—	—	—	—	4065 (3)	4065	—	4065.0 (30)	—
γ _{33,0} 4084.3 (2)	—	—	—	—	—	—	—	4084.0 (30)	—
— —	—	—	—	—	—	—	4140 (5)	—	—
γ _{34,0} 4173.1 (9)	—	—	—	4270	—	—	—	4172.0 (20)	—
— —	—	—	—	—	—	—	4420 (5)	—	—
γ _{40,0} 4436.9 (10)	—	—	4420 (40)	4410	4440 (3)	4440	—	4436.4 (10)	[4439 (3)]
γ _{41,0} 4455.0 (30)	—	—	—	—	—	—	—	4455.0 (30)	—
γ _{42,0} 4492 (3)	—	—	—	4490	—	—	—	4492.0 (30)	—
— —	—	—	—	—	—	—	4570 (5)	—	—
γ _{43,0} 4605.8 (7)	—	—	—	—	4603 (3)	4610	—	4600.0 (40)	—

Gamma transition energies, and measured and recommended gamma-ray energies (continued).

E _{GT} (keV) [#]	E _γ (keV)		
	1974Na17	1975VyZX	Recommended [§]
γ _{4,3} 114.7 (1)	—	—	γ _{4,3} 114.7 (1) ^Φ
γ _{26,22} 210.1 (10)	—	—	γ _{26,22} 210.1 (10)
γ _{36,28} 281 (1)	—	—	γ _{36,28} 281 (1)
γ _{21,18} 281.4 (2)	—	—	γ _{21,18} 281.4 (2)
γ _{38,31} 309.4 (4)	—	—	γ _{38,31} 309.4 (4)
γ _{26,20} 318.0 (10)	—	—	γ _{26,20} 318.0 (10)
γ _{5,4} 358.102 (11)	—	—	γ _{5,4} 358.101 (11)
γ _{17,14} 399.87 (6)	) 400.0 (5))	—	γ _{17,14} 399.87 (6)
γ _{20,16} 401.01 (9)		—	γ _{20,16} 401.01 (9)

E _{GT} (keV) [#]		E _γ (keV)		
		1974Na17	1975VyZX	Recommended [§]
γ _{7,5}	438.253 (11)	—	—	γ _{7,5} 438.252 (11)
γ _{6,4}	456.788 (11)	457.3 (5)	—	γ _{6,4} 456.787 (11)
γ _{5,3}	472.815 (10)	472.91 (6)	—	γ _{5,3} 472.813 (10)
γ _{18,14}	490.19 (7)	489.7 (2)	—	γ _{18,14} 490.19 (7)
γ _{14,8}	499.33 (4)	—	—	γ _{14,8} 499.33 (4)
γ _{18,13}	504.75 (7)	—	505.0	γ _{18,13} 504.75 (7)
—	annihilation radiation	—	—	— annihilation radiation
γ _{-1,1}	546.5 (5) ^Δ	—	546.5	γ _{-1,1} 546.5 (5) ^Δ
γ _{1,0}	559.102 (5)	559.11 (5)	559.5	γ _{1,0} 559.100 (5)
γ _{2,1}	563.181 (9)	563.22 (5)	563.1	γ _{2,1} 563.179 (9)
γ _{6,3}	571.501 (11)	571.7 (5)	571.0	γ _{6,3} 571.499 (11)
—	—	—	—	—
γ _{26,17}	599.8 (10)	599.2 (3)	599.4	γ _{26,17} 599.8 (10)
γ _{32,22}	605 (4)	604.4 (4)	605.2	γ _{32,22} 605 (4)
γ _{43,29}	635.2 (8)	—	—	γ _{43,29} 635.2 (8)
γ _{10,6}	641.447 (14)	—	—	γ _{10,6} 641.444 (14)
γ _{3,1}	657.045 (9)	657.00 (5)	657.2	γ _{3,1} 657.042 (9)
γ _{6,2}	665.365 (11)	665.1 (1)	665.0	γ _{6,2} 665.362 (11)
γ _{20,14}	681.66 (8)	681.4 (2)	681.3	γ _{20,14} 681.66 (8)
γ _{20,13}	696.22 (8)	695.8 (2)	696.1	γ _{20,13} 696.22 (8)
γ _{11,6}	727.015 (15)	727.5 (1)	727.1	γ _{11,6} 727.011 (15)
γ _{18,10}	730.98 (6)	730.4 (2)	731.0	γ _{18,10} 730.98 (6)
γ _{10,5}	740.133 (13)	740.0 (8)	740.6	γ _{10,5} 740.129 (13)
γ _{4,1}	771.758 (10)	771.8 (2)	772.2	γ _{4,1} 771.754 (10)
γ _{22,14}	789.52 (9)	789.1 (2)	789.1	γ _{22,14} 789.52 (9)
γ _{7,4}	796.355 (11)	—	—	γ _{7,4} 796.351 (11)
γ _{22,13}	804.08 (9)	803.5 (2)	804.0	γ _{22,13} 804.08 (9)
γ _{39,24}	812.1 (8)	—	812.5	γ _{39,24} 812.1 (8)
γ _{20,11}	836.88 (7)	836.5 (2)	) 838.1	γ _{20,11} 836.88 (7)
γ _{30,18}	838.3 (10)	—		γ _{30,18} 838.3 (10)
γ _{13,6}	867.67 (4)	867.5 (2)	868.4	γ _{13,6} 867.66 (4)
γ _{14,6}	882.23 (4)	882.3 (2)	882.0	γ _{14,6} 882.22 (4)
γ _{23,14}	886.58 (9)	886.1 (2)	886.3	γ _{23,14} 886.57 (9)
γ _{17,8}	899.20 (4)	—	—	γ _{17,8} 899.19 (4)
γ _{23,13}	901.14 (9)	900.6 (8)	902.0	γ _{23,13} 901.13 (9)
γ _{7,3}	911.068 (11)	—	—	γ _{7,3} 911.062 (11)

E _{GT} (keV) [#]		E _γ (keV)		
		1974Na17	1975VyZX	Recommended [§]
γ _{20,10}	922.45 (7)	—	—	γ _{20,10} 922.44 (7)
γ _{24,14}	934.20 (9)	934.2 (10)	933.5	γ _{24,14} 934.19 (9)
γ _{42,23}	936 (3)	—	935.5	γ _{42,23} 936 (3)
γ _{12,5}	941.8 (5)	) 942.3 (8)	) 942.0	γ _{12,5} 941.8 (5)
γ _{17,7}	942.54 (4)			γ _{17,7} 942.53 (4)
γ _{14,5}	980.92 (4)	980.8 (2)	981.4	γ _{14,5} 980.91 (4)
—	—	—	—	—
γ _{22,10}	1030.31 (8)	1030.3 (5)	1030.0	γ _{22,10} 1030.30 (8)
γ _{18,7}	1032.86 (6)	1032.5 (5)	1033.4	γ _{18,7} 1032.85 (6)
γ _{35,18}	1039.5 (4)	1040.9 (10)	—	γ _{35,18} 1039.5 (4)
—	—	—	—	—
γ _{38,19}	1060 (1)	—	—	γ _{38,19} 1060 (1)
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—
γ _{2,0}	1122.283 (7)	—	—	γ _{2,0} 1122.274 (7)
γ _{5,1}	1129.860 (9)	1129.85 (6)	1129.5	γ _{5,1} 1129.851 (9)
γ _{43,22}	1146.4 (7)	—	1145.0	γ _{43,22} 1146.4 (7)
γ _{9,3}	1158.1 (6)	1158.2 (5)	—	γ _{9,3} 1158.1 (5)
γ _{16,6}	1162.88 (5)	—	—	γ _{16,6} 1162.87 (5)
γ _{20,8}	1180.99 (7)	1178.0 (8)	—	γ _{20,8} 1180.98 (7)
γ _{25,10}	1193.1 (20)	—	—	γ _{25,10} 1193.1 (20)
γ _{10,3}	1212.948 (13)	1213.1 (1)	1212.8	γ _{10,3} 1212.938 (13)
γ _{3,0}	1216.147 (7)	1216.10 (5)	1216.2	γ _{3,0} 1216.137 (7)
γ _{20,7}	1224.33 (7)	1224.3 (5)	1224.2	γ _{20,7} 1224.32 (7)
γ _{6,1}	1228.546 (10)	1228.65 (6)	1228.7	γ _{6,1} 1228.535 (10)
γ _{43,20}	1254.3 (7)	—	—	γ _{43,20} 1254.3 (7)
γ _{21,8}	1270.9 (20)	—	—	γ _{21,8} 1270.9 (20)
γ _{17,6}	1282.10 (4)	—	—	γ _{17,6} 1282.09 (4)
γ _{22,8}	1288.85 (8)	—	—	γ _{22,8} 1288.84 (8)
γ _{11,3}	1298.516 (15)	—	—	γ _{11,3} 1298.504 (15)
γ _{29,14}	1300.7 (4)	1300.0 (8)	—	γ _{29,14} 1300.7 (4)
γ _{10,2}	1306.812 (13)	—	—	γ _{10,2} 1306.800 (13)
γ _{29,13}	1315.3 (4)	1315.0 (10)	—	γ _{29,13} 1315.3 (4)
γ _{13,4}	1324.46 (4)	—	—	γ _{13,4} 1324.45 (4)
—	—	—	—	—

E _{GT} (keV) [#]		E _γ (keV)		
		1974Na17	1975VyZX	Recommended [§]
γ _{18,6}	1372.42 (6)	1372.1 (2)	—	γ _{18,6} 1372.41 (6)
γ _{17,5}	1380.79 (4)	1380.56 (8)	—	γ _{17,5} 1380.78 (4)
γ _{33,13}	1429.0 (2)	) 1429.2 (2)	—	γ _{33,13} 1429.0 (2)
γ _{23,7}	1429.25 (8)		—	γ _{23,7} 1429.24 (8)
γ _{13,3}	1439.17 (4)	1439.5 (2)	—	γ _{13,3} 1439.16 (4)
γ _{14,3}	1453.73 (4)	1454.10 (8)	—	γ _{14,3} 1453.72 (4)
—	—	—	—	—
γ _{44,18}	1461.4 (20)	—	—	γ _{44,18} 1461.4 (20)
γ _{18,5}	1471.11 (6)	1471.14 (7)	—	γ _{18,5} 1471.09 (6)
—	—	—	—	—
γ _{31,11}	1504.6 (5)	1504.2 (5)	—	γ _{31,11} 1504.6 (5)
γ _{13,2}	1533.03 (4)	—	—	γ _{13,2} 1533.01 (4)
γ _{43,17}	1536.1 (7)	—	—	γ _{43,17} 1536.1 (7)
γ _{37,13}	1560.2 (2)	1560.2 (5)	—	γ _{37,13} 1560.2 (5)
—	—	—	—	—
γ _{7,1}	1568.113 (10)	1568.49 (8)	—	γ _{7,1} 1568.096 (10)
—	—	—	—	—
γ _{8,1}	1611.452 (13)	1612.0 (5)	—	γ _{8,1} 1611.434 (13)
γ _{15,3}	1642.0 (20)	—	—	γ _{15,3} 1642.0 (20)
γ _{33,10}	1655.2 (2)	1654.7 (5)	—	γ _{33,10} 1655.2 (2)
γ _{20,5}	1662.58 (7)	—	—	γ _{20,5} 1662.56 (7)
γ _{22,6}	1671.75 (8)	1672.5 (5)	—	γ _{22,6} 1671.73 (8)
—	—	—	—	—
γ _{27,8}	1742.4 (10)	1741.7 (10)	—	γ _{27,8} 1742.4 (10)
γ _{22,5}	1770.44 (8)	) 1769.9 (5)	—	γ _{22,5} 1770.42 (8)
γ _{35,10}	1770.5 (4)		—	γ _{35,10} 1770.5 (4)
γ _{6,0}	1787.648 (8)	1788.1 (5)	—	γ _{6,0} 1787.625 (8)
γ _{28,7}	1801.9 (6)	1802.0 (20)	—	γ _{28,7} 1801.9 (6)
γ _{9,1}	1815.1 (6)	1815.0 (20)	—	γ _{9,1} 1815.1 (6)
γ _{25,6}	1834.6 (20)	1833.6 (8)	—	γ _{25,6} 1834.6 (20)
γ _{17,3}	1853.60 (4)	1853.68 (5)	—	γ _{17,3} 1853.58 (4)
γ _{10,1}	1869.993 (12)	1868.3 (8)	—	γ _{10,1} 1869.968 (12)
—	—	—	—	—
γ _{26,6}	1881.9 (10)	—	—	γ _{26,6} 1881.9 (10)
γ _{39,11}	1901 (2)	—	—	γ _{39,11} 1901 (2)
γ _{18,3}	1943.92 (6)	1944.3 (5)	—	γ _{18,3} 1943.89 (6)

E _{GT} (keV) [#]		E _γ (keV)		
		1974Na17	1975VyZX	Recommended [§]
—	—	—	—	—
γ _{11,1}	1955.561 (14)	1956.2 (5)	—	γ _{11,1} 1955.534 (14)
γ _{43,12}	1975.0 (9)	1976.0 (10)	—	γ _{43,12} 1975.0 (9)
γ _{44,12}	1990.7 (21)	—	—	γ _{44,12} 1990.7 (21)
—	—	—	—	—
γ _{34,7}	2045.9 (9)	2046.1 (10)	—	γ _{34,7} 2045.9 (9)
γ _{12,1}	2071.7 (5)	2070.0 (20)	—	γ _{12,1} 2071.7 (5)
γ _{36,7}	2082 (1)	—	—	γ _{36,7} 2082 (1)
γ _{13,1}	2096.22 (4)	2096.78 (8)	—	γ _{13,1} 2096.19 (4)
γ _{14,1}	2110.78 (4)	2111.27 (8)	—	γ _{14,1} 2110.75 (4)
γ _{7,0}	2127.215 (8)	2127.4 (8)	—	γ _{7,0} 2127.183 (8)
γ _{20,3}	2135.39 (7)	2135.64 (8)	—	γ _{20,3} 2135.36 (7)
γ _{-1,2}	2170.0 (20) ^Δ	—	—	γ _{-1,2} 2170.0 (20) ^Δ
γ _{8,0}	2170.554 (12)	—	—	γ _{8,0} 2170.521 (12)
γ _{29,6}	2183.0 (4)	2183.1 (10)	—	γ _{29,6} 2183.0 (4)
γ _{20,2}	2229.26 (7)	2227.4 (20)	—	γ _{20,2} 2229.22 (7)
γ _{-1,3}	2235.0 (20) ^Δ	—	—	γ _{-1,3} 2235.0 (20) ^Δ
γ _{15,1}	2299.0 (20)	—	—	γ _{15,1} 2299.0 (20)
γ _{30,5}	2309.4 (10)	2310.7 (10)	—	γ _{30,5} 2309.4 (10)
γ _{23,3}	2340.31 (8)	—	—	γ _{23,3} 2340.27 (8)
—	—	—	—	—
γ _{16,1}	2391.43 (5)	2391.29 (6)	—	γ _{16,1} 2391.39 (5)
γ _{35,6}	2412.0 (4)	2411.8 (20)	—	γ _{35,6} 2412.0 (4)
γ _{10,0}	2429.095 (11)	2430.0 (20)	—	γ _{10,0} 2429.053 (11)
γ _{24,2}	2481.80 (8)	2483.5 (8)	—	γ _{24,2} 2481.76 (8)
γ _{17,1}	2510.65 (4)	2510.85 (8)	—	γ _{17,1} 2510.61 (4)
γ _{26,2}	2547.2 (10)	2546.7 (20)	—	γ _{26,2} 2547.2 (10)
—	—	—	—	—
γ _{18,1}	2600.97 (6)	2601.3 (1)	—	γ _{18,1} 2600.92 (6)
γ _{12,0}	2630.8 (5)	—	—	γ _{12,0} 2630.8 (5)
γ _{13,0}	2655.32 (4)	2658.4 (10)	—	γ _{13,0} 2655.27 (4)
γ _{31,4}	2688.4 (5)	2690.0 (15)	—	γ _{31,4} 2688.3 (5)
γ _{28,3}	2713.0 (6)	—	—	γ _{28,3} 2712.9 (6)
γ _{29,3}	2754.5 (4)	—	—	γ _{29,3} 2754.4 (4)
γ _{20,1}	2792.44 (7)	2792.72 (6)	—	γ _{20,1} 2792.38 (7)
γ _{-1,4}	2837.1 (30) ^Δ	—	—	γ _{-1,4} 2837.0 (30) ^Δ

E _{GT} (keV) [#]		E _γ (keV)		
		1974Na17	1975VyZX	Recommended [§]
γ _{32,3}	2848 (4)	—	—	γ _{32,3} 2848 (4)
—	—	—	—	—
γ _{22,1}	2900.30 (8)	2900.5 (1)	—	γ _{22,1} 2900.24 (8)
—	—	—	—	—
γ _{16,0}	2950.53 (5)	2950.55 (5)	—	γ _{16,0} 2950.47 (5)
γ _{35,3}	2983.5 (4)	—	—	γ _{35,3} 2983.4 (4)
—	—	—	—	—
γ _{23,1}	2997.36 (8)	2997.38 (8)	2997	γ _{23,1} 2997.30 (8)
γ _{24,1}	3044.98 (8)	3045.0 (10)	—	γ _{24,1} 3044.91 (8)
γ _{25,1}	3063.1 (20)	—	—	γ _{25,1} 3063.0 (20)
γ _{17,0}	3069.75 (4)	—	—	γ _{17,0} 3069.68 (4)
γ _{37,2}	3093.2 (2)	3093.3 (2)	—	γ _{37,2} 3093.1 (2)
γ _{18,0}	3160.07 (6)	3159.0 (2)	3158	γ _{18,0} 3160.00 (6)
γ _{20,0}	3351.54 (7)	3352.8 (10)	3351	γ _{20,0} 3351.46 (7)
—	—	—	—	—
γ _{28,1}	3370.0 (6)	3370.5 (10)	3368	γ _{28,1} 3369.9 (6)
γ _{29,1}	3411.5 (4)	3411.4 (5)	3410	γ _{29,1} 3411.4 (4)
γ _{32,1}	3505 (4)	—	3508	γ _{32,1} 3505 (4)
γ _{33,1}	3525.2 (2)	3525.2 (5)	3525	γ _{33,1} 3525.1 (2)
γ _{24,0}	3604.08 (8)	3603.99 (8)	3604	γ _{24,0} 3603.99 (8)
—	—	—	—	—
γ _{35,1}	3640.5 (4)	3638.8 (5)	3638	γ _{35,1} 3640.4 (4)
—	—	—	—	—
γ _{40,1}	3877.8 (10)	—	—	γ _{40,1} 3877.7 (10)
γ _{-1,5}	3892.1 (20) ^Δ	3892.0 (20)	—	γ _{-1,5} 3892.0 (20) ^Δ
γ _{27,0}	3913.0 (10)	3913.5 (10)	—	γ _{27,0} 3912.9 (10)
γ _{28,0}	3929.1 (6)	3928.3 (10)	3930	γ _{28,0} 3929.0 (6)
—	—	—	—	—
γ _{-1,6}	3963.6 (10) ^Δ	3963.1 (10)	3964	γ _{-1,6} 3963.5 (10) ^Δ
γ _{29,0}	3970.6 (4)	3971.0 (20)	—	γ _{29,0} 3970.5 (4)
—	—	—	—	—
γ _{31,0}	4019.3 (5)	4020.0 (10)	4023	γ _{31,0} 4019.2 (5)
—	—	—	—	—
γ _{43,1}	4046.7 (7)	4044.0 (20)	4043	γ _{43,1} 4046.6 (7)
γ _{32,0}	4064 (4)	—	—	γ _{32,0} 4064 (4)
γ _{33,0}	4084.3 (2)	—	4084	γ _{33,0} 4084.2 (2)

E _{GT} (keV) [#]		E _γ (keV)		
		1974Na17	1975VyZX	Recommended [§]
—	—	—	—	—
γ _{34,0}	4173.1 (9)	4172.0 (20)	4172	γ _{34,0} 4173.0 (9)
—	—	—	—	—
γ _{40,0}	4436.9 (10)	4432.0 (20)	4440	γ _{40,0} 4436.8 (10)
γ _{41,0}	4455.0 (30)	—	4455	γ _{41,0} 4454.9 (30)
γ _{42,0}	4492 (3)	4490	4492	γ _{42,0} 4492 (3)
—	—	—	—	—
γ _{43,0}	4605.8 (7)	4596.0 (20)	4604	γ _{43,0} 4605.7 (7)

[#] Determined from the nuclear level energies of 1995Si03, and nuclear levels derived directly from various previously unplaced gamma-ray emissions.

[§] Calculated by subtracting gamma recoil from gamma transition energy (E_{GT} (keV)).

^Δ Unplaced in proposed decay scheme.

^Φ Unobserved – introduced to ensure necessary and complete depopulation of the 1330.860-keV level to the 1216.147-keV level (4⁺ → 2⁺).

Published gamma-ray emission probabilities expressed relative to P_γ^{rel} (559.10 keV) fixed to 100, unless stated otherwise.

E _γ (keV)		P _γ									
		1959Gi46	1963Sa26 [‡]	1969Dz01		1971Dz08		1971La01	1974HeYW [#]		1974MuZB
				Table	Fig. 2	Table 2	Fig. 4		1998ENSDF		
				P _γ ^{rel †}	P _γ ^{rel *}	P _γ ^{rel *}	P _γ ^{pabs}		P _γ ^{rel *}	P _γ ^{pabs}		P_{γ}^{rel *}
γ _{4,3}	114.7 (1)	—	—	—	—	—	—	—	—	—	—
γ _{26,22}	210.1 (10)	—	15.9	—	—	—	—	—	—	0.0592 (16)	0.06
γ _{36,28}	281 (1)	—	) 10.4	—	—	—	—	—	—	) 0.163 (4)	) 0.22
γ _{21,18}	281.4 (2)	—)	—	—	—	—	—		
γ _{38,31}	309.4 (4)	—	—	—	—	—	—	—	—	0.141 (4)	0.19
γ _{26,20}	318.0 (10)	—	—	—	—	—	—	—	—	0.133 (4)	0.18
γ _{5,4}	358.101 (11)	—	8.7	—	—	0.5 (2)	0.38	—	1.3	0.37 (15)	0.44
γ _{17,14}	399.87 (6)	—	—	) 0.48 (5)	) 0.3	—	) 0.37	—	) 4.3	) 0.34 (4)	) 0.31
γ _{20,16}	401.01 (9)	—	—)		—			
γ _{7,5}	438.252 (11)	—	—	—	—	—	—	< 0.3	—	0.274 (7)	0.37
γ _{6,4}	456.787 (11)	—	—	—	—	—	—	—	—	0.067 (15)	—
γ _{5,3}	472.813 (10)	—	—	2.4 (3)	1.6	—	1.85	1.8	3.6	1.86 (10)	2.4
γ _{18,14}	490.19 (7)	—	—	0.55 (7)	0.4	—	0.42	< 0.3	0.36	0.36 (5)	0.47
γ _{14,8}	499.33 (4)	—	—	—	—	0.22 (9)	0.17	—	—	0.16 (7)	—
γ _{18,13}	504.75 (7)	—	—	—	—	0.30 (6)	0.23	—	—	0.229 (16)	—
—	annihilation radiation	200	—	146 (7)	—	145.2 (50)	—	—	—	109 (6)	—
γ _{-1,1}	546.5 (5) ^Δ	—	—	—	—	—	—	—	—	0.163 (23)	—
γ _{1,0}	559.100 (5)	95 (8)	100	100	67.5	100	73.38	100.0	100	74.0 (20)	100

E_γ (keV)	P_γ									
	1959Gi46	1963Sa26 [‡]	1969Dz01		1971Dz08		1971La01	1974HeYW [#] 1998ENSDF		1974MuZB
	$P_\gamma^{rel \dagger}$	$P_\gamma^{rel *}$	Table $P_\gamma^{rel *}$	Fig. 2 P_γ^{abs}	Table 2 $P_\gamma^{rel *}$	Fig. 4 P_γ^{abs}	$P_\gamma^{rel *}$	$P_\gamma^{rel *}$	P_γ^{abs}	$P_\gamma^{rel *}$
$\gamma_{2,1}$ 563.179 (9)	—	—	—	0.4**	5.3 (4)	3.85 (29)	—	12.0	3.6 (6)	6.5
$\gamma_{6,3}$ 571.499 (11)	—	—	—	—	0.92 (15)	0.71	0.5	—	0.44 (22)	0.4
575.1 (2) [†]	—	—	—	—	—	—	—	—	—	1.3
$\gamma_{26,17}$ 599.8 (10)	—	—	0.81 (7)	—	—	—	0.7	1.1	0.41 (16)	0.76
$\gamma_{32,22}$ 605 (4)	—	—	0.39 (5)	0.3	—	0.29	—	—	0.22 (7)	0.34
$\gamma_{43,29}$ 635.2 (8)	—	—	0.10 (3)	0.07	—	0.08	—	—	0.074 (22)	—
$\gamma_{10,6}$ 641.444 (14)	) 28 (2)	—	—	—	0.19 (5)	0.15	—	—	0.14 (4)	—
$\gamma_{3,1}$ 657.042 (9)	)	43.1	20.3 (15)	13.9	21.7 (9)	16.72	22.7	23.0	15.9 (9)	23.7
$\gamma_{6,2}$ 665.362 (11)	—	—	0.46 (12)	0.3	—	0.35	< 0.3	1.4	0.70 (4)	1.1
$\gamma_{20,14}$ 681.66 (8)	—	—	0.61 (4)	0.4	—	0.47	0.9	0.67	0.422 (25)	0.69
$\gamma_{20,13}$ 696.22 (8)	—	—	0.60 (20)	0.4	—	0.46	< 0.3	1.2	0.49 (3)	[0.9]
$\gamma_{11,6}$ 727.011 (15)	—	—	0.70 (6)	0.5	—	0.36	1.3	1.0	0.67 (15)	0.72
$\gamma_{18,10}$ 730.98 (6)	—	—	0.87 (7)	0.6	—	0.67	—	1.3	0.58 (8)	1.0
$\gamma_{10,5}$ 740.129 (13)	) 9 (1)	—	0.16 (3)	0.1	—	0.12	—	—	0.16 (5)	—
$\gamma_{4,1}$ 771.754 (10)	)	5.9	0.56 (10)	0.4	—	0.43	< 0.3	—	0.414 (25)	0.54
$\gamma_{22,14}$ 789.52 (9)	—	—	0.60 (4)	0.4	—	0.46	< 0.3	0.83	0.47 (3)	0.70
$\gamma_{7,4}$ 796.351 (11)	—	—	0.10 (3)	0.06	—	—	—	—	0.074 (22)	—
$\gamma_{22,13}$ 804.08 (9)	—	—	0.74 (7)	0.5	—	0.57	< 0.3	0.76	0.53 (4)	0.73
$\gamma_{39,24}$ 812.1 (8)	—	—	—	—	—	—	—	—	0.14 (4)	—
$\gamma_{20,11}$ 836.88 (7)	) 10 (1)	) 2.91	—	—	—	0.06	4.5	4.5	0.38 (7)	0.88
$\gamma_{30,18}$ 838.3 (10)	)	)	0.45 (9)	0.3	—	0.38	—	—	—	—
$\gamma_{13,6}$ 867.66 (4)	)	10.1	0.45 (3)	0.3	—	0.35	0.6	0.64	0.30 (3)	—
$\gamma_{14,6}$ 882.22 (4)	—	—	0.26 (3)	0.2	0.48 (7)	0.37	1.3	—	0.407 (24)	0.56
$\gamma_{23,14}$ 886.57 (9)	—	—	0.71 (6)	0.5	0.49 (7)	0.38	—	—	0.333 (24)	0.25
$\gamma_{17,8}$ 899.19 (4)	—	—	—	—	0.23 (3)	0.18	—	—	0.170 (23)	[0.15]
$\gamma_{23,13}$ 901.13 (9)	—	—	0.27 (2)	0.2	—	0.21	—	—	0.155 (15)	—
$\gamma_{7,3}$ 911.062 (11)	—	—	0.07 (4)	0.04	—	0.05	—	—	0.05 (3)	—
$\gamma_{20,10}$ 922.44 (7)	—	—	—	—	—	0.19	—	—	—	—
$\gamma_{24,14}$ 934.19 (9)	—	—	0.07 (3)	—	—	—	—	—	0.074 (15)	—
$\gamma_{42,23}$ 936 (3)	—	—	—	—	—	—	—	—	—	—
$\gamma_{12,5}$ 941.8 (5)	—	—	) 0.26 (4)	0.05	—	—	—	) 0.63	) 0.37 (1)	) < 0.3
$\gamma_{17,7}$ 942.53 (4)	—	—	)	0.2	—	0.20	—)))
$\gamma_{14,5}$ 980.91 (4)	—	14.0	0.50 (3)	0.3	—	0.23	0.8	—	0.33 (3)	0.4
— 984 [‡]	—	—	—	—	—	0.15	—	—	—	—

E _γ (keV)		P _γ									
		1959Gi46	1963Sa26 [‡]	1969Dz01		1971Dz08		1971La01	1974HeYW [#] 1998ENSDF		1974MuZB
				Table	Fig. 2	Table 2	Fig. 4		<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	
		<i>p</i> _γ ^{rel †}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}
γ _{22,10}	1030.30 (8)	—	—	0.79 (7)	0.5	0.67 (9)	0.51	1.6	) 2.9	0.57 (6)	1.1
γ _{18,7}	1032.85 (6)	—	—	0.75 (6)	0.5	0.87 (9)	0.67	—	)	0.58 (6)	1.2
γ _{35,18}	1039.5 (4)	—	—	0.16 (8)	0.1	—	0.12	—	—	0.07 (4)	—
—	1050 (10) ⁰	—	—	—	—	—	—	< 0.3	—	—	—
γ _{38,19}	1060 (1)	—	—	0.06 (3)	—	—	—	—	—	0.044 (22)	—
—	1069.1 (8) [¶] SP	—	—	—	—	—	—	—	—	—	0.42
—	1074 (1) ⁰	—	—	—	—	—	—	< 0.3	—	—	—
—	1088 (1) ⁰	—	—	—	—	—	—	< 0.3	—	—	—
γ _{2,0}	1122.274 (7)	—	—	—	—	—	—	—	—	—	—
γ _{5,1}	1129.851 (9)	) 4 (4)	) 14.0	6.23 (36)	4.2	—	4.80	9.6	7.1	4.59 (25)	6.2
γ _{43,22}	1146.4 (7)	)	)	0.07 (4)	—	—	0.05	—	—	0.059 (15)	—
γ _{9,3}	1158.1 (5)	—	—	0.18 (1)	—	—	—	—	—	0.148 (15)	—
γ _{16,6}	1162.87 (5)	—	—	0.22 (2)	0.1	—	0.17	0.4	—	0.163 (23)	—
γ _{20,8}	1180.98 (7)	—	—	0.07 (4)	0.09	—	0.05	—	—	0.09 (4)	0.33
γ _{25,10}	1193.1 (20)	—	—	0.14 (6)	—	—	—	—	—	0.10 (4)	—
γ _{10,3}	1212.938 (13)	) 19 (2)	) 33.8	0.95 (5)	0.6	2.9 (9)	2.24	—	) 16.0	1.7 (5)	3.2
γ _{3,0}	1216.137 (7)	)	)	13.0 (7)	8.9	11.8 (9)	9.10	)	)	8.8 (5)	13.1
γ _{20,7}	1224.32 (7)	—	)	—	—	—	—	) 29.6	—	0.28 (10)	—
γ _{6,1}	1228.535 (10)	—	)	3.05 (16)	2.1	—	2.35	)	3.8	2.09 (11)	2.5
γ _{43,20}	1254.3 (7)	—	—	0.11 (4)	0.08	—	0.08	—	—	0.08 (3)	—
γ _{21,8}	1270.9 (20)	—	—	0.08 (3)	0.05	—	—	—	—	0.059 (22)	< 0.3
γ _{17,6}	1282.09 (4)	—	—	0.10 (4)	0.07	—	0.08	—	—	0.07 (3)	—
γ _{22,8}	1288.84 (8)	—	—	0.07 (3)	0.1	—	0.05	—	—	0.052 (22)	—
γ _{11,3}	1298.504 (15)	—	—	0.12 (1)	0.08	—	—	—	—	0.089 (15)	—
γ _{29,14}	1300.7 (4)	—	) 2.07	0.23 (2)	0.08	0.23 (4)	0.18	—	—	0.155 (15)	—
γ _{10,2}	1306.800 (13)	—	)	—	—	0.25 (3)	0.19	—	—	0.185 (23)	—
γ _{29,13}	1315.3 (4)	—	)	—	—	—	—	—	—	0.052 (15)	—
γ _{13,4}	1324.45 (4)	—	)	0.06 (3)	0.04	—	0.05	—	—	0.044 (22)	—
—	1342 (1) [§] SE	—	—	—	—	—	—	0.8	—	—	—
γ _{18,6}	1372.41 (6)	7.0 (15)	—	0.79 (15)	0.5	—	0.61	) 8.8	—	0.55 (5)	0.97
γ _{17,5}	1380.78 (4)	—	—	3.45 (17)	2.3	—	2.66	)	4.3	2.52 (14)	3.7
γ _{33,13}	1429.0 (2)	—	)	0.40 (3)	) 0.3	—	0.21	—	) 0.64	) 0.532 (10)	—
γ _{23,7}	1429.24 (8)	—	) 11.0))	—	—	—))	—
γ _{13,3}	1439.16 (4)	—	)	0.81 (5)	0.55	—	0.82	1.1	1.1	0.58 (3)	1.0

E _γ (keV)		P _γ									
		1959Gi46	1963Sa26 [‡]	1969Dz01		1971Dz08		1971La01	1974HeYW [#] 1998ENSDF		1974MuZB
				Table	Fig. 2	Table 2	Fig. 4		<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	
		<i>p</i> _γ ^{rel †}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}
γ _{14,3}	1453.72 (4)	—	—	1.02 (6)	0.6	—	0.79	1.9	1.4	0.80 (5)	1.3
—	1457 [‡]	—	—	—	—	—	0.79	—	—	—	—
γ _{44,18}	1461.4 (20)	—	—	0.18 (4)	—	—	—	—	—	0.13 (3)	—
γ _{18,5}	1471.09 (6)	10 (2)	4.48	3.03 (19)	2.1	—	2.34	< 0.3	3.7	2.31 (13)	3.4
—	1489 (1) [§]	—	—	—	—	—	—	3.9	—	—	—
γ _{31,11}	1504.6 (5)	—	—	0.11 (5)	0.07	—	0.08	—	—	0.09 (4)	—
γ _{13,2}	1533.01 (4)	) < 3	—	0.08 (5)	0.05	—	0.08	—	—	0.06 (4)	—
γ _{43,17}	1536.1 (7)		—	0.23 (9)	0.05	—	0.18	—	—	0.17 (7)	—
γ _{37,13}	1560.2 (5)	—	8.09	0.65 (8)	—	—	—	1.9	0.7	0.459 (25)	0.78
—	1566 (1) [‡]	—	—	—	—	0.75 (15)	—	) < 0.3	—	—	—
γ _{7,1}	1568.096 (10)	—	—	1.40 (8)	1.0	0.65 (10)	0.50		1.6	0.96 (8)	1.5
—	1585 [‡]	—	—	—	—	—	0.58	—	—	—	—
γ _{8,1}	1611.434 (13)	—	—	0.46 (30)	0.3	—	0.35	—	—	0.28 (6)	< 0.3
γ _{15,3}	1642.0 (20)	< 3	5.07	0.18 (6)	—	—	—	—	—	0.13 (5)	—
γ _{33,10}	1655.2 (2)	—	—	—	—	—	—	—	—	0.118 (22)	—
γ _{20,5}	1662.56 (7)	—	—	0.19 (7)	0.1	—	0.14	< 0.3	—	0.14 (5)	—
γ _{22,6}	1671.73 (8)	—	—	0.32 (9)	0.2	—	0.24	< 0.3	—	0.24 (7)	—
—	1689.5 (10) [‡]	—	—	—	—	—	—	< 0.3	—	—	—
γ _{27,8}	1742.4 (10)	—	—	0.16 (5)	—	—	—	—	—	0.118 (15)	—
γ _{22,5}	1770.42 (8)	) < 3	—	) 0.81(25)	) 0.55	—	) 0.62	) 4.5	—	) 0.422 (11)	) 0.6
γ _{35,10}	1770.5 (4)		—))	—))	—))
γ _{6,0}	1787.625 (8)	—	3.89	0.84 (6)	0.6	—	0.65	1.2	1.1	0.57 (6)	0.88
γ _{28,7}	1801.9 (6)	—	—	—	—	—	—	—	—	0.030 (15)	—
γ _{9,1}	1815.1 (6)	—	—	—	—	—	—	—	—	0.148 (15)	—
γ _{25,6}	1834.6 (20)	—	) 23.2	0.13 (5)	—	—	—	—	—	0.19 (10)	—
γ _{17,3}	1853.58 (4)	17 (2)		20.2 (11)	13.7	—	15.57	26.1	22.0	14.7 (8)	20.6
γ _{10,1}	1869.968 (12)	—	—	0.20 (3)	0.1	—	0.15	—	—	0.141 (22)	0.26
—	1873 (1) [‡]	—	—	—	—	—	—	< 0.3	—	—	—
γ _{26,6}	1881.9 (10)	—	—	0.18 (6)	—	—	—	< 0.3	—	0.13 (4)	—
γ _{39,11}	1901 (2)	—	—	0.16 (6)	—	—	—	—	—	0.12 (4)	0.29
γ _{18,3}	1943.89 (6)	—	—	0.74 (5)	0.5	—	0.57	< 0.3	—	0.47 (8)	0.55
—	1946 [‡]	—	—	—	—	—	0.57	—	—	—	—
γ _{11,1}	1955.534 (14)	—	—	0.47 (4)	0.3	—	0.36	< 0.3	—	0.30 (5)	0.48
γ _{43,12}	1975.0 (9)	—	—	0.26 (8)	0.2	—	0.20	—	—	0.10 (8)	—

E _γ (keV)		P _γ									
		1959Gi46	1963Sa26 [‡]	1969Dz01		1971Dz08		1971La01	1974HeYW [#] 1998ENSDF		1974MuZB
				Table	Fig. 2	Table 2	Fig. 4		<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	
		<i>p</i> _γ ^{rel †}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}
γ _{44,12}	1990.7 (21)	—	—	0.11 (4)	0.07	—	—	—	—	0.08 (3)	—
—	1997 (1) ⁰	—	—	—	—	—	—	< 0.3	—	—	—
γ _{34,7}	2045.9 (9)	—	—	—	—	—	—	—	—	0.178 (16)	—
γ _{12,1}	2071.7 (5)	—	) 13.4	0.65 (16)	0.4	—	0.50	—	—	0.27 (22)	< 0.3
γ _{36,7}	2082 (1)	—		0.16 (5)	—	—	—	—	—	0.12 (4)	< 0.3
γ _{13,1}	2096.19 (4)	10 (1)		1.91 (12)	1.3	—	1.47	) 5.9	2.0	1.36 (8)	2.0
γ _{14,1}	2110.75 (4)	—		3.52 (19)	2.4	—	2.71		4.2	2.49 (14)	3.8
γ _{7,0}	2127.183 (8)	—		0.36 (9)	0.2	—	0.28	—	—	0.20 (6)	0.38
γ _{20,3}	2135.36 (7)	—		1.36 (8)	0.9	—	1.05	1.1	2.4	0.94 (8)	1.8
γ _{-1,2}	2170.0 (20) ^Δ	—	—	0.13 (5)	0.08	—	0.10	—	—	0.10 (4)	—
γ _{8,0}	2170.521 (12)	—	—	—	—	—	—	—	—	—	—
γ _{29,6}	2183.0 (4)	—	—	0.15 (4)	0.1	—	0.11	< 0.3	—	0.13 (4)	—
γ _{20,2}	2229.22 (7)	—	—	0.22 (8)	0.1	—	0.17	—	—	0.10 (6)	—
γ _{-1,3}	2235.0 (20) ^Δ	—	—	0.18 (8)	—	—	—	—	—	0.13 (6)	—
γ _{15,1}	2299.0 (20)	—	—	0.19 (6)	—	—	—	—	—	0.14 (4)	—
γ _{30,5}	2309.4 (10)	—	—	0.18 (6)	—	—	—	—	—	0.10 (3)	0.31
γ _{23,3}	2340.27 (8)	—	6.83	0.12 (5)	0.08	—	0.09	—	—	0.09 (4)	—
—	2389 ^Φ	—	—	—	—	—	1.03	—	—	—	—
γ _{16,1}	2391.39 (5)	6 (1)	—	6.7 (4)	4.5	—	4.13	8.8	9.1	4.7 (3)	7.0
γ _{35,6}	2412.0 (4)	—	—	—	—	—	—	—	—	0.06 (3)	—
γ _{10,0}	2429.053 (11)	—	5.46	0.20 (10)	0.2	—	0.15	2.8	—	0.10 (4)	—
γ _{24,2}	2481.76 (8)	—	—	0.21 (9)	0.1	—	0.16	—	—	0.133 (22)	—
γ _{17,1}	2510.61 (4)	—	2.06	2.77 (19)	1.8	—	8.14	2.4	3.2	1.95 (12)	2.2
γ _{26,2}	2547.2 (10)	—	—	—	—	—	—	—	—	0.006 (4)	—
—	2555 (2) ⁰	—	—	—	—	—	—	< 0.3	—	—	—
γ _{18,1}	2600.92 (6)	3 (3)	—	0.96 (7)	0.65	—	0.74	—	1.2	0.70 (4)	0.92
γ _{12,0}	2630.8 (5)	—	) 4.73	0.17 (5)	0.1	—	0.13	—	—	0.13 (4)	—
γ _{13,0}	2655.27 (4)	—		0.12 (6)	0.08	—	0.09	< 0.3	—	0.13 (4)	—
γ _{31,4}	2688.3 (5)	—	—	—	—	—	—	—	—	0.36 (4)	—
γ _{28,3}	2712.9 (6)	—	—	0.10 (3)	0.3	—	0.08	—	—	0.074 (22)	—
γ _{29,3}	2754.4 (4)	—	—	0.10 (3)	0.07	—	0.08	—	—	0.074 (22)	—
γ _{20,1}	2792.38 (7)	8.0 (15)	11.5	7.99 (55)	5.4	—	8.16	10.2	8.9	5.6 (3)	7.6
γ _{-1,4}	2837.0 (30) ^Δ	—	—	0.15 (6)	—	—	—	—	—	0.11 (4)	—
γ _{32,3}	2848 (4)	—	—	0.20 (6)	0.15	—	0.15	—	—	0.15 (4)	—

E _γ (keV)	P _γ									
	1959Gi46	1963Sa26 [‡]	1969Dz01		1971Dz08		1971La01	1974HeYW [#] 1998ENSDF		1974MuZB
	<i>p</i> _γ ^{rel †}	<i>p</i> _γ ^{rel *}	Table <i>p</i> _γ ^{rel *}	Fig. 2 <i>p</i> _γ ^{abs}	Table 2 <i>p</i> _γ ^{rel *}	Fig. 4 <i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{rel *}	<i>p</i> _γ ^{abs}	<i>p</i> _γ ^{rel *}
— 2890 (2) [§]	—	—	—	—	—	—	0.7	—	—	—
γ _{22,1} 2900.24 (8)	—	) 14.7	0.24 (9)	0.16	—	0.18	—	—	0.27 (10)	0.65
— 2947 (2) ^ϕ	) 12 (2)	)	1.47 (44)	1.0	—	—	—	—	—	—
γ _{16,0} 2950.47 (5)	)	)	9.40 (60)	6.5	—	8.38	15.2	13.9	7.4 (4)	11.2
γ _{35,3} 2983.4 (4)	)	—	0.12 (4)	0.08	—	0.09	—	—	0.09 (3)	[—]
— 2990 (2) [§]	—	—	—	—	—	—	1.71	—	—	—
γ _{23,1} 2997.30 (8)	—	—	1.30 (9)	0.9	—	1.00	—	3.0	0.96 (8)	1.5
γ _{24,1} 3044.91 (8)	—	) 4.33	—	—	—	0.05	—	—	0.022 (7)	—
γ _{25,1} 3063.0 (20)	—	)	0.10 (3)	—	—	—	—	—	0.074 (22)	—
γ _{17,0} 3069.68 (4)	—	)	0.06 (2)	0.04	—	0.05	—	—	0.044 (15)	—
γ _{37,2} 3093.1 (2)	—	—	—	—	—	—	< 0.3	1.6	0.163 (15)	—
γ _{18,0} 3160.00 (6)	—	) 0.79 +	0.37 (7)	0.3	—	0.28	< 0.3	—	0.148 (15)	—
γ _{20,0} 3351.46 (7)	—	) 0.49	0.26 (6)	0.2	—	0.16	< 0.3	—	0.252 (23)	0.34
— 3356 (3) [¶]	—	—	—	—	—	—	—	—	—	[—]
γ _{28,1} 3369.9 (6)	—	1.91	0.16 (6)	0.1	—	0.12	—	—	0.089 (15)	—
γ _{29,1} 3411.4 (4)	—	—	0.43 (12)	0.3	—	0.33	—	—	0.289 (17)	0.43
γ _{32,1} 3505 (4)	—	—	0.08 (3)	0.05	—	0.06	—	—	0.059 (22)	—
γ _{33,1} 3525.1 (2)	) 3.0 (7)	) 7.13	0.24 (2)	0.16	—	—	—	—	0.178 (16)	—
γ _{24,0} 3603.99 (8)	)	)	2.25 (18)	1.5	—	1.73	3.8	—	1.55 (12)	2.2
— 3625 (5) ^θ	—	—	—	—	—	—	< 0.3	—	—	—
γ _{35,1} 3640.4 (4)	—	—	0.16 (7)	0.1	—	0.12	—	—	0.148 (15)	< 0.3
— 3860 (5) ^θ	—	—	—	—	—	—	< 0.3	—	—	—
γ _{40,1} 3877.7 (10)	—	0.46	0.02 (1)	0.02	—	0.02	—	—	0.15 (7)	—
γ _{-1,5} 3892.0 (20) ^Δ	—	—	0.06 (3)	—	—	—	—	—	0.030 (15)	—
γ _{27,0} 3912.9 (10)	—	) 0.61	—	—	—	—	< 0.3	—	0.015 (7)	—
γ _{28,0} 3929.0 (6)	—	)	0.11 (5)	0.08	—	0.08	—	—	0.089 (15)	[< 0.4]
— 3940 (5) ^θ	—	—	—	—	—	—	< 0.3	—	—	—
γ _{-1,6} 3963.5 (10) ^Δ	) 0.2 (1)	—	0.04 (2)	—	—	—	—	—	0.022 (7)	—
γ _{29,0} 3970.5 (4)	)	—	0.02 (1)	0.01	—	0.01	—	—	0.010 (4)	—
— 4010 (5) ^θ	—	—	—	—	—	—	< 0.3	—	—	—
γ _{31,0} 4019.2 (5)	—	—	0.09 (3)	—	—	—	—	—	0.059 (15)	—
— 4030 (5) ^θ	—	—	—	—	—	—	< 0.3	—	—	—
γ _{43,1} 4046.6 (7)	—	—	0.05 (2)	0.04	—	0.04	—	—	0.104 (20) D?	[< 0.2]

E_γ (keV)		P_γ									
		1959Gi46	1963Sa26 [‡]	1969Dz01		1971Dz08		1971La01	1974HeYW [#] 1998ENSDF		1974MuZB
				Table	Fig. 2	Table 2	Fig. 4		$P_\gamma^{rel *}$	P_γ^{abs}	
$\gamma_{32,0}$	4064 (4)	—	—	$P_\gamma^{rel *}$	P_γ^{abs}	$P_\gamma^{rel *}$	P_γ^{abs}	$P_\gamma^{rel *}$	$P_\gamma^{rel *}$	P_γ^{abs}	$P_\gamma^{rel *}$
$\gamma_{33,0}$	4084.2 (2)	—	—	0.03 (1)	0.02	—	0.02	—	—	0.022 (7)	—
—	4140 (5) ⁰	—	—	—	—	—	—	< 0.3	—	—	—
$\gamma_{34,0}$	4173.0 (9)	—	0.05	—	—	—	—	—	—	0.022 (7)	—
—	4420 (5) ⁰	—	—	—	—	—	—	< 0.3	—	—	—
$\gamma_{40,0}$	4436.8 (10)	0.07 (4)	0.16	0.08 (3)	0.07	—	0.06	—	—	0.052 (15)	[< 0.2]
$\gamma_{41,0}$	4454.9 (30)	—	—	—	—	—	—	—	—	0.0067 (22)	—
$\gamma_{42,0}$	4492 (3)	—	0.13	—	—	—	—	—	—	0.0059 (22)	—
—	4570 (5) ⁰	—	—	—	—	—	—	< 0.3	—	—	—
$\gamma_{43,0}$	4605.7 (7)	—	—	0.02 (1)	0.02	—	0.02	—	—	0.022 (7)	—

Published gamma-ray emission probabilities expressed relative to P_γ^{rel} (559.10 keV) fixed to 100, unless stated otherwise (continued).

E_γ (keV)		P_γ (keV)		
		1974Na17	1975VyZX	Recommended
		$P_\gamma^{rel *}$	$P_\gamma^{rel *}$	$P_\gamma^{rel *}$
$\gamma_{4,3}$	114.7 (1)	—	—	0.45 (14) [▲]
$\gamma_{26,22}$	210.1 (10)	—	—	0.06 (2) [■]
$\gamma_{36,28}$	281 (1)	—	—	) 0.22 (4) [■]
$\gamma_{21,18}$	281.4 (2)	—	—	
$\gamma_{38,31}$	309.4 (4)	—	—	0.19 (6) [■]
$\gamma_{26,20}$	318.0 (10)	—	—	0.18 (6) [■]
$\gamma_{5,4}$	358.101 (11)	—	—	0.5 (2)
$\gamma_{17,14}$	399.87 (6)	) 0.14 (3)	—	) 0.48 (5)
$\gamma_{20,16}$	401.01 (9)		—	
$\gamma_{7,5}$	438.252 (11)	—	—	0.37 (4)
$\gamma_{6,4}$	456.787 (11)	0.09 (2)	—	0.09 (2)
$\gamma_{5,3}$	472.813 (10)	2.61 (11)	—	2.59 (10) ⁺
$\gamma_{18,14}$	490.19 (7)	0.43 (3)	—	0.45 (3) ⁺
$\gamma_{14,8}$	499.33 (4)	—	—	0.22 (9)
$\gamma_{18,13}$	504.75 (7)	—	0.31 (2)	0.31 (2) ⁺
—	annihilation radiation	—	—	145.2 (50)
$\gamma_{-1,1}$	546.5 (5) ^Δ	—	0.22 (3)	0.22 (3)
$\gamma_{1,0}$	559.100 (5)	100	100	100
$\gamma_{2,1}$	563.179 (9)	3.90 (20)	5.6 (3)	4.7 (8) ⁺

E _γ (keV)		P _γ (keV)		
		1974Na17	1975VyZX	Recommended
		$P_{\gamma}^{rel *}$	$P_{\gamma}^{rel *}$	$P_{\gamma}^{rel *}$
γ _{6,3}	571.499 (11)	0.25 (2)	0.89 (7)	0.6 (3) ⁺
—	575.1 (2) [†]	—	—	—
γ _{26,17}	599.8 (10)	0.34 (2)	0.78 (5)	0.57 (23) ⁺
γ _{32,22}	605 (4)	0.20 (2)	0.41 (4)	0.30 (10) ⁺
γ _{43,29}	635.2 (8)	—	—	0.10 (3)
γ _{10,6}	641.444 (14)	—	—	0.19 (5)
γ _{3,1}	657.042 (9)	21.4 (11)	21.9 (6)	21.6 (4) ⁺
γ _{6,2}	665.362 (11)	0.86 (4)	1.05 (5)	0.96 (10) ⁺
γ _{20,14}	681.66 (8)	0.56 (3)	0.59 (5)	0.58 (3) ⁺
γ _{20,13}	696.22 (8)	0.68 (3)	0.63 (5)	0.67 (3) ⁺
γ _{11,6}	727.011 (15)	1.18 (4)	0.66 (5)	0.9 (3) ⁺
γ _{18,10}	730.98 (6)	0.68 (3)	0.89 (5)	0.78 (10) ⁺
γ _{10,5}	740.129 (13)	0.14 (2)	0.29 (3)	0.18 (5) ⁺
γ _{4,1}	771.754 (10)	0.56 (3)	0.55 (4)	0.56 (3) ⁺
γ _{22,14}	789.52 (9)	0.65 (4)	0.60 (5)	0.62 (4) ⁺
γ _{7,4}	796.351 (11)	—	—	0.10 (3)
γ _{22,13}	804.08 (9)	0.67 (5)	0.76 (6)	0.72 (5) ⁺
γ _{39,24}	812.1 (8)	—	0.19 (6)	0.19 (6)
γ _{20,11}	836.88 (7)	0.61 (5)	—	0.61 (5)
γ _{30,18}	838.3 (10)	—	0.43 (3)	0.43 (3) ⁺
γ _{13,6}	867.66 (4)	0.37 (3)	0.46 (3)	0.43 (3) ⁺
γ _{14,6}	882.22 (4)	0.55 (3)	0.55 (4)	0.54 (3) ⁺
γ _{23,14}	886.57 (9)	0.47 (3)	0.42 (5)	0.46 (3) ⁺
γ _{17,8}	899.19 (4)	—	—	0.23 (3)
γ _{23,13}	901.13 (9)	0.17 (2)	0.25 (2)	0.23 (6) ⁺
γ _{7,3}	911.062 (11)	—	—	0.07 (4)
γ _{20,10}	922.44 (7)	—	—	0.26 (2) [×]
γ _{24,14}	934.19 (9)	0.09 (2)	0.05 (2)	0.07 (2) ⁺
γ _{42,23}	936 (3)	—	0.06 (2)	0.06 (2)
γ _{12,5}	941.8 (5)	) 0.23 (2)	) 0.27 (2)	) 0.25 (2) ⁺
γ _{17,7}	942.53 (4)			) 0.10 (2) [◇]
γ _{14,5}	980.91 (4)	0.41 (4)	0.49 (3)	0.48 (3) ⁺
—	984 [‡]	—	—	—
γ _{22,10}	1030.30 (8)	0.84 (8)	0.69 (7)	0.75 (7) ⁺
γ _{18,7}	1032.85 (6)	0.85 (8)	0.72 (7)	0.78 (6) ⁺

E_γ (keV)		P_γ (keV)		
		1974Na17	1975VyZX	Recommended
		$P_\gamma^{rel \ast}$	$P_\gamma^{rel \ast}$	$P_\gamma^{rel \ast}$
$\gamma_{35,18}$	1039.5 (4)	0.05 (2)	—	0.06 (2) ⁺
—	1050 (10) ^θ	—	—	—
$\gamma_{38,19}$	1060 (1)	—	—	0.06 (3)
—	1069.1 (8) [¶] SP	—	—	—
—	1074 (1) ^θ	—	—	—
—	1088 (1) ^θ	—	—	—
$\gamma_{2,0}$	1122.274 (7)	—	—	E0 transition
$\gamma_{5,1}$	1129.851 (9)	5.97 (30)	6.4 (3)	6.2 (3) ⁺
$\gamma_{43,22}$	1146.4 (7)	—	0.08 (2)	0.08 (2) ⁺
$\gamma_{9,3}$	1158.1 (5)	0.20 (2)	—	0.18 (1) ⁺
$\gamma_{16,6}$	1162.87 (5)	—	—	0.22 (2)
$\gamma_{20,8}$	1180.98 (7)	0.17 (2)	—	0.15 (2) ⁺
$\gamma_{25,10}$	1193.1 (20)	—	—	0.14 (6)
$\gamma_{10,3}$	1212.938 (13)	1.60 (10)	3.0 (2)	2.3 (7) ⁺
$\gamma_{3,0}$	1216.137 (7)	12.0 (6)	11.7 (3)	11.8 (3) ⁺
$\gamma_{20,7}$	1224.32 (7)	0.24 (2)	0.53 (8)	0.39 (15) ⁺
$\gamma_{6,1}$	1228.535 (10)	2.79 (12)	2.85 (20)	2.88 (12) ⁺
$\gamma_{43,20}$	1254.3 (7)	—	—	0.11 (4)
$\gamma_{21,8}$	1270.9 (20)	—	—	0.08 (3)
$\gamma_{17,6}$	1282.09 (4)	—	—	0.10 (4)
$\gamma_{22,8}$	1288.84 (8)	—	—	0.07 (3)
$\gamma_{11,3}$	1298.504 (15)	—	—	0.12 (1)
$\gamma_{29,14}$	1300.7 (4)	0.19 (2)	—	0.21 (2) ⁺
$\gamma_{10,2}$	1306.800 (13)	—	—	0.25 (3)
$\gamma_{29,13}$	1315.3 (4)	0.07 (2)	—	0.07 (2)
$\gamma_{13,4}$	1324.45 (4)	—	—	0.06 (3)
—	1342 (1) [§] SE	—	—	—
$\gamma_{18,6}$	1372.41 (6)	0.68 (4)	—	0.69 (4) ⁺
$\gamma_{17,5}$	1380.78 (4)	3.34 (14)	—	3.38 (14) ⁺
$\gamma_{33,13}$	1429.0 (2)	) 0.32 (2)	—	) 0.34 (2) ⁺
$\gamma_{23,7}$	1429.24 (8)		—	
$\gamma_{13,3}$	1439.16 (4)	0.76 (4)	—	0.78 (4) ⁺
$\gamma_{14,3}$	1453.72 (4)	1.15 (6)	—	1.09 (6) ⁺
—	1457 ^φ	—	—	—
$\gamma_{44,18}$	1461.4 (20)	—	—	0.18 (4)

E_γ (keV)		P_γ (keV)		
		1974Na17	1975VyZX	Recommended
		$P_\gamma^{rel \ast}$	$P_\gamma^{rel \ast}$	$P_\gamma^{rel \ast}$
$\gamma_{18,5}$	1471.09 (6)	3.20 (14)	—	3.14 (14) ⁺
—	1489 (1) [§]	—	—	—
$\gamma_{31,11}$	1504.6 (5)	0.13 (8)	—	0.12 (5) ⁺
$\gamma_{13,2}$	1533.01 (4)	—	—	0.08 (5)
$\gamma_{43,17}$	1536.1 (7)	—	—	0.23 (9)
$\gamma_{37,13}$	1560.2 (5)	0.59 (3)	—	0.60 (3) ⁺
—	1566 (1) ^ϕ	—	—	—
$\gamma_{7,1}$	1568.096 (10)	1.21 (6)	—	1.28 (6) ⁺
—	1585 ^ϕ	—	—	—
$\gamma_{8,1}$	1611.434 (13)	0.30 (3)	—	0.30 (3) ⁺
$\gamma_{15,3}$	1642.0 (20)	—	—	0.18 (6)
$\gamma_{33,10}$	1655.2 (2)	0.16 (3)	—	0.16 (3)
$\gamma_{20,5}$	1662.56 (7)	—	—	0.19 (7)
$\gamma_{22,6}$	1671.73 (8)	0.23 (2)	—	0.23 (2) ⁺
—	1689.5 (10) ^θ	—	—	—
$\gamma_{27,8}$	1742.4 (10)	0.16 (2)	—	0.16 (2) ⁺
$\gamma_{22,5}$	1770.42 (8)	) 0.32 (3)	—	) 0.33 (3) ⁺
$\gamma_{35,10}$	1770.5 (4)		—	
$\gamma_{6,0}$	1787.625 (8)	0.69 (4)	—	0.74 (4) ⁺
$\gamma_{28,7}$	1801.9 (6)	0.04 (2)	—	0.04 (2)
$\gamma_{9,1}$	1815.1 (6)	0.20 (2)	—	0.20 (2)
$\gamma_{25,6}$	1834.6 (20)	0.39 (2)	—	0.26 (13) ⁺
$\gamma_{17,3}$	1853.58 (4)	19.3 (10)	—	19.7 (10) ⁺
$\gamma_{10,1}$	1869.968 (12)	0.19 (2)	—	0.19 (2) ⁺
—	1873 (1) ^θ	—	—	—
$\gamma_{26,6}$	1881.9 (10)	—	—	0.18 (6)
$\gamma_{39,11}$	1901 (2)	—	—	0.16 (6)
$\gamma_{18,3}$	1943.89 (6)	0.53 (3)	—	0.64 (11) ⁺
—	1946 ^ϕ	—	—	—
$\gamma_{11,1}$	1955.534 (14)	0.33 (3)	—	0.40 (7) ⁺
$\gamma_{43,12}$	1975.0 (9)	0.03 (1)	—	0.15 (12) ⁺
$\gamma_{44,12}$	1990.7 (21)	—	—	0.11 (4)
—	1997 (1) ^θ	—	—	—
$\gamma_{34,7}$	2045.9 (9)	0.24 (2)	—	0.24 (2)
$\gamma_{12,1}$	2071.7 (5)	0.07 (4)	—	0.36 (30) ⁺

E_γ (keV)		P_γ (keV)		
		1974Na17	1975VyZX	Recommended
		$P_\gamma^{rel \ast}$	$P_\gamma^{rel \ast}$	$P_\gamma^{rel \ast}$
$\gamma_{36,7}$	2082 (1)	—	—	0.16 (5)
$\gamma_{13,1}$	2096.19 (4)	1.77 (10)	—	1.83 (10) ⁺
$\gamma_{14,1}$	2110.75 (4)	3.20 (16)	—	3.33 (16) ⁺
$\gamma_{7,0}$	2127.183 (8)	0.19 (2)	—	0.28 (9) [≠]
$\gamma_{20,3}$	2135.36 (7)	1.17 (7)	—	1.25 (7) ⁺
$\gamma_{-1,2}$	2170.0 (20) ^Δ	—	—	0.13 (5)
$\gamma_{8,0}$	2170.521 (12)	—	—	E0 transition
$\gamma_{29,6}$	2183.0 (4)	0.19 (5)	—	0.17 (4) ⁺
$\gamma_{20,2}$	2229.22 (7)	0.05 (1)	—	0.14 (9) [≠]
$\gamma_{-1,3}$	2235.0 (20) ^Δ	—	—	0.18 (8)
$\gamma_{15,1}$	2299.0 (20)	—	—	0.19 (6)
$\gamma_{30,5}$	2309.4 (10)	0.10.(1)	—	0.14 (4) [≠]
$\gamma_{23,3}$	2340.27 (8)	—	—	0.12 (5)
—	2389 ^Φ	—	—	—
$\gamma_{16,1}$	2391.39 (5)	6.18 (35)	—	6.4 (4) ⁺
$\gamma_{35,6}$	2412.0 (4)	0.04 (1)	—	0.04 (1)
$\gamma_{10,0}$	2429.053 (11)	0.08 (4)	—	0.14 (6) [≠]
$\gamma_{24,2}$	2481.76 (8)	0.15 (2)	—	0.18 (3) [≠]
$\gamma_{17,1}$	2510.61 (4)	2.49 (15)	—	2.60 (15) ⁺
$\gamma_{26,2}$	2547.2 (10)	0.008 (5)	—	0.008 (5)
—	2555 (2) ⁰	—	—	—
$\gamma_{18,1}$	2600.92 (6)	0.92 (4)	—	0.93 (4) ⁺
$\gamma_{12,0}$	2630.8 (5)	—	—	0.17 (5)
$\gamma_{13,0}$	2655.27 (4)	0.24 (2)	—	0.23 (2) ⁺
$\gamma_{31,4}$	2688.3 (5)	0.48 (5)	—	0.48 (5)
$\gamma_{28,3}$	2712.9 (6)	—	—	0.10 (3)
$\gamma_{29,3}$	2754.4 (4)	—	—	0.10 (3)
$\gamma_{20,1}$	2792.38 (7)	7.30 (36)	—	7.5 (4) ⁺
$\gamma_{-1,4}$	2837.0 (30) ^Δ	—	—	0.15 (6)
$\gamma_{32,3}$	2848 (4)	—	—	0.20 (6)
—	2890 (2) [§]	—	—	—
$\gamma_{22,1}$	2900.24 (8)	0.50 (3)	—	0.37 (13) ⁺
—	2947 (2) ^Φ	—	—	—
$\gamma_{16,0}$	2950.47 (5)	10.50 (51)	—	10.0 (5) ⁺
$\gamma_{35,3}$	2983.4 (4)	—	—	0.12 (4)

E_γ (keV)	P_γ (keV)		
	1974Na17	1975VyZX	Recommended
	$P_\gamma^{rel \ast}$	$P_\gamma^{rel \ast}$	$P_\gamma^{rel \ast}$
— 2990 (2) §	—	—	—
$\gamma_{23,1}$ 2997.30 (8)	1.31 (3)	1.1 (1)	1.29 (3) ⁺
$\gamma_{24,1}$ 3044.91 (8)	0.03 (1)	—	0.03 (1)
$\gamma_{25,1}$ 3063.0 (20)	—	—	0.10 (3)
$\gamma_{17,0}$ 3069.68 (4)	—	—	0.06 (2)
$\gamma_{37,2}$ 3093.1 (2)	0.22 (2)	—	0.22 (2)
$\gamma_{18,0}$ 3160.00 (6)	0.19 (2)	0.21 (8)	0.19 (2) ⁺
$\gamma_{20,0}$ 3351.46 (7)	0.35 (2)	0.33 (5)	0.34 (2) ⁺
— 3356 (3) ¶	—	—	—
$\gamma_{28,1}$ 3369.9 (6)	0.14 (1)	0.09 (2)	0.13 (1) ⁺
$\gamma_{29,1}$ 3411.4 (4)	0.40 (2)	0.37 (8)	0.40 (2) ⁺
$\gamma_{32,1}$ 3505 (4)	—	0.04 (2)	0.05 (2) ⁺
$\gamma_{33,1}$ 3525.1 (2)	0.25 (2)	0.23 (2)	0.24 (2) ⁺
$\gamma_{24,0}$ 3603.99 (8)	2.18 (15)	2.0 (2)	2.16 (15) ⁺
— 3625 (5) ⁰	—	—	—
$\gamma_{35,1}$ 3640.4 (4)	0.23 (2)	0.16 (4)	0.21 (2) ⁺
— 3860 (5) ⁰	—	—	—
$\gamma_{40,1}$ 3877.7 (10)	—	—	0.02 (1)
$\gamma_{-1,5}$ 3892.0 (20) ^Δ	0.02 (1)	—	0.04 (2) [≠]
$\gamma_{27,0}$ 3912.9 (10)	0.02 (1)	—	0.02 (1)
$\gamma_{28,0}$ 3929.0 (6)	0.12 (2)	0.12 (3)	0.12 (2) ⁺
— 3940 (5) ⁰	—	—	—
$\gamma_{-1,6}$ 3963.5 (10) ^Δ	0.03 (1)	0.04 (2)	0.03 (1) ⁺
$\gamma_{29,0}$ 3970.5 (4)	0.008 (3)	—	0.014 (6) [≠]
— 4010 (5) ⁰	—	—	—
$\gamma_{31,0}$ 4019.2 (5)	0.09 (2)	0.07 (2)	0.08 (2) ⁺
— 4030 (5) ⁰	—	—	—
$\gamma_{43,1}$ 4046.6 (7)	0.06 (2)	0.08 (2)	0.06 (2) ⁺
$\gamma_{32,0}$ 4064 (4)	—	—	0.03 (1)
$\gamma_{33,0}$ 4084.2 (2)	—	0.02 (1)	0.02 (1)
— 4140 (5) ⁰	—	—	—
$\gamma_{34,0}$ 4173.0 (9)	0.03 (1)	0.025 (10)	0.028 (10) ⁺
— 4420 (5) ⁰	—	—	—
$\gamma_{40,0}$ 4436.8 (10)	0.08 (5)	0.06 (2)	0.07 (2) ⁺
$\gamma_{41,0}$ 4454.9 (30)	—	0.009 (3)	0.009 (3)

E_γ (keV)		P_γ (keV)		
		1974Na17	1975VyZX	Recommended
		P_γ^{rel*}	P_γ^{rel*}	P_γ^{rel*}
$\gamma_{42.0}$	4492 (3)	—	0.008 (3)	0.008 (3)
—	4570 (5) [†]	—	—	—
$\gamma_{43.0}$	4605.7 (7)	0.03 (1)	0.02 (1)	0.02 (1) ⁺

[†] Emission probabilities expressed relative to P_γ for 511-keV annihilation radiation of 200%.

[‡] Emission probabilities listed as a combination of individual and groups of gamma rays.

[#] Relative and absolute gamma-ray emission probabilities adopted from ENSDF (1998) when updated by 1974HeYW in 1998.

^{*} Emission probabilities expressed relative to P_γ (559.10 keV) defined as 100.

[▲] Unobserved, but introduced to ensure necessary and complete depopulation of the 1330.860-keV level to the 1216.147-keV level ($4^+ \rightarrow 2^+$).

[■] Relative emission probabilities adopted from the measurements of 1974MuZB with only estimated uncertainties assigned.

⁺ Weighted-mean analysis of selected relative emission probabilities – when necessary, the recommended uncertainty has been adjusted to be in alignment with the smallest uncertainty of the values used to calculate the weighted mean.

[≠] Unweighted-mean analysis of selected relative emission probabilities.

[¶] Rejected although observed by 1974MuZB – no evidence of such an emission found in any of the other spectroscopic studies.

^ϕ Rejected although observed by 1969Dz01 and/or 1971Dz08 – no evidence of such an emission found in any of the other spectroscopic studies.

^θ Judged to be unobserved from the gamma-ray measurements of 1971La01 (< 0.3% relative emission probability) and all of the other spectroscopic studies.

[§] Rejected although observed by 1971La01 – no evidence of such an emission found in any of the other spectroscopic studies.

[◇] Determined by calculation of the ratios of the relative emission probabilities of equivalent depopulating gammas within neighbouring nuclear levels.

[×] P_γ (922.44 keV) of 0.19 adopted from measurements of 1971Dz08, with an uncertainty of ± 0.02 corresponding to that determined for the relative P_γ (563.18 keV) of 5.3 (4) by 1971Dz08; relative P_γ (922.44 keV) re-defined as 0.26 (2) relative to P_γ (559.10 keV) defined as 100.

^Δ Unplaced in proposed decay scheme.

SP Possible sum peak of 559.1 + 511 = 1070.1 keV

SE Possible single escape peak of 1853.6 – 511 = 1342.6 keV.

Weighted-mean analyses of the measured relative emission probabilities were carried out when judged appropriate. Considerably more detail can be found within the gamma-ray measurements of Dzhelepov *et al.* (1969Dz01, 1971Dz08), Nagahara *et al.* (1974Na17) and Vylov, Dzhelepov *et al.* (1975VyZX), with some additional guidance taken from the studies of Müller *et al.* (1974MuZB) to which no uncertainties had originally been assigned.

Multipolarities, Internal Conversion and Internal-Pair Coefficients

The nuclear level scheme specified by Balraj Singh was used to define the multipolarities of the gamma transitions on the basis of known spins-parities (1995Si03). Studies of the γ - γ angular correlation coefficients, nuclear orientation and mixing ratios for specific gamma-ray emissions in the β^- decay of ⁷⁶As to particular nuclear levels of ⁷⁶Se support the proposed transition types for the 571.50-, 657.04-, 740.13-, 771.75-, 867.66-, 882.22-, 1129.85-, 1212.94-, 1228.54-, 1439.16-, 1453.72-, 1869.97-, 2096.19- and 2110.7-keV gamma rays (1976Ba15, 1980Ka36, 1987Su05 and 1989Za03). These measurements also provided evidence for the spins and parities of various nuclear levels of ⁷⁶Se, most notably for the 2655.32- and 2669.88-keV levels of 1⁽⁻⁾ and 2⁽⁻⁾, respectively. A number of definitive and possible (M1 + E2) gamma transitions judged to be of reasonable importance in the derivation of the ⁷⁶Br decay scheme were arbitrarily assigned multipolarities of (50% M1 + 50% E2) – i.e. gamma rays with energies of 210.1, 281, 281.4, 309.4, 318.0, 358.10, 401.01, 438.25, 472.81, 599.8, 605, 635.2, 727.01, 1380.78, 1471.09, 1568.10, 1853.58, 2135.36, 2391.39, 2510.61, 2792.38, 2950.47, 2997.30 and 3603.99 keV.

E0 and E2 + M1 (+ E0) gamma transitions were assigned within the proposed decay scheme:

E_γ (keV)	Transition type	Comments
657.042 (9)	E2 + M1 (+ E0)	$\delta = +5.2$ (2) as determined by (1976Ba15, 1989Za03) → defined as (96.43% M1 + 3.57% E2), with $\alpha_{\text{total}} = 0.001\,226$ (18) and relative TP of 21.6 (4) % that depopulates the 1216.147-keV nuclear level of ⁷⁶ Se (2+)
1122.274 (7)	E0	absolute γ transition probability of 0.000 82% (1986Gi12) originating the 1122.283-keV nuclear level of ⁷⁶ Se (0+)
2170.521 (12)	(E0)	2170.0(20)-keV γ ray observed with relative $P_\gamma = 0.13$ (5) % cannot be an E0 transition – defined as unplaced; therefore, an additional 2170.521 (12)-keV γ proposed as an E0 transition with relative TP_γ of 0.61 (10) % to balance population-depopulation of the 2170.554-keV nuclear level of ⁷⁶ Se ((0+))

Measured mixing ratios and multipolarities of gamma-ray emissions of ⁷⁶As β^- decay to equivalent nuclear levels of ⁷⁶Se.

E_γ (keV)	δ				
	1976Ba15	1980Ka36	1987Su05	1989Za03	Adopted
571.50	–	–	> 1.37 or -0.13 (34)	$+0.13$ (12)	$+0.13$ (12) → 98.3% M1 + 1.7% E2
657.04	$+5.2$ (2)	4.4 (5)	$+4.15$ (20)	$+5.3$ (5)	$+5.2$ (2) → 96.43% M1 + 3.57% E2 (+ E0)
740.13	–	–	$+0.08$ (16)	-0.21 (12)	-0.21 (12) → 95.8% E1 + 4.2% M2
771.75	–	–	–	$+0.01$ (1)	E2
867.66	–	–	$0.38^{+0.57}_{-0.28}$	$+0.08$ (7)	$+0.08$ (7) → (E1)
882.22	–	–	$-0.24 < \delta < 5.3$	$+0.26$ (15)	$+0.26$ (15) → 93.7% E1 + 6.3% M2
980.91	–	–	$+0.24 > \delta > +16.4$	–	E1
1129.85	–	–	$+0.57 < \delta < +3.55$	$+1.08$ (10)	$+1.08$ (10) → 53.8% E2 + 46.2% M1
1212.94	–	–	$+0.11$ (10)	$+0.025$ (20)	E1
1228.54	-0.49 (5)	0.43 (6)	-0.53 (8)	-0.54 (10)	-0.51 (5) [§] → 79.4% M1 + 20.6% E2
1439.16	–	0.12 (16)	-0.02 (10)	$+0.01$ (3)	(E1)
1453.72	–	–	-0.11 (12)	$+0.05$ (2)	E1
1869.97	–	–	$+0.002$ (76)	–	E1
2096.19	–	pure E1	0.00 (8)	$+0.02$ (6)	(E1)
2110.75	–	0.05 (5)	-0.02 (16)	-0.09 (2)	E1

[§] Weighted mean of 1976Ba15, 1987Su05 and 1989Za03, with an uncertainty adjusted from ± 0.04 to ± 0.05 to align with the smallest uncertainty of the values used to calculate the weighted mean value.

Recommended internal conversion coefficients have been determined from the frozen orbital approximation of Kibédi *et al.* (2008Ki07), based on the theoretical model of Band *et al.* (2002Ba85, 2002Ra45). A significant number of gamma transitions undergo decay via internal-pair formation, and the coefficient for this process has also been quantified in a few cases from the tabulations of 2008Ki07.

Gamma-ray emissions: multipolarities, and theoretical internal-conversion and internal-pair formation coefficients (frozen orbital approximation).

E_γ(keV)	Multipolarity	α_K	α_L	α_{M+}	α_{totalICC}	α_{IPF}	α_{total}
114.7 (1)	E2	0.434 (7)	0.0573 (9)	0.0097	0.501 (8)	–	0.501 (8)
210.1 (10)	[50% M1 + 50% E2] δ = 1.0 (2)	0.030 (4)	0.0034 (5)	0.00060	0.034 (5)	–	0.034 (5)
281 (1)	[50% M1 + 50% E2] δ = 1.0 (2)	0.0113 (12)	0.00125 (14)	0.00021	0.0128 (14)	–	0.0128 (14)
281.4 (2)	[50% M1 + 50% E2] δ = 1.0 (2)	0.0113 (12)	0.00125 (14)	0.00019	0.0127 (13)	–	0.0127 (13)
309.4 (4)	[50% M1 + 50% E2] δ = 1.0 (2)	0.0083 (8)	0.00091 (9)	0.00016	0.0094 (9)	–	0.0094 (9)
318.0 (10)	[50% M1 + 50% E2] δ = 1.0 (2)	0.0076 (7)	0.00084 (8)	0.00014	0.0086 (8)	–	0.0086 (8)
358.101 (11)	50% M1 + 50% E2 δ = 1.0 (2)	0.0053 (5)	0.00057 (5)	0.00013	0.0059 (5)	–	0.0059 (5)
399.87 (6)	E1	0.001307 (19)	0.0001363 (19)	0.0000227	0.001466 (21)	–	0.001466 (21)
401.01 (9)	(50% M1 + 50% E2) δ = 1.0 (2)	0.0038 (3)	0.00041 (3)	0.00006	0.0042 (3)	–	0.0042 (3)
438.252 (11)	(50% M1 + 50% E2) δ = 1.0 (2)	0.00290 (18)	0.000311 (21)	0.000052	0.00326 (21)	–	0.00326 (21)
456.787 (11)	E2	0.00324 (5)	0.000351 (5)	0.000059	0.00365 (6)	–	0.00365 (6)
472.813 (10)	50% M1 + 50% E2 δ = 1.0 (2)	0.00233 (13)	0.000250 (15)	0.000050	0.00263 (15)	–	0.00263 (15)
490.19 (7)	[E1]	0.000778 (11)	0.0000809 (12)	0.000013	0.000872 (13)	–	0.000872 (13)
499.33 (4)	(M2)	0.00500 (7)	0.000546 (8)	0.000094	0.00564 (8)	–	0.00564 (8)
504.75 (8)	[E1]	0.000723 (11)	0.0000753 (11)	0.0000127	0.000811 (12)	–	0.000811 (12)
546.5 (5)						–	
559.100 (5)	E2	0.001747 (25)	0.000187 (3)	0.000036	0.00197 (3)	–	0.00197 (3)
563.179 (9)	E2	0.001710 (24)	0.000183 (3)	0.000027	0.00192 (3)	–	0.00192 (3)
571.499 (11)	98.3% M1 + 1.7% E2 δ = + 0.13 (12)	0.00115 (3)	0.000120 (3)	0.000020	0.00129 (3)	–	0.00129 (3)
599.8 (10)	[50% M1 + 50% E2] δ = 1.0 (2)	0.00122 (5)	0.000129 (6)	0.000022	0.00137 (6)	–	0.00137 (6)
605 (4)	[50% M1 + 50% E2] δ = 1.0 (2)	0.00120 (5)	0.000127 (6)	0.000021	0.00134 (6)	–	0.00134 (6)
635.2 (8)	(50% M1 + 50% E2) δ = 1.0 (2)	0.00105 (4)	0.000111 (5)	0.000019	0.00118 (5)	–	0.00118 (5)
641.444 (14)	E1	0.000410 (6)	0.0000426 (6)	0.0000074	0.000460 (7)	–	0.000460 (7)

657.042 (9)	96.43% E2 + 3.57% M1 (+ E0) $\delta = + 5.2$ (2)	0.001090 (16)	0.0001159 (17)	0.0000201	0.001226 (18)	–	0.001226 (18)
665.362 (11)	E2	0.001062 (15)	0.0001128 (16)	0.000019	0.001194 (17)	–	0.001194 (17)
681.66 (8)	E1	0.000358 (5)	0.0000371 (6)	0.0000059	0.000401 (6)	–	0.000401 (6)
696.22 (8)	(E1)	0.000342 (5)	0.0000354 (5)	0.0000056	0.000383 (6)	–	0.000383 (6)
727.011 (15)	(50% M1 + 50% E2) $\delta = 1.0$ (2)	0.000751 (21)	0.0000790 (24)	0.000014	0.000844 (24)	–	0.000844 (24)
730.98 (6)	[E1]	0.000307 (5)	0.0000318 (5)	0.0000052	0.000344 (5)	–	0.000344 (5)
740.129 (13)	95.8% E1 + 4.2% M2 $\delta = - 0.21$ (12)	0.00036 (8)	0.000037 (9)	0.0000030	0.00040 (9)	–	0.00040 (9)
771.754 (10)	E2	0.000712 (10)	0.0000752 (11)	0.000013	0.000800 (12)	–	0.000800 (12)
789.52 (9)	(E1)	0.000261 (4)	0.0000270 (4)	0.0000040	0.000292 (4)	–	0.000292 (4)
796.351 (11)	(E2)	0.000656 (10)	0.0000693 (10)	0.000012	0.000737 (11)	–	0.000737 (11)
804.08 (9)	(E1)	0.000251 (4)	0.0000260 (4)	0.0000040	0.000281 (4)	–	0.000281 (4)
812.1 (8)						–	
836.88 (7)	(M1 + E2)					–	
838.3 (10)						–	
867.66 (4)	(E1)	0.000215 (3)	0.0000222 (4)	0.0000028	0.000240 (4)	–	0.000240 (4)
882.22 (4)	93.7% E1 + 6.3% M2 $\delta = + 0.26$ (15)	0.00026 (7)	0.000027 (8)	0.0000030	0.00029 (8)	–	0.00029 (8)
886.57 (9)						–	
899.19 (4)						–	
901.13 (9)						–	
911.062 (11)	(M1 + E2)					–	
922.44 (7)						–	
934.19 (9)	E1	0.000185 (3)	0.0000191 (3)	0.0000032	0.000207 (3)	–	0.000207 (3)
936 (3)						–	
941.8 (5)						–	
942.53 (4)	(M1 + E2)					–	
980.91 (4)	E1	0.0001682 (24)	0.00001736 (25)	0.0000030	0.000189 (3)	–	0.000189 (3)
1030.30 (8)	(E1)	0.0001531 (22)	0.00001579 (23)	0.0000027	0.0001716 (24)	–	0.0001716 (24)
1032.85 (6)							
1039.5 (4)							
1060 (1)							
1122.274 (7)	E0						
1129.851 (9)	53.8% E2 + 46.2% M1 $\delta = + 1.08$ (10)	0.000275 (4)	0.0000286 (5)	0.0000044	0.000308 (4)	0.00000157 (4)	0.000309 (5)
1146.4 (7)	(M1 + E2)						
1158.1 (5)							

1162.87 (5)	M1 + E2						
1180.98 (7)							
1193.1 (20)							
1212.938 (13)	E1	0.0001134 (16)	0.00001167 (17)	0.0000019	0.0001270 (16)	0.0000548 (8)	0.000182 (3)
1216.137 (7)	E2	0.000241 (4)	0.0000251 (4)	0.0000039	0.000270 (4)	0.00001090 (16)	0.000281 (4)
1224.32 (7)	(M1 + E2)						
1228.535 (10)	79.4% M1 + 20.6% E2 $\delta = -0.51$ (5)	0.000226 (4)	0.0000234 (4)	0.0000036	0.000253 (4)	0.00001041 (18)	0.000264 (4)
1254.3 (7)	(M1 + E2)						
1270.9 (20)	(M1 + E2)						
1282.09 (4)	(M1 + E2)						
1288.84 (8)	(E2)	0.000213 (3)	0.0000221 (3)	0.0000029	0.000238 (3)	0.0000254 (4)	0.000264 (4)
1298.504 (15)	(M1 + E2)						
1300.7 (4)	(E1)	0.0001002 (14)	0.00001031 (15)	0.0000018	0.0001123 (15)	0.0001141 (17)	0.000226 (4)
1306.800 (13)	E3	0.000388 (6)	0.0000411 (6)	0.0000069	0.000436 (6)	0.00000838 (12)	0.000445 (7)
1315.3 (4)	(E1)	0.0000983 (14)	0.00001011 (15)	0.0000017	0.0001101 (14)	0.0001237 (18)	0.000234 (4)
1324.45 (4)	(E3)	0.000376 (6)	0.0000397 (6)	0.0000066	0.000422 (6)	0.00000993 (14)	0.000432 (6)
1372.41 (6)							
1380.78 (4)	[50% M1 + 50% E2] $\delta = 1.0$ (2)	0.000181 (3)	0.0000187 (3)	0.0000033	0.000203 (3)	0.0000422 (14)	0.000245 (4)
1429.0 (2)							
1429.24 (8)							
1439.16 (4)	(E1)	0.0000843 (12)	0.00000867 (13)	0.0000016	0.0000945 (12)	0.000205 (3)	0.000299 (5)
1453.72 (4)	E1	0.0000829 (12)	0.00000852 (12)	0.0000015	0.0000929 (12)	0.000215 (3)	0.000308 (5)
1461.4 (20)							
1471.09 (6)	[50% M1 + 50% E2] $\delta = 1.0$ (2)	0.0001592 (23)	0.00001647 (24)	0.0000028	0.0001784 (23)	0.0000671 (20)	0.000245 (5)
1504.6 (5)							
1533.01 (4)	(E1)	0.0000760 (11)	0.00000780 (11)	0.0000013	0.0000851 (11)	0.000277 (4)	0.000362 (5)
1536.1 (7)	(M1 + E2)						
1560.2 (5)	(E1)	0.0000738 (11)	0.00000758 (11)	0.0000013	0.0000827 (11)	0.000299 (5)	0.000381 (6)
1568.096 (10)	(50% M1 + 50% E2) $\delta = 1.0$ (2)	0.0001404 (20)	0.00001451 (21)	0.0000025	0.0001574 (21)	0.000101 (3)	0.000259 (5)
1611.434 (13)	(E2)	0.0001348 (19)	0.00001394 (20)	0.0000024	0.0001511 (19)	0.0001309 (19)	0.000282 (4)
1642.0 (20)							
1655.2 (2)							
1662.56 (7)							
1671.73 (8)	(M1 + E2)						

1742.4 (10)							
1770.42 (8)	(M1 + E2)						
1770.5 (4)							
1787.625 (8)	E2	0.0001103 (16)	0.00001139 (16)	0.0000019	0.0001236 (16)	0.000209 (3)	0.000333 (5)
1801.9 (6)							
1815.1 (6)							
1834.6 (20)							
1853.58 (4)	(50% M1 + 50% E2) $\delta = 1.0$ (2)	0.0001022 (15)	0.00001053 (15)	0.0000018	0.0001145 (15)	0.000219 (6)	0.000334 (7)
1869.968 (12)	E1	0.0000555 (8)	0.00000568 (8)	0.0000009	0.0000621 (8)	0.000535 (8)	0.000597 (9)
1881.9 (10)							
1901 (2)							
1943.89 (6)							
1955.534 (14)	(M1 + E2)						
1975.0 (9)							
1990.7 (21)							
2045.9 (9)							
2071.7 (5)							
2082 (1)							
2096.19 (4)	(E1)	0.0000467 (7)	0.00000478 (7)	0.0000009	0.0000523 (7)	0.000697 (10)	0.000749 (11)
2110.75 (4)	E1	0.0000462 (7)	0.00000473 (7)	0.0000008	0.0000517 (7)	0.000707 (10)	0.000759 (11)
2127.183 (8)	(E2)	0.0000800 (12)	0.00000824 (12)	0.0000014	0.0000897 (12)	0.000372 (6)	0.000461 (7)
2135.36 (7)	(50% M1 + 50% E2) $\delta = 1.0$ (2)	0.0000789 (12)	0.00000812 (12)	0.0000014	0.0000884 (12)	0.000349 (8)	0.000438 (9)
2170.0 (20)							
2170.521 (12)	(E0)						
2183.0 (4)	(M1 + E2)						
2229.22 (7)							
2235.0 (20)							
2299.0 (20)							
2309.4 (10)							
2340.27 (8)							
2391.39 (5)	50% M1 + 50% E2 $\delta = 1.0$ (2)	0.0000646 (10)	0.00000663 (10)	0.0000011	0.0000723 (10)	0.000469 (10)	0.000541 (11)
2412.0 (4)							
2429.053 (11)	E3	0.0000991 (14)	0.00001026 (15)	0.0000017	0.0001111 (14)	0.000326 (5)	0.000437 (7)
2481.76 (8)							
2510.61 (4)	(50% M1 + 50% E2) $\delta = 1.0$ (2)	0.0000593 (9)	0.00000609 (9)	0.0000011	0.0000665 (9)	0.000524 (11)	0.000590 (11)

2547.2 (10)							
2600.92 (6)							
2630.8 (5)							
2655.27 (4)	(E1)	0.0000333 (5)	0.00000340 (5)	0.0000005	0.0000372 (5)	0.001049 (15)	0.001087 (16)
2688.3 (5)							
2712.9 (6)							
2754.4 (4)	(M1 + E2)						
2792.38 (7)	(50% M1 + 50% E2) $\delta = 1.0$ (2)	0.0000495 (7)	0.00000508 (8)	0.0000008	0.0000554 (7)	0.000651 (13)	0.000706 (13)
2837.0 (30)							
2848 (4)							
2900.24 (8)	(M1 + E2)						
2950.47 (5)	[50% M1 + 50% E2] $\delta = 1.0$ (2)	0.0000452 (7)	0.00000463 (7)	0.0000008	0.0000506 (7)	0.000719 (13)	0.000770 (14)
2983.4 (4)							
2997.30 (8)	[50% M1 + 50% E2] $\delta = 1.0$ (2)	0.0000440 (7)	0.00000451 (7)	0.0000008	0.0000493 (7)	0.000739 (14)	0.000789 (14)
3044.91 (8)	(M1 + E2)						
3063.0 (20)							
3069.68 (4)							
3093.1 (2)							
3160.00 (6)							
3351.46 (7)							
3369.9 (6)							
3411.4 (4)	(M1 + E2)						
3505 (4)							
3525.1 (2)							
3603.99 (8)	[50% M1 + 50% E2] $\delta = 1.0$ (2)	0.0000326 (5)	0.00000334 (5)	0.0000007	0.0000366 (5)	0.000981 (17)	0.001018 (17)
3640.4 (4)							
3877.7 (10)							
3892.0 (20)							
3912.9 (10)							
3929.0 (6)							
3963.5 (10)							
3970.5 (4)							
4019.2 (5)							
4046.6 (7)	(M1 + E2)						
4064 (4)							

4084.2 (2)							
4173.0 (9)							
4436.8 (10)							
4454.9 (30)							
4492 (3)							
4605.7 (7)							

Measured conversion-electron emission probabilities |(1970Dz09).

	P_{ce}^{rel} (%)
K (559 keV)	100
K (657 keV)	18 (1)
L (657 keV)	4.3 (8)
K (1213 + 1216 keV)	3.3 (5)
L (1213 + 1216 keV)	1.2 (3)
K (1853 keV)	1.1 (2)
K (2392 keV)	0.27 (9)
K (2508 keV)	0.13 (3)
K (2792 keV)	0.25 (6)
K (2949 keV)	0.36 (7)

Knowing the relative $P_{EC}(\text{total})$ that populates each nuclear level by a combination of EC and β^+ decay, and their theoretical capture-to-positron ratios (1971Go40), relative P_{β^+} values can be determined:

Relative positron emission probabilities calculated from $P_{EC}(\text{total})$ and ϵ/β^+ ratios.

	Nuclear level energy (keV)	Calculated relative $P_{EC}(\text{total})$	ϵ/β^+ (1971Go40)	Relative P_{β^+}
44	4621.5 (20)	0.29 (6)	—	—
43	4605.8 (7)	0.75 (16)	—	—
42	4492 (3)	0.07 (2)	—	—
41	4455.2 (30)	0.009 (3)	—	—
40	4436.9 (10)	0.09 (2)	—	—
39	4416 (2)	0.35 (9)	—	—
38	4328.7 (10)	0.25 (7)	—	—
37	4215.5 (2)	0.82 (4)	—	—
36	4210 (1)	0.32 (6)	—	—
35	4199.6 (4)	0.49 (5)	—	—
34	4173.1 (9)	0.27 (2)	—	—
33	4084.3 (2)	0.68 (5)	—	—
32	4064 (4)	0.58 (12)	—	—
31	4019.3 (5)	0.49 (9)	—	—
30	3998.4 (10)	0.57 (5)	—	—
29	3970.6 (4)	0.86 (7)	—	—
28	3929.1 (6)	0.23 (5)	—	—
27	3913.0 (10)	0.18 (2)	—	—
26	3669.5 (10)	1.00 (25)	147.2	0.0067 (17)
25	3622.2 (20)	0.50 (15)	78.5	0.0063 (19)
24	3604.08 (8)	2.25 (17)	63.8	0.0347 (26)
23	3556.46 (8)	2.12 (10)	38.0	0.0544 (26)
22	3459.40 (8)	2.59 (20)	16.7	0.146 (11)
21	3441.5 (2)	0.14 (4)	14.5	0.009 (3)
20	3351.54 (7)	12.2 (5)	8.00	1.36 (6)
18	3160.07 (6)	7.18 (23)	3.01	1.79 (6)
17	3069.75 (4)	25.4 (4)	2.10	8.19 (13)
16	2950.53 (5)	16.2 (7)	1.37	6.8 (3)
15	2858.1 (20)	0.37 (8)	1.009	0.18 (4)
14	2669.88 (4)	3.20 (21)	0.595	2.01 (13)
13	2655.32 (4)	0.55 (16)	0.571	0.35 (10)
12	2630.8 (5)	0.4 (3)	0.537	0.26 (20)
11	2514.663 (13)	0.5 (3)	0.414	0.35 (21)
10	2429.095 (11)	1.1 (7)	0.346	0.8 (5)
9	2374.2 (6)	0.38 (2)	0.309	0.29 (2)
7	2127.215 (8)	0.31 (17)	0.194	0.26 (14)
6	1787.648 (8)	1.3 (5)	0.114	1.2 (5)
5	1688.962 (7)	1.0 (5)	0.188	0.8 (4)
3	1216.147 (7)	2.6 (14)	0.0559	2.5 (13)
2	1122.283 (7)	2.9 (8)	0.0502	2.8 (8)
1	559.102 (5)	35.8 (12)	0.0292	34.8 (12)
		Σ 127.3 (26)		Σ 65.0 (22)
0	0.0	7.8 (11)	0.01835	7.7 (11)
		Σ 135.1 (28)		Σ 72.7 (25)

The common normalisation factor for the relative transition and emission probabilities of the EC, positron and γ -ray transitions and emissions can be determined via a number of alternative routes:

- (a). 1971Dz08: adoption of a relative emission probability of 145.2 (50) % for the γ^\pm annihilation radiation as determined from the measurements by Dzhelepov *et al.* of 146 (7) % (1969Dz01) and 145.2 (50) % (1971Dz08). Consider all EC/ β^+ transitions that can be identified with β^+ decay:

$$\text{since } X_i = EC_i + \beta_i^+ = \beta_i^+(1 + r_i)$$

$$\text{and } \beta_i^+ = X_i/(1 + r_i)$$

$$2 \left[X_0/(1 + r_0) + \sum X_i/(1 + r_i) \right] = P_{\gamma^\pm} \quad (1)$$

where X_0 and X_i are the total EC/ β^+ transition probability balances populating the ground and all other i levels, respectively $((\gamma + ce)_{\text{out}} - (\gamma + ce)_{\text{in}})$, and r_0 and r_i are the EC_i/β_i^+ theoretical ratios to the ground and i^{th} levels respectively. Defining X_0 and all other X_i as total relative transition probabilities, and P_{γ^\pm} as the relative emission probability of the annihilation radiation:

$$2 [X_0/1.01835 + 65.0 (22)] = 145.2 (50)$$

$$\text{relative } X_0 = P_{EC_0}^{\text{rel}} + P_{\beta_0^+}^{\text{rel}} = (72.6 (25) - 65.0 (22)) \times 1.01835 = 7.7 \pm 3.3$$

$$\text{and } P_{\beta_0^+}^{\text{rel}} = X_0/1.01835 = 7.6 \pm 3.3$$

Another route can be adopted to determine $P_{\beta_0^+}^{\text{rel}}$ via the positron emission probability ratio $P_{\beta^+}(\text{populating } 0.0 \text{ keV-level})/P_{\beta^+}(\text{populating } 559.102\text{-keV level}) = 0.22 (3)$, as measured by 1971Dz08. Relative $P_{\beta^+}(\text{populating } 559.102\text{-keV level})$ and all other recommended relative P_{β^+} values other than $P_{\beta^+}(\text{populating } 0.0\text{-keV ground state})$ have been determined by balancing the relative total EC transition probability against the relative transition probabilities of the γ rays populating-depopulating the many nuclear levels of ⁷⁶Se, and applying the theoretical capture-to-positron ratio (ϵ/β^+) to the EC branch derived (1971Go40):

$$\text{relative } P_{\beta^+}(\text{populating } 559.102\text{-keV level}) = 34.8 (12)$$

where NF is the normalisation factor to be applied to the relative EC(total), β^+ and γ -ray emission probabilities.

$$\text{Therefore, relative } P_{\beta^+}(\text{populating } 0.0\text{-keV level}) = P_{\beta_0^+}^{\text{rel}} = 0.22 (3) \times 34.8 (12) = 7.7 \pm 1.1$$

$$\text{and } P_{EC}^{\text{rel}} + P_{\beta_0^+}^{\text{rel}} = 7.7(11) \times 1.01835 = 7.8 \pm 1.1$$

The $P_{\beta_0^+}^{\text{rel}}$ and $(P_{EC}^{\text{rel}} + P_{\beta_0^+}^{\text{rel}})$ values possessing the lower uncertainties have been adopted.

Consider direct relative EC/ β^+ and γ population of the ground state of ⁷⁶Se:

$$\left[X_0 + \sum P_{\gamma i}(\gamma + ce) \text{ directly to ground state} \right] \times NF = 100 \quad (2)$$

where $P_{\gamma i}$ is the relative γ transition probability of the i^{th} gamma ray directly populating the ground state of ⁷⁶Se, and NF is the common normalization factor for the relative transition and emission probabilities of all EC, positrons and γ rays. Thus:

$$\left[7.8 (11) + 127.3 (6) \right] \times NF = 100$$

$$NF = 100/135.1 (13) = 0.740 \pm 0.007$$

These data exhibit excellent agreement with the relative emission probabilities of the 511-keV annihilation radiation and 559.100-keV γ ray as measured by Dzhelepov *et al.* (1971Dz08):

$$P_\gamma(511 \text{ keV}) / P_\gamma(559.100 \text{ keV}) = 1452 (50) / 1000 = 1.45 (5) \text{ from } 1971\text{Dz08}$$

Equivalent value derived with NF of 0.740 (7):

$$P_\gamma(511 \text{ keV}) = 108 (4), \text{ and } P_\gamma(559.100 \text{ keV}) = 100 \times 0.740 (7) = 74.0 (7)$$

$$\text{Therefore, } P_\gamma(511 \text{ keV}) / P_\gamma(559.100 \text{ keV}) = 108 (4) / 74.0 (7) = 1.46 (6)$$

- (b). Summation of all absolute EC/ β^+ transition probabilities to equal 100% – resulting normalisation factor is in agreement with the value determined above ((a)), but is approximately 8% lower than the value determined via route (c):

$$\sum (\text{total EC}/\beta^+ \text{ transition probabilities populating all nuclear levels of } ^{76}\text{Se}) = 100$$

$$135 (4) \times NF = 100$$

$$NF = 100 / 135.1 (28) = 0.740 \pm 0.015$$

- (c). Measurements of the positron emission probability ratio $P_{\beta^+}(0.0 \text{ keV})/P_{\beta^+}(559.102 \text{ keV})$ by Dzhelepov *et al.* (1971Dz08) and total absolute positron branch determined by Qaim *et al.* (2007Qa02):

Positron emission probability ratio $P_{\beta^+}(\text{populating } 0.0 \text{ keV-level})/P_{\beta^+}(\text{populating } 559.102\text{-keV level}) = 0.22 (3)$, as measured by 1971Dz08. Relative $P_{\beta^+}(\text{populating } 559.102\text{-keV level})$ and all other recommended relative P_{β^+} values other than $P_{\beta^+}(\text{populating } 0.0\text{-keV ground state})$ have been determined by balancing the relative total EC transition probability against the relative transition probabilities of the γ rays populating-depopulating the many nuclear levels of ⁷⁶Se, and applying the theoretical capture-to-positron ratio (ϵ/β^+) to the EC branch derived (1971Go40):

$$P_{\beta^+}(\text{populating } 559.102\text{-keV level}) = 34.8 (12) \times NF$$

where NF is the normalisation factor to be applied to the relative EC(total), β^+ and γ -ray emission probabilities.

$$\text{Therefore } P_{\beta^+}(\text{populating } 0.0\text{-keV level}) = 0.22 (3) \times 34.8 (12) \times NF = 7.7 (11) NF$$

[$P_{\beta^+}(\text{populating } 0.0\text{-keV level})$ was determined to be $7.6 (33) NF$ from the measured annihilation radiation (see (a), above).]

All evaluated relative positron emission probabilities sum to $72.7 (25) NF$, and should be directly equivalent to the weighted-average of $58.2 (19) \%$ for the absolute total positron branch, as determined by Qaim *et al.* (2007Qa02) from β^+ counting, X-ray spectroscopy and γ -ray spectroscopy studies:

$$\sum \text{relative } P_{\beta^+} = 72.7 (25) NF = 58.2 (19)$$

$$\text{and therefore } NF = 58.2 (19) / 72.7 (25) = 0.80 \pm 0.04$$

Adoption of this value for the normalisation factor results in excellent agreement with the relative emission probabilities of the 511-keV annihilation radiation and 559.100-keV γ ray as measured by Dzhelepov *et al.* (1971Dz08):

$$P_{\gamma}(511 \text{ keV}) / P_{\gamma}(559.100 \text{ keV}) = 1452 (50) / 1000 = 1.45 (5)$$

This ratio agrees with the equivalent value derived with NF of 0.80 (4):

$$P_{\gamma}(511 \text{ keV}) = 2 \times 58.2 (19) = 116 (4), \text{ and } P_{\gamma}(559.100 \text{ keV}) = 100 \times 0.80 (4) = 80 (4)$$

$$P_{\gamma}(511 \text{ keV}) / P_{\gamma}(559.100 \text{ keV}) = 116 (4) / 80 (4) = 1.45 (9)$$

When coupled with the relative γ -ray emission probability data of Dzhelepov *et al.* (1971Dz08), a normalisation factor of 0.740 (7) can be determined that generates an absolute $P_{\gamma}(511\text{-keV})$ emission probability of $108 (4) \%$. Such annihilation radiation represents a total positron branch of only $54 (2) \%$ that compares with a directly measured value of $58.2 (19) \%$ by Qaim *et al.* (2007Qa02). These values are sufficiently different and unresolvable to necessitate an arbitrary and somewhat unsatisfactory adoption of one particular value for the total positron branch. Under these circumstances, a value of $54 (2) \%$ has been selected for the total positron branch on the supportive basis of the comprehensive nature of the discrete gamma-ray emission probabilities and total (EC+ β^+) transition probabilities as determined primarily from the studies of Dzhelepov *et al.* (1969Dz09, 1971Dz08). A value of 0.740 (7) was adopted as the normalisation factor in order to maintain consistency between the large number of discrete γ -ray emission probabilities and EC/ β^+ transition/emission probabilities, and in this manner determine the absolute transition and emission probabilities of the EC, β^+ particles and γ rays from the relative transition and emission probabilities. This situation is regrettable. Further extensive studies are merited to resolve the existing discrepancy between the various γ -ray measurements and the total positron branch determined by Qaim *et al.* (2007Qa02). Both in-depth γ singles and γ - γ coincidence studies would be beneficial along with measurements of the absolute γ -ray emission probabilities to lead on to a more confident determination of the detail of the rather complex decay scheme of ⁷⁶Br.

Thirty-five previously unplaced γ rays have been introduced into the recommended decay scheme which constitutes 42 EC transitions, 24 β^+ emissions and 161 γ -ray transitions. A further six γ rays are judged to be valid, but remain unplaced as far as the proposed decay scheme is concerned (546.5 (5), 2170.0 (20), 2235.0 (20), 2837.0 (30), 3892.0 (20) and 3963.5 (10) keV).

Recommended gamma-ray energies, relative and absolute emission probabilities, and transition probabilities.

E_γ (keV)	P_γ^{rel} (%) [‡]	P_γ^{abs} (%)	Transition probability (%)
$\gamma_{4,3}$ 114.7 (1)	0.45 (14)	0.33 (11)	0.50 (17)
$\gamma_{26,22}$ 210.1 (10)	0.06 (2)	0.044 (15)	0.045 (15)
$\gamma_{36,28}$ 281 (1)	) 0.22 (4)	0.16 (3)	0.120 (23)
$\gamma_{21,18}$ 281.4 (2)		0.06 (3)	0.045 (23)
$\gamma_{38,31}$ 309.4 (4)	0.19 (6)	0.14 (5)	0.14 (5)
$\gamma_{26,20}$ 318.0 (10)	0.18 (6)	0.13 (5)	0.13 (5)
$\gamma_{5,4}$ 358.101 (11)	0.5 (2)	0.37 (15)	0.37 (15)
$\gamma_{17,14}$ 399.87 (6)	) 0.48 (5)	0.07 (2)	0.052 (15)
$\gamma_{20,16}$ 401.01 (9)		0.41 (5)	0.30 (4)
$\gamma_{7,5}$ 438.252 (11)	0.37 (4)	0.27 (3)	0.27 (3)
$\gamma_{6,4}$ 456.787 (11)	0.09 (2)	0.067 (15)	0.067 (15)
$\gamma_{5,3}$ 472.813 (10)	2.59 (10) ⁺	1.92 (8)	1.93 (8)
$\gamma_{18,14}$ 490.19 (7)	0.45 (3) ⁺	0.333 (23)	0.333 (23)
$\gamma_{14,8}$ 499.33 (4)	0.22 (9)	0.16 (7)	0.16 (7)
$\gamma_{18,13}$ 504.75 (7)	0.31 (2) ⁺	0.229 (15)	0.229 (15)
— annihilation radiation	145.2 (50) [§]	108(4)	—
$\gamma_{-1,1}$ 546.5 (5) ^Δ	0.22 (3)	0.163 (23)	0.163 (23)
$\gamma_{1,0}$ 559.100 (5)	100	74.0(7)	74.1 (7)
$\gamma_{2,1}$ 563.179 (9)	4.7 (8) ⁺	3.5 (6)	3.5 (6)
$\gamma_{6,3}$ 571.499 (11)	0.6 (3) ⁺	0.44 (23)	0.44 (23)
$\gamma_{26,17}$ 599.8 (10)	0.57 (23) ⁺	0.42 (17)	0.42 (17)
$\gamma_{32,22}$ 605 (4)	0.30 (10) ⁺	0.22 (8)	0.22 (8)
$\gamma_{43,29}$ 635.2 (8)	0.10 (3)	0.074 (23)	0.074 (23)
$\gamma_{10,6}$ 641.444 (14)	0.19 (5)	0.14 (4)	0.14 (4)
$\gamma_{3,1}$ 657.042 (9)	21.6 (4) ⁺	16.0 (4)	16.0 (4)
$\gamma_{6,2}$ 665.362 (11)	0.96 (10) ⁺	0.71 (8)	0.71 (8)
$\gamma_{20,14}$ 681.66 (8)	0.58 (3) ⁺	0.429 (23)	0.429 (23)
$\gamma_{20,13}$ 696.22 (8)	0.67 (3) ⁺	0.496 (23)	0.496 (23)
$\gamma_{11,6}$ 727.011 (15)	0.9 (3) ⁺	0.67 (23)	0.67 (23)
$\gamma_{18,10}$ 730.98 (6)	0.78 (10) ⁺	0.58 (8)	0.58 (8)
$\gamma_{10,5}$ 740.129 (13)	0.18 (5) ⁺	0.13 (4)	0.13 (4)
$\gamma_{4,1}$ 771.754 (10)	0.56 (3) ⁺	0.414 (23)	0.414 (23)
$\gamma_{22,14}$ 789.52 (9)	0.62 (4) ⁺	0.46 (3)	0.46 (3)
$\gamma_{7,4}$ 796.351 (11)	0.10 (3)	0.074 (23)	0.074 (23)
$\gamma_{22,13}$ 804.08 (9)	0.72 (5) ⁺	0.53 (4)	0.53 (4)
$\gamma_{39,24}$ 812.1 (8)	0.19 (6)	0.14 (5)	0.14 (5)
$\gamma_{20,11}$ 836.88 (7)	0.61 (5)	0.45 (4)	0.45 (4)
$\gamma_{30,18}$ 838.3 (10)	0.43 (3) ⁺	0.318 (23)	0.318 (23)
$\gamma_{13,6}$ 867.66 (4)	0.43 (3) ⁺	0.318 (23)	0.318 (23)
$\gamma_{14,6}$ 882.22 (4)	0.54 (3) ⁺	0.40 (2)	0.40 (2)
$\gamma_{23,14}$ 886.57 (9)	0.46 (3) ⁺	0.340 (23)	0.340 (23)
$\gamma_{17,8}$ 899.19 (4)	0.23 (3)	0.170 (23)	0.170 (23)
$\gamma_{23,13}$ 901.13 (9)	0.23 (6) ⁺	0.17 (5)	0.17 (5)
$\gamma_{7,3}$ 911.062 (11)	0.07 (4)	0.05 (3)	0.05 (3)
$\gamma_{20,10}$ 922.44 (7)	0.26 (2)	0.192 (15)	0.192 (15)
$\gamma_{24,14}$ 934.19 (9)	0.07 (2) ⁺	0.052 (15)	0.052 (15)
$\gamma_{42,23}$ 936 (3)	0.06 (2)	0.044 (15)	0.044 (15)
$\gamma_{12,5}$ 941.8 (5)	) 0.25 (2) ⁺	0.15 (3)	0.111 (23)
$\gamma_{17,7}$ 942.53 (4)		0.10 (2)	0.074 (15)
$\gamma_{14,5}$ 980.91 (4)	0.48 (3) ⁺	0.355 (23)	0.355 (23)
$\gamma_{22,10}$ 1030.30 (8)	0.75 (7) ⁺	0.56 (6)	0.56 (6)
$\gamma_{18,7}$ 1032.85 (6)	0.78 (6) ⁺	0.58 (5)	0.58 (5)
$\gamma_{35,18}$ 1039.5 (4)	0.06 (2) ⁺	0.044 (15)	0.044 (15)
$\gamma_{38,19}$ 1060 (1)	0.06 (3)	0.044 (23)	0.044 (23)
$\gamma_{2,0}$ 1122.274 (7)	E0 transition	—	0.00082 (8) [†]
$\gamma_{5,1}$ 1129.851 (9)	6.2 (3) ⁺	4.59 (23)	4.59 (23)
$\gamma_{43,22}$ 1146.4 (7)	0.08 (2) ⁺	0.059 (15)	0.059 (15)
$\gamma_{9,3}$ 1158.1 (5)	0.18 (1) ⁺	0.133 (8)	0.133 (8)

	E_γ (keV)	P_γ^{rel} (%) [‡]	P_γ^{abs} (%)	Transition probability (%)
$\gamma_{16,6}$	1162.87 (5)	0.22 (2)	0.163 (15)	0.163 (15)
$\gamma_{20,8}$	1180.98 (7)	0.15 (2) ⁺	0.111 (15)	0.111 (15)
$\gamma_{25,10}$	1193.1 (20)	0.14 (6)	0.10 (5)	0.10 (5)
$\gamma_{10,3}$	1212.938 (13)	2.3 (7) ⁺	1.7 (6)	1.7 (6)
$\gamma_{3,0}$	1216.137 (7)	11.8 (3) ⁺	8.73 (22)	8.73 (22)
$\gamma_{20,7}$	1224.32 (7)	0.39 (15) ⁺	0.29 (11)	0.29 (11)
$\gamma_{6,1}$	1228.535 (10)	2.88 (12) ⁺	2.13 (10)	2.13 (10)
$\gamma_{43,20}$	1254.3 (7)	0.11 (4)	0.08 (3)	0.08 (3)
$\gamma_{21,8}$	1270.9 (20)	0.08 (3)	0.059 (23)	0.059 (23)
$\gamma_{17,6}$	1282.09 (4)	0.10 (4)	0.07 (3)	0.07 (3)
$\gamma_{22,8}$	1288.84 (8)	0.07 (3)	0.052 (23)	0.052 (23)
$\gamma_{11,3}$	1298.504 (15)	0.12 (1)	0.089 (8)	0.089 (8)
$\gamma_{29,14}$	1300.7 (4)	0.21 (2) ⁺	0.155 (15)	0.155 (15)
$\gamma_{10,2}$	1306.800 (13)	0.25 (3)	0.185 (23)	0.185 (23)
$\gamma_{29,13}$	1315.3 (4)	0.07 (2)	0.052 (15)	0.052 (15)
$\gamma_{13,4}$	1324.45 (4)	0.06 (3)	0.044 (23)	0.044 (23)
$\gamma_{18,6}$	1372.41 (6)	0.69 (4) ⁺	0.51 (3)	0.51 (3)
$\gamma_{17,5}$	1380.78 (4)	3.38 (14) ⁺	2.50 (11)	2.50 (11)
$\gamma_{33,13}$	1429.0 (2)	) 0.34 (2) ⁺)	0.26 (3)	0.192 (23)
$\gamma_{23,7}$	1429.24 (8)		0.08 (4)	0.06 (3)
$\gamma_{13,3}$	1439.16 (4)	0.78 (4) ⁺	0.58 (3)	0.58 (3)
$\gamma_{14,3}$	1453.72 (4)	1.09 (6) ⁺	0.81 (5)	0.81 (5)
$\gamma_{44,18}$	1461.4 (20)	0.18 (4)	0.13 (3)	0.13 (3)
$\gamma_{18,5}$	1471.09 (6)	3.14 (14) ⁺	2.32 (11)	2.32 (11)
$\gamma_{31,11}$	1504.6 (5)	0.12 (5) ⁺	0.09 (4)	0.09 (4)
$\gamma_{13,2}$	1533.01 (4)	0.08 (5)	0.06 (4)	0.06 (4)
$\gamma_{43,17}$	1536.1 (7)	0.23 (9)	0.17 (7)	0.17 (7)
$\gamma_{37,13}$	1560.2 (5)	0.60 (3) ⁺	0.444 (23)	0.444 (23)
$\gamma_{7,1}$	1568.096 (10)	1.28 (6) ⁺	0.95 (5)	0.95 (5)
$\gamma_{8,1}$	1611.434 (13)	0.30 (3) ⁺	0.222 (23)	0.222 (23)
$\gamma_{15,3}$	1642.0 (20)	0.18 (6)	0.13 (5)	0.13 (5)
$\gamma_{33,10}$	1655.2 (2)	0.16 (3)	0.118 (23)	0.118 (23)
$\gamma_{20,5}$	1662.56 (7)	0.19 (7)	0.14 (6)	0.14 (6)
$\gamma_{22,6}$	1671.73 (8)	0.23 (2) ⁺	0.170 (15)	0.170 (15)
$\gamma_{27,8}$	1742.4 (10)	0.16 (2) ⁺	0.118 (15)	0.118 (15)
$\gamma_{22,5}$	1770.42 (8)	) 0.33 (3) ⁺)	0.27 (3)	0.200 (23)
$\gamma_{35,10}$	1770.5 (4)		0.06 (2)	0.044 (15)
$\gamma_{6,0}$	1787.625 (8)	0.74 (4) ⁺	0.55 (3)	0.55 (3)
$\gamma_{28,7}$	1801.9 (6)	0.04 (2)	0.030 (15)	0.030 (15)
$\gamma_{9,1}$	1815.1 (6)	0.20 (2)	0.148 (15)	0.148 (15)
$\gamma_{25,6}$	1834.6 (20)	0.26 (13) ⁺	0.19 (10)	0.19 (10)
$\gamma_{17,3}$	1853.58 (4)	19.7 (10) ⁺	14.6 (8)	14.6 (8)
$\gamma_{10,1}$	1869.968 (12)	0.19 (2) ⁺	0.141 (15)	0.141 (15)
$\gamma_{26,6}$	1881.9 (10)	0.18 (6)	0.13 (5)	0.13 (5)
$\gamma_{39,11}$	1901 (2)	0.16 (6)	0.12 (5)	0.12 (5)
$\gamma_{18,3}$	1943.89 (6)	0.64 (11) ⁺	0.47 (9)	0.47 (9)
$\gamma_{11,1}$	1955.534 (14)	0.40 (7) ⁺	0.30 (6)	0.30 (6)
$\gamma_{43,12}$	1975.0 (9)	0.15 (12) ⁺	0.11 (9)	0.11 (9)
$\gamma_{44,12}$	1990.7 (21)	0.11 (4)	0.08 (3)	0.08 (3)
$\gamma_{34,7}$	2045.9 (9)	0.24 (2)	0.178 (15)	0.178 (15)
$\gamma_{12,1}$	2071.7 (5)	0.36 (30) ⁺	0.27 (23)	0.27 (23)
$\gamma_{36,7}$	2082 (1)	0.16 (5)	0.12 (4)	0.12 (4)
$\gamma_{13,1}$	2096.19 (4)	1.83 (10) ⁺	1.35 (8)	1.35 (8)
$\gamma_{14,1}$	2110.75 (4)	3.33 (16) ⁺	2.46 (12)	2.46 (12)
$\gamma_{7,0}$	2127.183 (8)	0.28 (9) [‡]	0.21 (7)	0.21 (7)
$\gamma_{20,3}$	2135.36 (7)	1.25 (7) ⁺	0.93 (6)	0.93 (6)
$\gamma_{-1,2}$	2170.0 (20) ^Δ	0.13 (5)	0.10 (4)	0.10 (4)
$\gamma_{8,0}$	2170.521 (12)	(E0) transition	–	0.45 (8) [¶]
$\gamma_{29,6}$	2183.0 (4)	0.17 (4) ⁺	0.13 (3)	0.13 (3)

	E_γ (keV)	P_γ^{rel} (%)[‡]	P_γ^{abs} (%)	Transition probability (%)
γ _{20,2}	2229.22 (7)	0.14 (9) [‡]	0.10 (7)	0.10 (7)
γ _{-1,3}	2235.0 (20) ^Δ	0.18 (8)	0.13 (6)	0.13 (6)
γ _{15,1}	2299.0 (20)	0.19 (6)	0.14 (5)	0.14 (5)
γ _{30,5}	2309.4 (10)	0.14 (4) [‡]	0.10 (3)	0.10 (3)
γ _{23,3}	2340.27 (8)	0.12 (5)	0.09 (4)	0.09 (4)
γ _{16,1}	2391.39 (5)	6.4 (4) ⁺	4.7 (3)	4.7 (3)
γ _{35,6}	2412.0 (4)	0.04 (1)	0.030 (8)	0.030 (8)
γ _{10,0}	2429.053 (11)	0.14 (6) [‡]	0.10 (5)	0.10 (5)
γ _{24,2}	2481.76 (8)	0.18 (3) [‡]	0.133 (23)	0.133 (23)
γ _{17,1}	2510.61 (4)	2.60 (15) ⁺	1.92 (12)	1.92 (12)
γ _{26,2}	2547.2 (10)	0.008 (5)	0.006 (4)	0.006 (4)
γ _{18,1}	2600.92 (6)	0.93 (4) ⁺	0.69 (3)	0.69 (3)
γ _{12,0}	2630.8 (5)	0.17 (5)	0.13 (4)	0.13 (4)
γ _{13,0}	2655.27 (4)	0.23 (2) ⁺	0.170 (15)	0.170 (15)
γ _{31,4}	2688.3 (5)	0.48 (5)	0.36 (4)	0.36 (4)
γ _{28,3}	2712.9 (6)	0.10 (3)	0.074 (23)	0.074 (23)
γ _{29,3}	2754.4 (4)	0.10 (3)	0.074 (23)	0.074 (23)
γ _{20,1}	2792.38 (7)	7.5 (4) ⁺	5.6 (3)	5.6 (3)
γ _{-1,4}	2837.0 (30) ^Δ	0.15 (6)	0.11 (5)	0.11 (5)
γ _{32,3}	2848 (4)	0.20 (6)	0.15 (5)	0.15 (5)
γ _{22,1}	2900.24 (8)	0.37 (13) ⁺	0.27 (10)	0.27 (10)
γ _{16,0}	2950.47 (5)	10.0 (5) ⁺	7.4 (4)	7.4 (4)
γ _{35,3}	2983.4 (4)	0.12 (4)	0.09 (3)	0.09 (3)
γ _{23,1}	2997.30 (8)	1.29 (3) ⁺	0.955 (24)	0.955 (24)
γ _{24,1}	3044.91 (8)	0.03 (1)	0.022 (8)	0.022 (8)
γ _{25,1}	3063.0 (20)	0.10 (3)	0.074 (23)	0.074 (23)
γ _{17,0}	3069.68 (4)	0.06 (2)	0.044 (15)	0.044 (15)
γ _{37,2}	3093.1 (2)	0.22 (2)	0.163 (15)	0.163 (15)
γ _{18,0}	3160.00 (6)	0.19 (2) ⁺	0.141 (15)	0.141 (15)
γ _{20,0}	3351.46 (7)	0.34 (2) ⁺	0.252 (15)	0.252 (15)
γ _{28,1}	3369.9 (6)	0.13 (1) ⁺	0.096 (8)	0.096 (8)
γ _{29,1}	3411.4 (4)	0.40 (2) ⁺	0.296 (15)	0.296 (15)
γ _{32,1}	3505 (4)	0.05 (2) ⁺	0.037 (15)	0.037 (15)
γ _{33,1}	3525.1 (2)	0.24 (2) ⁺	0.178 (15)	0.178 (15)
γ _{24,0}	3603.99 (8)	2.16 (15) ⁺	1.60 (11)	1.60 (11)
γ _{35,1}	3640.4 (4)	0.21 (2) ⁺	0.155 (15)	0.155 (15)
γ _{40,1}	3877.7 (10)	0.02 (1)	0.015 (8)	0.015 (8)
γ _{-1,5}	3892.0 (20) ^Δ	0.04 (2) [‡]	0.030 (15)	0.030 (15)
γ _{27,0}	3912.9 (10)	0.02 (1)	0.015 (8)	0.015 (8)
γ _{28,0}	3929.0 (6)	0.12 (2) ⁺	0.089 (15)	0.089 (15)
γ _{-1,6}	3963.5 (10) ^Δ	0.03 (1) [‡]	0.022 (8)	0.022 (8)
γ _{29,0}	3970.5 (4)	0.014 (6) [‡]	0.010 (5)	0.010 (5)
γ _{31,0}	4019.2 (5)	0.08 (2) ⁺	0.059 (15)	0.059 (15)
γ _{43,1}	4046.6 (7)	0.06 (2) ⁺	0.044 (15)	0.044 (15)
γ _{32,0}	4064 (4)	0.03 (1)	0.022 (8)	0.022 (8)
γ _{33,0}	4084.2 (2)	0.02 (1)	0.015 (8)	0.015 (8)
γ _{34,0}	4173.0 (9)	0.028 (10) ⁺	0.021 (8)	0.021 (8)
γ _{40,0}	4436.8 (10)	0.07 (2) ⁺	0.052 (15)	0.052 (15)
γ _{41,0}	4454.9 (30)	0.009 (3)	0.0067 (23)	0.0067 (23)
γ _{42,0}	4492 (3)	0.008 (3)	0.0059 (23)	0.0059 (23)
γ _{43,0}	4605.7 (7)	0.02 (1) ⁺	0.015 (8)	0.015 (8)

[‡] Gamma-ray emission probabilities expressed relative to P_γ(559.10 keV) of 100.

^Δ Unplaced in proposed decay scheme.

[†] Weighted-mean analysis of selected relative emission probabilities – when necessary, the recommended uncertainty has been adjusted to be in alignment with the smallest uncertainty of the values used to calculate the weighted mean.

[§] Adopted from the measurements of Dzhelepov *et al.* (1971Dz08).

[‡] Unweighted-mean analysis of selected relative emission probabilities.

[†] Absolute transition probability for the 1122.27-keV E0 gamma ray of 0.00082% determined by Giannatiempo *et al.* (1986Gi12), and assigned an arbitrary uncertainty of ± 0.00008%.

[‡] Absolute transition probability for the 2170.52-keV E0 gamma ray of 0.45 (7) % derived from population-depopulation balance of the 2170.55-keV nuclear level with a total P_{EC} of zero.

EC/ β^+ Transitions

Energies

All EC/ β^+ energies were derived from the structural details of the proposed decay scheme. The nuclear level energies of 1995Si03 and evaluated Q_{EC} -value of 4963 (9) keV (2012Wa38) were used to determine the recommended energies and uncertainties of the EC transitions and β^+ emissions.

Transition and Emission Probabilities

Both β^+ and γ -ray spectral measurement have been undertaken in order to study and understand the decay-scheme characteristics of ⁷⁶Br. β^+ studies provide data of direct relevance to the primary EC/ β^+ decay process, whereas γ -ray spectroscopic data are used to calculate the population and depopulation on nuclear levels in order to derive EC/ β^+ transition probabilities.

Total EC transition probabilities were derived for the population-depopulation imbalances of the relative emission probabilities of the gamma rays, their theoretical internal conversion and internal-pair formation coefficients, and a normalisation factor of 0.741 (19) for the gamma-ray emissions as calculated above. Component EC and β^+ transition and emission probabilities were determined from EC/ β^+ ratios (1971Go40), and $\log ft$ values and average E_{β^+} energies were derived by means of the LOGFT code. Fractional EC probabilities P_K , P_L , P_M and P_N were calculated by means of the EC-CAPTURE code (1998Sc28) as developed from the data tabulations of 1995ScZY.

A value of $(108 \pm 4)\%$ for the absolute emission probability of the 511-keV annihilation radiation can be determined from the γ -ray measurements of Dzhelepov *et al.* (1971Dz08) with a relative P_γ^\pm of 145.2 (50) % and normalization factor of 0.740 (7). The absolute emission probability for the 511-keV annihilation radiation can also be derived from the recommended total absolute positron emission probability of $72.7 (25) \times 0.740 (7) = 53.8 (19) \%$:

$$P_\gamma^\pm = 2 \times 53.8 (19) = (108 \pm 4)\%$$

These consistent values can be compared with a P_γ^\pm of $(116 \pm 4)\%$ derived from a total positron branch of 58.2 (19) %, as measured by Qaim *et al.* (2007Qa02).

A consistent decay scheme was derived that consists of 42 EC / 24 β^+ transitions and 161 gamma-ray emissions, of which only 7.8 (11) % of the EC/ β^+ decay occurs directly to the ground state of ⁷⁶Se. There is substantial 511-keV positron-annihilation radiation. After significant efforts, only six observed gamma-ray emissions could not be placed in the proposed decay scheme. However, further extensive spectroscopic studies are required to resolve the existing modest discrepancy between the absolute emission probability of the 511-keV annihilation radiation of $(108 \pm 4)\%$ as determined from the total absolute positron emission probability derived from the evaluated decay scheme, and a value of $(116 \pm 4)\%$ measured in the positron emission studies of Qaim *et al.* (2007Qa02).

All of the experimental evidence shows the decay scheme of Br-76 to be reasonably complex, and that significant uncertainties remain as to the nature of the EC/ β^+ population and γ depopulation of the many nuclear levels of Se-76 and associated detail therein. Overall, further γ singles and γ - γ coincidence measurements are merited to improve the definition of the recommended decay scheme, along with total absorption gamma-ray spectroscopy (TAGS) to ensure a more confident and correct treatment of the high-energy γ emissions and associated higher-energy nuclear levels involved in the EC/ β^+ decay of Br-76.

Directly measured and calculated EC and β^+ decay data of ⁷⁶Br.

Nuclear level energy (keV)	E _{EC} (keV)		1952Fu04 [#] measured	1959Gi46 [*] γ calculation	1962Ku06 [*] measured	1963Sa26 [†] measured	1969Dz01 [*] γ calculation	1971Dz08 [*] γ calculation	1971La01 [*] γ calculation	1974HeYW ⁺ 1998 ENSDF	1974Na17 [*] γ calculation
4605.8 (7)	357 (9)	P _{β^+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	0.5	0.65	—	—	0.06
		log <i>ft</i>	—	—	—	—	—	5.8	—	—	6.3
4570?		P _{β^+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	—	—	0.5	—	—
		log <i>ft</i>	—	—	—	—	—	—	—	—	—
4436.9 (10)	526 (9)	P _{β^+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	0.044 (25)	—	—	0.1	0.08	—	0.067	—
		log <i>ft</i>	—	7.0 (4)	—	—	6.0	7.2	—	—	—
4420?		P _{β^+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	—	—	< 0.3	—	—
		log <i>ft</i>	—	—	—	—	—	—	5.6	—	—
4215.5 (2)	748 (9)	P _{β^+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	—	—	—	0.62	0.51
		log <i>ft</i>	—	—	—	—	—	—	—	—	5.8
4199.6 (4)	763 (9)	P _{β^+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	0.3	0.34	—	—	0.41
		log <i>ft</i>	—	—	—	—	6.4	6.7	—	—	6.0
4173.1 (9)	790 (9)	P _{β^+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	—	—	—	—	0.17
		log <i>ft</i>	—	—	—	—	—	—	—	—	6.5
4163?		P _{β^+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	2.8	—	—	—	—
		log <i>ft</i>	—	—	—	—	5.3	—	—	—	—
4140?		P _{β^+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	4.4 (10)	—	—	—	—	< 0.3	—	—
		log <i>ft</i>	—	5.7 (1)	—	—	—	—	6.4	—	—
4084.3 (2)	879 (9)	P _{β^+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	1.4	0.53	—	0.56	0.46
		log <i>ft</i>	—	—	—	—	6.5	6.6	—	—	6.2

Nuclear level energy (keV)	E _{EC} (keV)		1952Fu04# measured	1959Gi46* γ calculation	1962Ku06* measured	1963Sa26† measured	1969Dz01* γ calculation	1971Dz08* γ calculation	1971La01* γ calculation	1974HeYW+ 1998 ENSDF	1974Na17* γ calculation
4065?		P _{β+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	0.2	—	—	—	—
		log <i>ft</i>	—	—	—	—	8.0	—	—	—	—
4030?		P _{β+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	—	—	0.1	—	—
		log <i>ft</i>	—	—	—	—	—	—	6.6	—	—
4019.3 (5)	944 (9)	P _{β+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	—	—	—	—	0.48
		log <i>ft</i>	—	—	—	—	—	—	—	—	6.4
3970.6 (4)	992 (9)	P _{β+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	0.13 (6)	—	—	0.5	1.40	—	0.63	0.54
		log <i>ft</i>	—	7.2 (4)	—	—	6.3	6.9	—	—	6.3
3929.1 (6)	1034 (9)	P _{β+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	0.7	0.37	—	0.28	0.11
		log <i>ft</i>	—	—	—	—	6.5	6.9	—	—	7.1
3913.1?		P _{β+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	—	—	0.6	—	0.11
		log <i>ft</i>	—	—	—	—	—	—	6.4	—	7.1
3669.0?		P _{β+} (%)	—	—	—	—	—	—	—	—	—
		P _{EC} (%)	—	—	—	—	—	—	—	—	0.14
		log <i>ft</i>	—	—	—	—	—	—	—	—	7.3
3604.08 (8)	1359 (9)	P _{β+} (%)	—	—	—	—	—	0.09	—	—	—
		P _{EC} (%)	—	—	—	—	—	2.94	—	1.78	1.5
		log <i>ft</i>	—	—	—	—	—	6.3	—	—	6.3
3556.46 (8)	1407 (9)	P _{β+} (%)	—	—	—	—	—	0.16	—	—	—
		P _{EC} (%)	—	20 (2)	—	—	1.4	1.73	—	1.81	1.2
		log <i>ft</i>	—	5.5 (1)	—	—	6.4	6.2	—	—	6.4
3459.40 (8)	1504 (9)	P _{β+} (%)	—	—	—	—	—	0.19	—	) 2.5	0.008
		P _{EC} (%)	—	—	—	—	2.4	2.12	2.2		1.8
		log <i>ft</i>	—	—	—	—	6.2	6.6	6.2	—	6.3
3351.54 (7)	1611 (9)	P _{β+} (%)	—	—	~ 1	0.01/1	0.1	1.61	—	) 8.6	0.36
		P _{EC} (%)	—	—	—	—	7.1	7.76	7.7		6.9
		log <i>ft</i>	—	—	—	—	5.7	6.0	5.7	—	5.8

Nuclear level energy (keV)	E _{EC} (keV)		1952Fu04# measured	1959Gi46* γ calculation	1962Ku06* measured	1963Sa26† measured	1969Dz01* γ calculation	1971Dz08* γ calculation	1971La01* γ calculation	1974HeYW+ 1998 ENSDF	1974Na17* γ calculation
3160.07 (6)	1803 (9)	P _{β+} (%)	–	–	–	–	0.2	2.17	–	) 5.9	0.23
		P _{EC} (%)	–	–	–	–	4.8	4.24	–	)	4.4
		log <i>ft</i>	–	–	–	–	6.2	6.4	–	–	6.2
3069.75 (4)	1893 (9)	P _{β+} (%)	–	–	5	0.08/5	1.6	9.23	) 20	–	1.4
		P _{EC} (%)	–	–	–	–	15.4	12.16	)	–	14.0
		log <i>ft</i>	–	–	–	–	5.7	5.9	4.6	–	5.7
2990?		P _{β+} (%)	–	–	–	–	–	–	) 4.3	–	–
		P _{EC} (%)	–	–	–	–	–	–)	–	–
		log <i>ft</i>	–	–	–	–	–	–	5.5	–	–
2950.53 (5)	2012 (9)	P _{β+} (%)	19	2.2 (3)	–	–	2.0	6.73	) 14.1	) 12.3	1.7
		P _{EC} (%)	–	4.8 (7)	–	–	8.6	5.87	)	)	8.5
		log <i>ft</i>	5.8	6.4 (1)	–	–	6.0	6.4	5.1	–	6.0
2690?		P _{β+} (%)	–	–	–	–	–	–	) 0.6	–	–
		P _{EC} (%)	–	–	–	–	–	–)	–	–
		log <i>ft</i>	–	–	–	–	–	–	6.6	–	–
2669.88 (4)	2293 (9)	P _{β+} (%)	14	–	)	)	1.0	1.49	) 4.0	) 2.0	0.77
		P _{EC} (%)	–	–	)	)	1.5	0.62	)	)	1.1
		log <i>ft</i>	6.1	–	)	)	6.9	7.4	6.2	–	7.0
2655.32 (4)	2308 (9)	P _{β+} (%)	–	–	) 15	) 0.23/15	0.6	0.84	) 2.8	) 0.31	0.17
		P _{EC} (%)	–	–	)	)	0.7	0.33	)	)	0.23
		log <i>ft</i>	–	–	)	)	7.3	7.6	6.4	–	7.5
2630.8 (5)	2332 (9)	P _{β+} (%)	–	–	)	)	0.15	0.71	–	) 0.47	0.02
		P _{EC} (%)	–	–	)	)	0.15	0.27	–	)	0.03
		log <i>ft</i>	–	–	)	)	8.2	7.8	–	–	8.7
2514.663 (13)	2448 (9)	P _{β+} (%)	–	–	–	–	–	0.08	–	) 0.49	0.26
		P _{EC} (%)	–	–	–	–	–	0.03	–	)	0.22
		log <i>ft</i>	–	–	–	–	–	8.9	–	–	7.7
2429.095 (11)	2534 (9)	P _{β+} (%)	11	~ 2	–	–	–	1.24	2.9	) < 1.3	0.01
		P _{EC} (%)	–	~1	–	–	–	0.30	1.7	)	0.006
		log <i>ft</i>	6.5	~ 7	–	–	–	7.8	6.7	–	9.3
2374.0?		P _{β+} (%)	–	–	–	–	–	–	–	–	0.17
		P _{EC} (%)	–	–	–	–	–	–	–	–	0.08
		log <i>ft</i>	–	–	–	–	–	–	–	–	8.3

Nuclear level energy (keV)	E _{EC} (keV)		1952Fu04# measured	1959Gi46* γ calculation	1962Ku06* measured	1963Sa26† measured	1969Dz01* γ calculation	1971Dz08* γ calculation	1971La01* γ calculation	1974HeYW+ 1998 ENSDF	1974Na17* γ calculation
2170.554 (12)		P _{β+} (%)	–	–	–	–	0.3	–	–	–	–
		P _{EC} (%)	–	–	–	–	0.1	–	–	–	–
		log <i>ft</i>	–	–	–	–	8.2	–	–	–	–
2127.215 (8)	2836 (9)	P _{β+} (%)	–	–	–	–	0.15	–	1.7	) < 0.12	0.20
		P _{EC} (%)	–	–	–	–	0.05	–	0.6	)	0.006
		log <i>ft</i>	–	–	–	–	8.7	–	7.4	–	9.1
2048?		P _{β+} (%)	–	~ 1.5	–	–	–	–	3.8	–	–
		P _{EC} (%)	–	~ 0.5	–	–	–	–	1.1	–	–
		log <i>ft</i>	–	~ 8	–	–	–	–	7.1	–	–
1942?		P _{β+} (%)	–	–	–	–	–	–	4	–	–
		P _{EC} (%)	–	–	–	–	–	–	1	–	–
		log <i>ft</i>	–	–	–	–	–	–	7.3	–	–
1883?		P _{β+} (%)	–	–	–	–	–	–	0.8	–	–
		P _{EC} (%)	–	–	–	–	–	–	0.2	–	–
		log <i>ft</i>	–	–	–	–	–	–	8.0	–	–
1787.648 (8) [‡]	3175 (9)	P _{β+} (%)	10	8.5 (10)	8	0.13/8	1.3	0.62	1.2	) 1.1	0.80
		P _{EC} (%)	–	1.5 (3)	–	–	0.2	0.05	0.3	)	0.11
		log <i>ft</i>	7.1	7.3 (2)	–	–	8.2	8.8	8.1	–	8.3
1688.962 (7)	3274 (9)	P _{β+} (%)	–	–	–	–	0.27	0.67	2.6	) < 0.9	0.84
		P _{EC} (%)	–	–	–	–	0.03	0.05	0.4	)	0.11
		log <i>ft</i>	–	–	–	–	8.9	9.1	7.9	–	8.3
1330.860 (8)		–	–	–	–	–	–	–	–	–	–
1216.147 (7)	3747 (9)	P _{β+} (%)	–	11.5 (40)	–	–	2.2	0.64	1.9	) 2.9	3.5
		P _{EC} (%)	–	1.1 (7)	–	–	0.1	0.03	0.1	)	0.20
		log <i>ft</i>	–	7.9 (2)	–	–	8.3	9.1	8.4	–	8.2
1122.283 (7)	3841 (9)	P _{β+} (%)	–	–	–	–	–	2.26	–	) 2.2	1.5
		P _{EC} (%)	–	–	–	–	–	0.09	–	)	0.07
		log <i>ft</i>	–	–	–	–	–	8.7	–	–	8.7
559.102 (5)	4404 (9)	P _{β+} (%)	–	33 (6)	–	–	25.1	23.19	10	) 26.6	23.3
		P _{EC} (%)	–	–	–	–	0.8	0.83	–	)	0.72
		log <i>ft</i>	–	7.8 (1)	–	–	7.8	8.0	8.1	–	7.8

Nuclear level energy (keV)	E _{EC} (keV)		1952Fu04 [#] measured	1959Gi46 [*] γ calculation	1962Ku06 [*] measured	1963Sa26 [†] measured	1969Dz01 [*] γ calculation	1971Dz08 [*] γ calculation	1971La01 [*] γ calculation	1974HeYW ⁺ 1998 ENSDF	1974Na17 [*] γ calculation
0.0	4963 (9)	P _{β⁺} (%)	46	8 (8)	35	0.55/35	14.8	5.22	20	) 6	19.9
		P _{EC} (%)	—	—	—	—	0.3	0.09	—	)	0.36
		log <i>ft</i>	7.85	≥ 8.3	—	—	8.3	9.0	8.3	—	8.2

[#] Relative positron emission probabilities.

^{*} Absolute positron emission and EC transition probabilities.

[†] Emission probability expressed initially as relative intensity, and secondly as percentage total decay.

⁺ Only 79.4% EC/β⁺ decay compiled by 1974HeYW in 1998 update (1998 ENSDF).

[‡] Identified as ~ 1860-keV nuclear level in some measurements, but assumed to be 1790 keV as assigned by a majority of other more recent studies.

Recommended energies, transition/emission probabilities, transition type and log *ft* values for the EC/ β^+ decay of ⁷⁶Br.

E_{EC} (keV)*	E_{β^+} (keV)	Av. E_{β^+} (keV)	$P_{EC}(\text{total})$	ϵ/β^+ (theory)	P_{EC}	P_{β^+}	⁷⁶ Br	⁷⁶ Se	transition type	log <i>ft</i>
EC _{0,44} 342 (9)	—	—	0.21 (4)	—	0.21 (4)	—	1 —		[first forbidden non-unique]	6.3
EC _{0,43} 357 (9)	—	—	0.56 (12)	—	0.56 (12)	—	1 —	(1 +, 2 +)	(first forbidden non-unique)	5.9
EC _{0,42} 471 (10)	—	—	0.052 (15)	—	0.052 (15)	—	1 —		[non-unique]	7.2
EC _{0,41} 508 (10)	—	—	0.007 (2)	—	0.007 (2)	—	1 —		[non-unique]	8.1
EC _{0,40} 526 (9)	—	—	0.067 (15)	—	0.067 (15)	—	1 —	(1, 2)	[non-unique]	7.2
EC _{0,39} 547 (9)	—	—	0.26 (7)	—	0.26 (7)	—	1 —		[first forbidden non-unique]	6.6
EC _{0,38} 634 (9)	—	—	0.19 (5)	—	0.19 (5)	—	1 —		[first forbidden non-unique]	6.9
EC _{0,37} 748 (9)	—	—	0.61 (3)	—	0.61 (3)	—	1 —	(1 +, 2 +)	(first forbidden non-unique)	6.5
EC _{0,36} 753 (9)	—	—	0.24 (4)	—	0.24 (4)	—	1 —		[first forbidden non-unique]	6.9
EC _{0,35} 763 (9)	—	—	0.36 (4)	—	0.36 (4)	—	1 —	(1, 2)	[first forbidden non-unique]	6.8
EC _{0,34} 790 (9)	—	—	0.200 (15)	—	0.200 (15)	—	1 —	(1, 2)	[first forbidden non-unique]	7.1
EC _{0,33} 879 (9)	—	—	0.50 (4)	—	0.50 (4)	—	1 —	(1, 2)	[first forbidden non-unique]	6.7
EC _{0,32} 899 (10)	—	—	0.43 (9)	—	0.43 (9)	—	1 —		[first forbidden non-unique]	6.8
EC _{0,31} 944 (9)	—	—	0.36 (7)	—	0.36 (7)	—	1 —		[first forbidden non-unique]	7.0
EC _{0,30} 965 (9)	—	—	0.42 (4)	—	0.42 (4)	—	1 —		[first forbidden non-unique]	6.9
EC _{0,29} 992 (9)	—	—	0.64 (5)	—	0.64 (5)	—	1 —	(1 +, 2 +)	(first forbidden non-unique)	6.7
EC _{0,28} 1034 (9)	—	—	0.17 (4)	—	0.17 (4)	—	1 —	(1, 2)	[first forbidden non-unique]	7.4
EC _{0,27} 1050 (9)	—	—	0.133 (15)	—	0.133 (15)	—	1 —		[first forbidden non-unique]	7.5
EC _{0,26} 1294 (9)	272 (9)	122 (4)	0.74 (19)	147.2	0.73 (19)	0.005 (1)	1 —		[first forbidden non-unique]	6.9
EC _{0,25} 1341 (9)	319 (9)	142 (4)	0.37 (11)	78.5	0.36 (11)	0.005 (2)	1 —		[first forbidden non-unique]	7.3
EC _{0,24} 1359 (9)	337 (9)	149 (4)	1.67 (13)	63.8	1.64 (13)	0.026 (3)	1 —	1 +, 2 +	first forbidden non-unique	6.61
EC _{0,23} 1407 (9)	385 (9)	169 (4)	1.57 (8)	38.0	1.53 (8)	0.040 (4)	1 —	(1, 2)	[first forbidden non-unique]	6.67
EC _{0,22} 1504 (9)	482 (9)	210 (4)	1.92 (16)	16.7	1.81 (15)	0.108 (9)	1 —	(2 +)	(first forbidden non-unique)	6.65
EC _{0,21} 1522 (9)	500 (9)	218 (4)	0.10 (3)	14.5	0.09 (3)	0.006 (2)	1 —	(1 +, 2 +, 3 +)	(first forbidden non-unique)	8.0
EC _{0,20} 1611 (9)	589 (9)	256 (4)	9.0 (4)	8.00	8.0 (4)	1.00 (4)	1 —	(1, 2) +	(first forbidden non-unique)	6.07
EC _{0,19} 1694 (9)	—	—	(zero)	—	—	—	1 —		—	—
EC _{0,18} 1803 (9)	781 (9)	339 (4)	5.31 (18)	3.01	3.99 (14)	1.32 (4)	1 —	(2)	[first forbidden non-unique]	6.47
EC _{0,17} 1893 (9)	871 (9)	378 (4)	18.8 (3)	2.10	12.7 (2)	6.1 (1)	1 —	(1, 2) +	(first forbidden non-unique)	6.01
EC _{0,16} 2012 (9)	990 (9)	430 (4)	12.0 (5)	1.37	6.9 (3)	5.1 (2)	1 —	1 +, 2 +	first forbidden non-unique	6.33

EC _{0,15}	2105 (9)	1083 (9)	471 (4)	0.27 (6)	1.009	0.14 (3)	0.13 (3)	1 –		[first forbidden non-unique]	8.1
EC _{0,14}	2293 (9)	1271 (9)	554 (4)	2.37 (16)	0.595	0.88 (6)	1.49 (10)	1 –	2 –	allowed	7.33
EC _{0,13}	2308 (9)	1286 (9)	561 (4)	0.41 (12)	0.571	0.15 (4)	0.26 (8)	1 –	1 (–)	(allowed)	8.1
EC _{0,12}	2332 (9)	1310 (9)	572 (4)	0.31 (24)	0.537	0.11 (9)	0.20 (15)	1 –	(1, 2)	[first forbidden non-unique]	8.3
EC _{0,11}	2448 (9)	1426 (9)	624 (4)	0.39 (24)	0.414	0.11 (7)	0.28 (17)	1 –	(2) +	(first forbidden non-unique)	8.3
EC _{0,10}	2534 (9)	1512 (9)	663 (4)	0.8 (5)	0.346	0.2 (1)	0.6 (4)	1 –	3 –	second forbidden non-unique	8.1
EC _{0,9}	2589 (9)	1567 (9)	688 (4)	0.28 (2)	0.309	0.07 (1)	0.21 (2)	1 –		[first forbidden non-unique]	8.6
EC _{0,8}	2792 (9)	–	–	zero	0.211	–	–	1 –	(0 +)	(first forbidden non-unique)	–
EC _{0,7}	2836 (9)	1814 (9)	800 (4)	0.23 (13)	0.194	0.04 (2)	0.19 (11)	1 –	(2) +	(first forbidden non-unique)	8.9
EC _{0,6}	3175 (9)	2153 (9)	957 (4)	1.0 (4)	0.114	0.10 (4)	0.9 (4)	1 –	2 +	first forbidden non-unique	8.6
EC _{0,5}	3274 (9)	2252 (9)	1026 (4)	0.7 (4)	0.188 [†]	0.11 (6)	0.6 (3)	1 –	3 +	first forbidden unique	10.0 ^{1u}
EC _{0,4}	3632 (9)	–	–	zero	–	–	–	1 –	4 +	third forbidden non-unique	–
EC _{0,3}	3747 (9)	2725 (9)	1224 (4)	1.9 (10)	0.0559	0.10 (5)	1.8 (9)	1 –	2 +	first forbidden non-unique	8.71
EC _{0,2}	3841 (9)	2819 (9)	1268 (4)	2.2 (6)	0.0502	0.11 (3)	2.1 (6)	1 –	0 +	first forbidden non-unique	8.71
EC _{0,1}	4404 (9)	3382 (9)	1535 (4)	26.5 (9)	0.0292	0.75 (3)	25.7 (9)	1 –	2 +	first forbidden non-unique	7.98
EC _{0,0}	4963 (9)	3941 (9)	1803 (4)	5.8 (8)	0.01835	0.10 (2)	5.7 (8)	1 –	0 +	first forbidden non-unique	8.93
				Σ 100.049			Σ 53.9 (18)				
				100.0 (20)							

* Determined from the nuclear level energies of 1995Si03 and Q-value of 4963 (9) keV (2012Wa38).

[†] e/β^+ ratio calculated on the basis of log-based allowed and first forbidden unique ratios as extracted from the relevant tables of 1971Go40.

Recommended energies and fractional electron-capture probabilities for the EC decay of ⁷⁶Br.

E_{EC} (keV)*		P_K	P_L	P_M	P_N
EC _{0,44}	342 (9)	0.8735 (16)	0.1058 (13)	0.0187 (4)	0.0020 (2)
EC _{0,43}	357 (9)	0.8738 (16)	0.1055 (13)	0.0186 (4)	0.0020 (2)
EC _{0,42}	471 (10)	0.8756 (16)	0.1041 (13)	0.0183 (4)	0.0020 (2)
EC _{0,41}	508 (10)	0.8760 (16)	0.1038 (13)	0.0183 (4)	0.0020 (2)
EC _{0,40}	526 (9)	0.8761 (16)	0.1037 (13)	0.0182 (4)	0.0020 (2)
EC _{0,39}	547 (9)	0.8763 (16)	0.1035 (13)	0.0182 (4)	0.0020 (2)
EC _{0,38}	634 (9)	0.8769 (16)	0.1030 (13)	0.0181 (4)	0.0020 (2)
EC _{0,37}	748 (9)	0.8775 (15)	0.1025 (13)	0.0180 (4)	0.0019 (2)
EC _{0,36}	753 (9)	0.8776 (15)	0.1025 (13)	0.0180 (4)	0.0019 (2)
EC _{0,35}	763 (9)	0.8776 (15)	0.1025 (13)	0.0180 (4)	0.0019 (2)
EC _{0,34}	790 (9)	0.8777 (15)	0.1024 (13)	0.0180 (4)	0.0019 (2)
EC _{0,33}	879 (9)	0.8780 (15)	0.1021 (13)	0.0179 (4)	0.0019 (2)
EC _{0,32}	899 (10)	0.8781 (15)	0.1021 (13)	0.0179 (4)	0.0019 (2)
EC _{0,31}	944 (9)	0.8782 (15)	0.1020 (13)	0.0179 (4)	0.0019 (2)
EC _{0,30}	965 (9)	0.8783 (15)	0.1019 (13)	0.0179 (4)	0.0019 (2)
EC _{0,29}	992 (9)	0.8783 (15)	0.1019 (13)	0.0179 (4)	0.0019 (2)
EC _{0,28}	1034 (9)	0.8784 (15)	0.1018 (13)	0.0179 (4)	0.0019 (2)
EC _{0,27}	1050 (9)	0.8785 (15)	0.1017 (13)	0.0179 (4)	0.0019 (2)
EC _{0,26}	1294 (9)	0.8789 (15)	0.1014 (12)	0.0178 (4)	0.0019 (2)
EC _{0,25}	1341 (9)	0.8790 (15)	0.1013 (12)	0.0178 (4)	0.0019 (2)
EC _{0,24}	1359 (9)	0.8790 (15)	0.1013 (12)	0.0178 (4)	0.0019 (2)
EC _{0,23}	1407 (9)	0.8791 (15)	0.1013 (12)	0.0178 (4)	0.0019 (2)
EC _{0,22}	1504 (9)	0.8792 (15)	0.1012 (12)	0.0177 (4)	0.0019 (2)
EC _{0,21}	1522 (9)	0.8792 (15)	0.1012 (12)	0.0177 (4)	0.0019 (2)
EC _{0,20}	1611 (9)	0.8793 (15)	0.1011 (12)	0.0177 (4)	0.0019 (2)
EC _{0,19}	1694 (9)	—	—	—	—
EC _{0,18}	1803 (9)	0.8794 (15)	0.1010 (12)	0.0177 (4)	0.0019 (2)
EC _{0,17}	1893 (9)	0.8795 (15)	0.1009 (12)	0.0177 (4)	0.0019 (2)
EC _{0,16}	2012 (9)	0.8796 (15)	0.1008 (12)	0.0177 (4)	0.0019 (2)
EC _{0,15}	2105 (9)	0.8796 (15)	0.1008 (12)	0.0177 (4)	0.0019 (2)
EC _{0,14}	2293 (9)	0.8797 (15)	0.1007 (12)	0.0176 (4)	0.0019 (2)
EC _{0,13}	2308 (9)	0.8797 (15)	0.1007 (12)	0.0176 (4)	0.0019 (2)
EC _{0,12}	2332 (9)	0.8797 (15)	0.1007 (12)	0.0176 (4)	0.0019 (2)
EC _{0,11}	2448 (9)	0.8798 (15)	0.1007 (12)	0.0176 (4)	0.0019 (2)
EC _{0,10}	2534 (9)	0.8798 (15)	0.1006 (12)	0.0176 (4)	0.0019 (2)
EC _{0,9}	2589 (9)	0.8798 (15)	0.1006 (12)	0.0176 (4)	0.0019 (2)
EC _{0,8}	2792 (9)	—	—	—	—
EC _{0,7}	2836 (9)	0.8799 (15)	0.1006 (12)	0.0176 (4)	0.0019 (2)
EC _{0,6}	3175 (9)	0.8800 (15)	0.1005 (12)	0.0176 (4)	0.0019 (2)
EC _{0,5}	3274 (9)	0.8800 (15)	0.1005 (12)	0.0176 (4)	0.0019 (2)
EC _{0,4}	3632 (9)	—	—	—	—
EC _{0,3}	3747 (9)	0.8801 (15)	0.1004 (12)	0.0176 (4)	0.0019 (2)
EC _{0,2}	3841 (9)	0.8801 (15)	0.1004 (12)	0.0176 (4)	0.0019 (2)
EC _{0,1}	4404 (9)	0.8802 (15)	0.1003 (12)	0.0176 (4)	0.0019 (2)
EC _{0,0}	4963 (9)	0.8803 (15)	0.1003 (12)	0.0176 (4)	0.0019 (2)

* Determined from the nuclear level energies of 1995Si03 and Q-value of 4963 (9) keV (2012Wa38).

Atomic Data

The X-ray and Auger-electron data have been calculated using the evaluated gamma-ray data, and atomic data from 1996Sc06, 1998ScZM and 1999ScZX. Both the X-ray and Auger-electron emission probabilities were determined by means of the EMISSION computer program (version 4.02, 28 February 2012), as described in 2000Sc47. This program incorporates atomic data from 1996Sc06 and the evaluated gamma-ray data.

K and L X-ray energies and emission probabilities of ⁷⁶Br.

			Energy (keV)	Photons per 100 disint.	Relative probability
XL	(Se)		1.204 – 1.648	0.968 (20)	6.93
	XL ₁	(Se)	1.204	0.0242 (8)	
	XL _α	(Se)	1.379	0.569 (16)	
	XL _η	(Se)	1.245	0.0131 (4)	
	XL _β	(Se)	1.420 – 1.492	0.360 (11)	
	XL _γ	(Se)	1.648	0.00245 (7)	
XK _α	XK _{α2}	(Se)	11.1815 (2)	7.20 (13)	51.6
	XK _{α1}	(Se)	11.2225 (2)	13.96 (25)	100
XK' _{β1}	XK _{β3}	(Se)	12.4897 (7)	3.26 (7)	23.4
	XK _{β1}	(Se)	12.4960 (4)		
	XK _{β5} "	(Se)	12.596 (1)		
XK' _{β2}	XK _{β2}	(Se)	12.6523 (6)	0.183 (7)	1.31

Auger-electron energies and emission probabilities of ⁷⁶Br.

		Energy (keV)	Electrons per 100 disint.	Relative probability
e _{AK}	(Se)		16.3 (3)	
	KLL	9.280 – 9.712	12.04 (23)	100
	KLX	10.749 – 11.216	3.91 (9)	32.5
	KXY	12.195 – 12.647	0.318 (9)	2.64
e _{AL}	(Se)	0.956 – 1.312	52.9 (7)	439

Se: ω_K = 0.602 (4); ω_L = 0.0175 (5); n_{KL} = 1.202 (4) were taken from 1996Sc06.

Electron energies were determined from electron binding energies tabulated by Larkins (1977La19) and the evaluated gamma-ray energies. Absolute electron emission probabilities were calculated from the evaluated absolute gamma-ray emission probabilities and associated internal conversion coefficients.

Main Production Modes

⁷⁶Se(p,n)⁷⁶Br, ⁷⁷Se(p,2n)⁷⁶Br, ^{nat}Se(p,xn)⁷⁶Br, ⁷⁵As(α,3n)⁷⁶Br, ^{nat}Br(p,x)⁷⁶Br, ^{nat}Sr(p,x)⁷⁶Br, ⁸⁹Y(p,x)⁷⁶Br, ⁷⁹Br(p,4n)⁷⁶Kr(EC)⁷⁶Br, ^{nat}Cu(¹⁴N,3n)⁷⁶Kr(EC)⁷⁶Br, ⁶⁵Cu(¹⁴N,3n)⁷⁶Kr(EC)⁷⁶Br

Data Consistency

A Q_{EC}-value of 4963 (9) keV has been adopted from the atomic mass evaluation of Wang *et al.* (2012Wa38) while in the course of formulating the decay scheme of ⁷⁶Br. This value has subsequently been compared with the Q-value calculated by summing the contributions of the individual emissions to the ⁷⁶Br EC-decay process (i.e. EC/β⁺, electron, γ, etc., including handling of pure E0 transitions by adoption of the calculated absolute gamma transition probabilities as absolute gamma-ray emission probabilities prior to re-definition of the latter as negligible (zero) in the final form of the database):

$$\text{calculated Q-value} = 4960 (60) \text{ keV}$$

Percentage deviation from the Q-value of Wang *et al.* is (0.06 ± 1.21)%, which supports the derivation of a consistent decay scheme with a significant variant.

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Addendum (April 2017): As a consequence of an unfortunate oversight, a number of references originating from the same laboratory were not considered during the course of the 2015 evaluation:

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These γ singles and γ-γ coincidence studies have the potential to impact upon the assignment and identity of a significant number of nuclear levels, along with adjustments in the recommended location of various populating and depopulating γ-ray emissions.

Highly-relevant γ singles and γ-γ coincidence measurements are also known to be underway involving the Brookhaven Linear Isotope Producer (BLIP) and Gammasphere facilities at the Argonne National Laboratory, and led by US National Nuclear Data Center staff (E. Ricard-McCutchan, A.A. Sonzogni *et al.*).