NRL Report 7554

Photonuclear Activation Analysis with Ge(Li) Detectors

A Compilation

M. ELAINE TOMS

Linac Branch
Nuclear Sciences Division

February 20, 1973

NAVAL RESEARCH LABORATORY
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the decay proceeds with multiple gamma rays. Two of these, with energies of 0.8933 MeV and 0.3747 MeV have 100-percent intensity, and another strong gamma ray has an energy of 0.9117 MeV.

Under each reaction the gamma rays are listed by decreasing percent and for the same percent value by decreasing energy. When the percent intensity is not available, the energies of the gamma rays are listed in the order of relative intensities if known.

Table 2, derived from Table 1, is designed to be useful for identifying gamma rays from unknown target nuclei. It also serves to show when certain reactions cannot be distinguished by gamma-ray energy alone. The listing of target nuclei, rather than residual nuclei, permits quick checking back to Table 1 for other possible reactions with the same target nucleus. Table 2 has three parts to separate three regions of half-lives: Part A, from 100 μsec to less than 1 minute; Part B, from 1 minute to 2 hours; and Part C, from 2 hours to 24 hours. In this dual-column listing the order is by gamma-ray energy in MeV. All photonuclear reactions which can produce this gamma ray are listed in ascending order of target nucleus together with the resulting photoparticles. The intensity factors, percent intensity times abundance, are rounded to 0.1 percent, and any reaction which has an intensity factor of less than 0.05 percent is omitted. Usually the reactions listed under a gamma ray produce the same radioactive nucleus. However at times the same gamma ray results from the decay of two different residual nuclei or through consecutive decay. Care was taken to list all the reactions which can produce a given gamma ray. The number of significant figures given for the gamma-ray energy reflects the accuracy of measurement. Errors for these values are not available without extensive literature searches. More recent values for some of these energies may exist. The literature search needed to obtain the latest values could not be undertaken at this time. Some more recent values may be obtained from Galatanu and Grecescu [7], who list gamma-ray energies from γ,n and γ,p reactions in their Tables I and II. The activities they list have half-lives ranging from 5.3 seconds to 303 days. Another possible source for more recent gamma-ray energies is the "Catalogue of γ-Rays Emitted by Radionuclides" by Wakat [8]. This listing is not confined to photo-produced radionuclides. Wakat presents two lists by gamma-ray energies: one for activities of half-lives less than 1 day and the other for activities longer than 1 day.

Another important compilation of nuclear data is the "Table of Isotopes" compiled by R. L. Heath which is published in the CRC Handbook of Chemistry and Physics, 53rd edition, 1972-1973, pages B245 to B541. Information is listed for isotopes of all known elements. For some of the gamma-ray energies the uncertainties are given. The residual nuclei which result from the photonuclear reactions listed in Table 1 can be found among the isotopes in Heath's Table.

CROSS SECTIONS AND RADIOACTIVE YIELDS

Values of photoreaction cross sections and yields of resultant activities could not be included in the tables at this time. The following discussion of applicable photonuclear cross sections is presented as an aid in using the compilation and is not intended to be comprehensive. The reader is referred to the NBS Photonuclear Data Index [9], which was used in selecting the pertinent references by authors mentioned in the following paragraphs. These cross-section studies are applicable to reactions given in the compilation.

Photoneutron reactions have been studied more extensively than other photonuclear disintegrations. Measurements made using resultant radioactivity such as those by Carver and Turchinetz [10], Baglin and Spicer [11], Anderson et al. [12], and Kayser et al. [13] could distinguish γ,n reactions from γ,2n and γ,np reactions. Measurements made with the detection of photoneutrons give results for γ,n alone only below multiple-particle thresholds. With the technique of measuring photoneutron multiplicity, developed by Fultz and coworkers [14] and used by Bergère and coworkers [15] as well as by Antropov et al. [16], the cross sections for γ,2n and γ,3n reactions can be separated from the single-neutron (γ,n and γ,np) cross section. The percentage of the total neutron cross section contributed by the multineutron reactions up to about 30 MeV varies with neutron enrichment both among the isotopes of an element and with atomic number. The average for Sn isotopes is about 30 percent, whereas for ^{181}Ta and ^{186}W the value is 40 percent. One can expect that the γ,np reaction for medium-weight elements to have a cross section similar in magnitude and energy to that of the γ,2n reaction. Up to 30 MeV the γ,3n reaction is quite small, contributing less than 4 percent of the total neutron cross section.

There may be certain cases in which γ,3n reactions are of special importance. The measurements by Haustein and Voigt [17] with 70-MeV bremsstrahlung of the isomer ratio for ^{137}Ce and ^{141}Nd showed that the γ,3n reaction leading to ^{137}Ce^{m} and ^{141}Nd^{m} were more efficient in producing the higher spin isomer relative to the lower spin ground state than were the γ,n reactions leading to the same resultant nuclei.

Costa et al. [18] have measured the production by the γ,n reaction of an isomer with a spin lower than that of the ground state. Up to 70 MeV the production of the isomer relative to the total γ,n reaction was found to be approximately 0.5 for ^{38}K^{m} and 0.8 for ^{89}Z^{m} and ^{91}Mo^{m}.

Much less information is available for photoprotons, photodeuterons or γ,np, phototritons, and photo-alpha particles. For intermediate nuclei the value of the γ,p cross section is strongly influenced by the number of neutrons; for example the γ,p cross sections integrated to 30 MeV for ^{58}Ni and for ^{60}Ni were measured by Ishkhanov et al. [19] to be 570 and 320 MeV-mb respectively. Carver and Turchinetz [10] found cross-section values integrated to 32 MeV of 0.22 MeV-b for ^{58}Ni(γ,n), 0.52 MeV-b for ^{58}Ni(γ,p), and 0.13 MeV-b for ^{62}Ni(γ,p). The observation of specific gamma rays with a NaI(Tl) spectrometer was used by Carver, Peaslee, and Taylor [20] to measure the cross sections of the reactions ^{186}W(γ,p)^{185}Ta, ^{186}W(γ,n)^{185}W^{m}, ^{184}W(γ,p)^{183}Ta, and ^{201}Hg(γ,p)^{200}Au.

The usefulness of a particular reaction for activation analysis depends on various factors. The isotopic abundance of the parent nucleus and the fractional decay which produces the gamma ray being detected are included in the intensity factor. The cross section for a photonuclear reaction is a factor which involves the dependence of the yield upon the energy of excitation. The half-life of the resulting activity also strongly influences the yield. When a photonuclear reaction can produce an isomeric state and a radioactive ground state, the relative detectability depends on both the branching ratio for formation of the states and their half-lives. The optimum duration of irradiation is directly related to the half-life of the resulting activity. Variations with energy and duration of the irradiation can be noted from Table 2 in Lutz's article [3], which gives calculated sensitivities for photon activation analysis. The half-lives of the activities included in his table range from 2.7 seconds to 150 years. He gives sensitivity in terms

of disintegrations per second (per microgram of element). The intensity of a particular gamma ray is not included. A number of the reactions listed in Lutz's table decay through β^+ only and therefore are not included in this compilation.

Yields of photonuclear reactions and the gamma-ray spectrometric study of resulting nuclei have been studied extensively with 20-MeV bremsstrahlung by Oka and coworkers [21]. They give yields per mole-roentgen which, with the bremsstrahlung shape at 20 MeV, are related to cross sections. They also give yields in terms of microcuries per milligram. Their work with short-lived nuclides and their spectrometric studies give data on the limits of detection in micrograms and the counts per minute per milligram in the photopeak of the gamma ray measured by a NaI(Tl) detector. These data can be used as guides for estimating the feasibility of specific reactions for activation analysis with a Ge(Li) spectrometer.

The use of higher energy and more intense bremsstrahlung from linear electron accelerators permits the use of other photonuclear reactions in addition to γ,n and γ,p reactions. High-intensity bremsstrahlung up to 60 MeV in energy was used by Oka, Kato, and Sato [22] along with chemical separation to study the yields of photonuclear reactions in titanium and vanadium. They used a NaI(Tl) detector and expressed their measurement of yield relative to the β^+ activity from the $^{12}C(\gamma,n)^{11}C$ reaction. They observed decay from residual nuclei produced by multiparticle photodisintegrations. From titanium the decay gamma rays from ^{45}Ti, ^{44}Sc, ^{46}Sc, ^{47}Sc, ^{48}Sc, and ^{47}Ca were observed. The vanadium target yielded ^{48}V, ^{46}Sc, ^{47}Sc, and ^{48}Sc as resultant nuclei.

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Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity X Abundance
				Energy (MeV)	Percent	
$_{10}Ne^{22}$ (Cont.) (9.22)	np (23.37)	F^{20} 11.4s	β^-	1.63	100.0	9.22
	p (15.27)	F^{21} 4.4s	β^-	0.35 1.40	99.0 12.0	9.02 1.095
$_{11}Na^{23}$ (100.0)	He^3 (24.45)	F^{20} 11.4s	β^-	1.63	100.0	100.0
	2p (24.06)	F^{21} 4.4s	β^-	0.35 1.40	99.0 12.0	99.0 12.0
	2n (23.49)	Na^{21} 22.8s	β^+	0.350	2.3	2.3
$_{12}Mg^{24}$ (78.99)	T (26.70)	Na^{21} 22.8s	β^+	0.350	2.3	1.82
	2n (29.70)	Mg^{22} 3.99s	β^+	0.583 0.074 1.28	95.4 95.4 4.6	75.30 75.30 3.63
	n (16.53)	Mg^{23} 12.1s	β^+	0.439	9.0	7.10
$_{12}Mg^{25}$ (10.00)	p (12.06)	Na^{24m} 20ms	IT	0.473	100.0	10.00
		Na^{24} 15.0h	β^-	2.7539 1.3685	99.0 99.0	9.90 9.90
	2n (23.86)	Mg^{23} 12.1s	β^+	0.439	9.0	0.90
$_{12}Mg^{26}$ (11.01)	He^3 (26.00)	Ne^{23} 37.6s	β^-	0.439	32.0	3.52
	2p (24.84)	Ne^{24} 3.38m	β^- to Na^{24} (15.0h)	0.437 0.88	100.0 8.0	11.01 0.88
	n,p (23.16)	Na^{24m} 20ms	I.T.	0.473	100.0	11.01
		Na^{24} 15.0h	β^-	2.7539 1.3685	99.0 99.0	10.90 10.90
	p (14.15)	Na^{25} 59s	β^-	0.98 0.58 0.40 1.61	15.0 14.0 14.0 6.0	1.65 1.54 1.54 0.66

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{13}Al^{27}$ (100.0)	He^3 (23.71)	Na^{24m} 20ms	IT	0.473	100.0	100.0
		Na^{24} 15.0h	β^-	2.7539 1.3685	99.0 99.0	99.0 99.0
	2p (22.42)	Na^{25} 59s	β^-	0.98 0.58 0.40 1.61	15.0 14.0 14.0 6.0	15.0 14.0 14.0 6.0
$_{14}Si^{28}$ (92.21)	nα (26.51)	Mg^{23} 12.1s	β^+	0.439	9.0	8.29
	2n (30.49)	Si^{26} 2.1s	β^+	0.82	34.0	31.35
$_{14}Si^{29}$ (4.70)	p (12.33)	Al^{28} 2.31m	β^-	1.780	100.0	4.70
$_{14}Si^{30}$ (3.09)	He^3 (24.79)	Mg^{27} 9.5m	β^-	0.842 1.013	69.0 31.0	2.13 0.96
	np (22.94)	Al^{28} 2.31m	β^-	1.780	100.0	3.09
	p (13.51)	Al^{29} 6.6m	β^-	1.28 2.43	93.0 7.0	2.87 0.22
$_{15}P^{31}$ (100.0)	He^3 (22.51)	Al^{28} 2.31m	β^-	1.780	100.0	100.0
	2p (20.80)	Al^{29} 6.6m	β^-	1.28 2.43	93.0 7.0	93.0 7.0
	2n (23.64)	P^{29} 4.4s	β^+	1.28 2.43	0.8 0.2	0.8 0.2
	n (12.31)	P^{30} 2.50m	β^+	2.23	0.5	0.5
$_{16}S^{32}$ (95.0)	T (24.02)	P^{29} 4.4s	β^+	1.28 2.43	0.8 0.2	0.76 0.19
	np (21.18)	P^{30} 2.50m	β^+	2.23	0.5	0.48
	2n (28.09)	S^{30} 1.42s	β^+	0.684	80.0	76.0

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{16}S^{32}$ (Cont.) (95.0)	n (15.09)	S^{31} 2.61s	β^+	1.27	1.1	1.05
$_{17}Cl^{35}$ (75.77)	n,α (19.31)	P^{30} 2.50m	β^+	2.23	0.5	0.37
	n (12.64)	Cl^{34m} 32.3m	IT β^+	0.145 2.127 3.304 1.177	45.0 40.2 14.8 12.2	34.1 30.4 11.2 9.24
$_{17}Cl^{37}$ (24.23)	He^3 (21.87)	P^{34} 12.4s	β^-	2.127	25.0	6.06
$_{18}Ar^{36}$ (0.337)	np (21.14)	Cl^{34m} 32.3m	IT β^+	0.145 2.127 3.304 1.177	45.0 40.2 14.8 12.2	0.516 0.135 0.05 0.04
	n (15.25)	Ar^{35} 1.8s	β^+	1.220 1.763	5.0 2.0	0.017 0.007
$_{18}Ar^{40}$ (99.60)	He^3 (23.08)	S^{37} 5.06m	β^-	3.09	90.0	89.64
	np (20.60)	Cl^{38} 37.3m	β^-	2.170 1.60	47.0 38.0	46.8 37.9
	p (12.53)	Cl^{39} 55.5m	β^-	1.27 0.246 1.52	51.0 43.0 42.0	50.8 42.8 41.8
$_{19}K^{39}$ (93.08)	nα (19.85)	Cl^{34m} 32.3m	IT β^+	0.145 2.127 3.304 1.177	45.0 40.2 14.8 12.2	41.9 37.4 13.8 11.4
	2n (25.15)	K^{37} 1.23s	β^+	2.80	2.0	1.86
	n (13.09)	K^{38} 7.68m	β^+	2.170	100.0	93.08
$_{19}K^{41}$ (6.91)	He^3 (20.68)	Cl^{38} 37.3m	β^-	2.170 1.60	47.0 38.0	3.24 2.62

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{19}K^{41}$ (Cont.) (6.91)	2p (20.32)	Cl^{39} 55.5m	β^-	1.27 0.246 1.52	51.0 43.0 42.0	3.52 2.97 2.90
$_{20}Ca^{40}$ (96.97)	nα (22.29)	Ar^{35} 1.8s	β^+	1.220 1.763	5.0 2.0	4.85 1.94
	T (25.00)	K^{37} 1.23s	β^+	2.80	2.0	1.94
	np (21.42)	K^{38} 7.68m	β^+	2.170	100.0	96.97
	2n (28.94)	Ca^{38} 0.66s	β^+	3.50	–	
$_{20}Ca^{43}$ (0.145)	2p (19.91)	Ar^{41} 1.83h	β^-	1.293	99.2	0.134
	p (10.67)	K^{42} 12.4h	β^-	1.528	18.0	0.025
$_{20}Ca^{44}$ (2.06)	He^3 (23.32)	Ar^{41} 1.83h	β^-	1.293	99.2	2.04
	np (21.80)	K^{42} 12.4h	β^-	1.528	18.0	0.37
	p (12.17)	K^{43} 22.4h	β^-	0.374 0.619 0.594 0.394 0.388	84.7 82.4 14.0 11.2 6.6	1.75 1.70 0.29 0.23 0.14
$_{20}Ca^{48}$ (0.18)	np (24.16)	K^{46} 115s	β^-	1.347 3.7	89.0 28.0	0.16 0.05
	p (15.80)	K^{47} 17.5s	β^-	2.01	84.0	0.15
$_{21}Se^{45}$ (100.0)	He^3 (20.97)	K^{42} 12.4h	β^-	1.528	18.0	18.0
	2p (19.06)	K^{43} 22.4h	β^-	0.374 0.619 0.594 0.394 0.388	84.7 82.4 14.0 11.2 6.6	84.7 82.4 14.0 11.2 6.6

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{21}Se^{45}$ (Cont.) (100.0)	2n (21.03)	Sc^{43} 3.94h	β^+	0.374	22.0	22.0
	n (11.32)	Sc^{44} 3.92h	β^+	1.156	99.8	99.8
$_{22}Ti^{46}$ (7.93)	np (21.67)	Sc^{44} 3.92h	β^+	1.156	99.8	7.92
$_{22}Ti^{47}$ (7.28)	p (10.46)	Sc^{46m} 20s	IT	0.142	100.0	7.28
$_{22}Ti^{48}$ (73.94)	np (22.09)	Sc^{46m} 20s	IT	0.142	100.0	73.94
$_{23}V^{50}$ (0.24)	α (9.88)	Sc^{46m} 20s	IT	0.142	100.0	0.24
$_{23}V^{51}$ (99.76)	nα (20.94)	Sc^{46m} 20s	IT	0.142	100.0	99.76
$_{24}Cr^{50}$ (4.345)	2n (23.32)	Cr^{48} 23h	EC	0.116 0.31	100.0 100.0	4.345 4.345
	n (12.93)	Cr^{49} 41.9m	β^+, EC	0.09065 0.06229 0.153	30.0 15.0 14.0	1.304 0.652 0.608
$_{24}Cr^{53}$ (9.50)	p (11.13)	V^{52} 3.75m	β^-	1.4336	100.0	9.50
$_{24}Cr^{54}$ (2.365)	He^3 (22.12)	Ti^{51} 5.8m	β^-	0.3194 0.928	95.4 4.6	2.258 0.147
	np (20.86)	V^{52} 3.75m	β^-	1.4336	100.0	2.365
	p (12.04)	V^{53} 2.0m	β^-	1.01	100.0	2.365
$_{25}Mn^{55}$ (100.0)	He^3 (21.20)	V^{52} 3.75m	β^-	1.4336	100.0	100.0
$_{26}Fe^{54}$ (5.82)	nα (21.35)	Cr^{49} 41.9m	β^+, EC	0.09065 0.06229 0.153	30.0 15.0 14.0	1.746 0.873 0.815

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{26}Fe^{54}$ (Cont.) (5.82)	2n (24.06)	Fe^{52} 8.2h	β^+, EC via Mn^{52m} (21 m)	0.165 0.383	100.0 100.0	5.82 5.82
	n (13.62)	Fe^{53m} 2.53m	IT	0.702 0.011 1.328 2.339	100.0 80.0 80.0 20.0	5.82 4.66 4.66 1.16
		Fe^{53} 8.5m	β^+	0.383 0.915	50.0 11.0	2.91 0.64
$_{26}Fe^{57}$ (2.19)	p (10.56)	Mn^{56} 2.58h	β^-	0.847 1.811 2.110	99.0 29.0 15.5	2.168 0.635 0.339
$_{26}Fe^{58}$ (0.33)	np (20.60)	Mn^{56} 2.58h	β^-	0.847 1.811 2.110	99.0 29.0 15.5	0.327 0.096 0.051
	p (11.96)	Mn^{57} 1.7m		0.1219 0.1363	89.0 11.0	0.294 0.036
$_{27}Co^{59}$ (100.0)	He^3 (20.26)	Mn^{56} 2.58h	β^-	0.847 1.811 2.110 2.52	99.0 29.0 15.5 1.1	99.0 29.0 15.5 1.1
	2p (19.33)	Mn^{57} 1.7m	β^-	0.1219 0.1363	89.0 11.0	89.0 11.0
$_{28}Ni^{58}$ (67.77)	nα (20.03)	Fe^{53m} 2.53m	IT	0.702 1.011 1.328 2.339	100.0 80.0 80.0 20.0	67.77 54.22 54.22 13.55
		Fe^{53} 8.5m	β^+	0.383 0.915	50.0 11.0	33.89 7.45
	T (21.16)	Co^{55} 18.2h	EC, β^+	0.933 1.412 0.480 1.322	70.0 11.0 10.0 5.0	47.44 7.45 6.78 3.39
$_{28}Ni^{61}$ (1.25)	p (9.86)	Co^{60m} 10.5m	IT	0.0586	100.0	1.25

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Washington, D.C.

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{30}Zn^{64}$	T	Cu^{61}		0.38	2.5	1.22
(Cont.)	(Cont.)	(Cont.)		0.58	1.5	0.73
(48.89)	(18.97)	3.41h		0.94	1.4	0.68
	n,p	Cu^{62}	β^+, EC	1.172	0.5	0.24
	(18.55)	9.80m				
	2n	Zn^{62}	EC, β^+	0.42	34.0	16.62
	(21.02)	9.3h		0.59	22.0	10.75
				0.51	11.0	5.38
	n	Zn^{63}	β^+, EC	0.669	8.0	3.91
	(11.86)	38.4m		0.962	6.0	2.93
$_{30}Zn^{67}$	p	Cu^{66}	β^-	1.039	9.0	0.37
(4.11)	(8.90)	5.1m				
$_{30}Zn^{68}$	He^3	Ni^{65}	β^-	1.481	24.6	4.57
(18.57)	(19.79)	2.56h		1.115	16.0	2.97
				0.368	4.4	0.82
	np	Cu^{66}	β^-	1.039	9.0	1.67
	(19.10)	5.1m				
$_{30}Zn^{70}$	n,α	Ni^{65}	β^-	1.481	24.6	0.15
(0.62)	(14.91)	2.56h		1.115	16.0	0.10
	He^3	Ni^{67}	β^-	0.90	50.0	0.31
	(*)	50s		0.89	16.0	0.10
	np	Cu^{68}	β^-	1.078	92.4	0.57
	(19.50)	30s		0.80	15.4	0.095
	n	Zn^{69m}	IT	0.439	100.0	0.62
	(9.20)	13.8h				
$_{31}Ga^{69}$	nα	Cu^{64}	β^+, EC	1.34	0.5	0.30
(60.16)	(14.39)	12.75h				
	n	Ga^{68}	β^+, EC	1.078	4.0	2.40
	(10.32)	68.3m				
$_{31}Ga^{71}$	nα	Cu^{66}	β^-	1.039	9.0	3.59
(39.84)	(14.38)	5.1m				
	He^3	Cu^{68}	β^-	1.078	92.4	36.80
	(19.66)	30s		0.80	15.4	6.14
				1.88	6.6	2.63
				1.24	2.0	0.80

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{31}Ga^{71}$ (Cont.) (39.84)	np (17.07)	Zn^{69m} 13.8h	IT	0.439	100.0	39.84
	n (9.31)	Ga^{70} 21.1m	β^-	1.040	0.5	0.20
$_{32}Ge^{70}$ (20.5)	np (18.84)	Ga^{68} 68.3m	β^+, EC	1.078	4.0	0.82
$_{32}Ge^{72}$ (27.4)	He^3 (19.08)	Zn^{69m} 13.8h	IT	0.439	100.0	27.4
	np (19.04)	Ga^{70} 21.1m	β^-	1.040	0.5	0.14
	n (10.75)	Ge^{71m} 20ms	IT	0.1750	100.0	27.4
$_{32}Ge^{73}$ (7.8)	α (5.29)	Zn^{69m} 13.8h	IT	0.439	100.0	7.80
	p (10.00)	Ga^{72m} 36ms	IT	0.099	100.0	7.80
		Ga^{72} 14.1h	β^-	0.835	83.3	6.50
				2.201	27.3	2.13
				0.630	26.7	2.08
				0.601	8.2	0.64
				1.050	6.9	0.54
				2.490	6.8	0.53
	2n (17.53)	Ge^{71m} 20ms	IT	0.1750	100.0	7.8
$_{32}Ge^{74}$ (36.5)	nα (15.49)	Zn^{69m} 13.8h	IT	0.439	100.0	36.5
	np (20.20)	Ga^{72m} 36ms	IT	0.099	100.0	36.5
		Ga^{72} 14.1h	β^-	0.835	83.3	30.4
				2.201	27.3	9.96
				0.630	26.7	9.74
				0.601	8.2	2.99
				1.050	6.9	2.52
				2.490	6.8	2.48
	p (10.96)	Ga^{73} 4.9h	β^- to Ge^{73m}	0.054	100.0	36.5
				0.295	99.0	36.2
				0.74	6.0	2.19

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Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{34}Se^{76}$ (9.02)	nα (15.85)	Ge^{71m} 20ms	IT	0.1750	100.0	9.02
	He^3 (18.89)	Ge^{73m} 0.53s	IT	0.054	100.0	9.02
	np (19.76)	As^{74m} 8.0s	IT	0.283	100.0	9.02
	p (9.52)	As^{75m} 17ms	IT	0.304	100.0	9.02
$_{34}Se^{77}$ (7.58)	α (5.73)	Ge^{73m} 0.53s	IT	0.054	100.0	7.58
	T (18.70)	As^{74m} 8.0s	IT	0.283	100.0	7.58
	np (16.93)	As^{75m} 17ms	IT	0.304	100.0	7.58
	γ' E3	Se^{77m} 17.5s	IT	0.161	100.0	7.58
$_{34}Se^{78}$ (23.52)	nα (16.22)	Ge^{73m} 0.53s	IT	0.054	100.0	23.52
	He^3 (20.12)	Ge^{75m} 48s	IT	0.139	100.0	23.52
		Ge^{75} 82m	β^-	0.2646 0.1986	10.6 1.7	2.49 0.40
	T (18.94)	As^{75m} 17ms	IT	0.304	100.0	23.52
	p (10.39)	As^{77m} 116μs	IT	0.210 0.263	100.0 100.0	23.52 23.52
	n (10.49)	Se^{77m} 17.5s	IT	0.161	100.0	23.52
$_{34}Se^{80}$ (49.82)	nα (16.41)	Ge^{75m} 48s	IT	0.139	100.0	49.82
		Ge^{75} 82m	β^-	0.2646 0.1986	10.6 1.7	5.28 0.85
	He^3 (21.51)	Ge^{77m} 54s	IT, β^-	0.159 0.215	36.0 18.0	17.94 8.97
		Ge^{77} 11.3h	β^-	0.265 0.210	57.0 35.0	28.40 17.45

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{34}Se^{80}$ (Cont.) (49.82)	He^3 (Cont.) (21.51)	Ge^{77} (Cont.) 11.3h		0.215	27.0	13.45
				0.416	27.0	13.45
				0.368	18.0	8.97
				0.563	15.0	7.48
				0.632	11.0	5.48
				0.709	10.0	4.98
	T (18.79)	As^{77m} 116μs	IT	0.210	100.0	49.82
				0.263	100.0	49.82
	np (20.36)	As^{78} 91m		0.615	39.5	19.67
				0.695	11.1	5.53
				0.83	7.5	3.74
				1.307	4.8	2.39
				1.21	4.2	2.09
				0.955	3.8	1.89
				1.31	3.5	1.74
				0.270	3.3	1.64
	p (11.35)	As^{79} 9.0m	β^-	0.096	100.0	49.82
				0.43	2.0	1.00
				0.36	1.5	0.75
	n (9.90)	Se^{79m} 3.9m	IT	0.096	100.0	49.82
$_{34}Se^{82}$ (9.19)	nα (16.91)	Ge^{77m} 54s, Ge^{77} 11.3h	IT, β^-	0.159	36.0	3.31
				0.215	18.0	1.66
				0.265	57.0	5.24
				0.210	35.0	3.22
				0.215	27.0	2.48
				0.416	27.0	2.48
				0.368	18.0	1.66
				0.563	15.0	1.38
				0.632	11.0	1.01
				0.709	10.0	0.92
	α (8.00)	Ge^{78} 1.47h	β^-	0.277	94.0	8.64
				0.294	6.0	0.55
	T (18.85)	As^{79} 9.0m	β^-	0.096	100.0	9.19
				0.43	2.0	0.18
				0.36	1.5	0.14
	n (9.26)	Se^{81m} 57m	IT	0.103	100.0	9.19

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{35}Br^{79}$ (50.69)	nα (15.72)	As^{74m} 8.0s	IT	0.283	100.0	50.69
	α (5.47)	As^{75m} 17ms	IT	0.304	100.0	50.69
	2p (16.74)	As^{77m} 116μs	IT	0.210 0.263	100.0 100.0	50.69 50.69
	np (16.83)	Se^{77m} 17.5s	IT	0.161	100.0	50.69
	2n (18.98)	Br^{77m} 4.2m	IT	0.108	100.0	50.69
	n (10.66)	Br^{78} 6.5m	β^+, EC	0.615	13.0	6.59
	γ′ E3	Br^{79m} 4.8s	IT	0.21	100.0	50.69
$_{35}Br^{81}$ (49.31)	α (6.48)	As^{77m} 116μs	IT	0.210 0.263	100.0 100.0	49.31 49.31
	He^3 (20.15)	As^{78} 91m	β^-	0.615 0.695 0.83 1.307 1.21 0.955 1.31 0.270	39.5 11.1 7.5 4.8 4.2 3.8 3.5 3.3	19.45 5.46 3.69 2.36 2.07 1.87 1.72 1.62
	2p (18.86)	As^{79} 9.0m	β^-	0.096 0.43 0.36	100.0 2.0 1.5	49.31 0.98 0.74
	np (17.41)	Se^{79m} 3.9m	IT	0.096	100.0	49.31
	2n (17.97)	Br^{79m} 4.8s	IT	0.21	100.0	49.31
	n (10.16)	Br^{80} 17.6m	EC, β^+, β^-	0.618 0.666	6.0 1.0	2.95 0.49
$_{36}Kr^{78}$ (0.354)	nα (16.47)	Se^{73m} 42m	β^+, EC	0.0658	75.0	0.265
		Se^{73} 7.1h	β^+, EC	0.359 0.0658	100.0 100.0	0.354 0.354

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{36}Kr^{78}$ (Cont.) (0.354)	T (19.65)	Br^{75} 1.7h	β^+	0.285	75.0	0.265
	np (18.87)	Br^{76} 16.1h	EC, β^+	0.5593 0.6574 1.86 1.217	56.5 14.0 10.0 10.0	0.200 0.050 0.035 0.035
	p (8.20)	Br^{77m} 4.2m	IT	0.108	100.0	0.354
	2n (20.86)	Kr^{76} 14.8h	EC	0.093 0.267	– –	
$_{36}Kr^{80}$ (2.27)	np (19.80)	Br^{78} 6.5m	β^+, EC	0.615	13.0	0.30
	p (9.11)	Br^{79m} 4.8s	IT	0.21	100.0	2.27
	n (11.51)	Kr^{79m} 55s	IT	0.127	100.0	2.27
$_{36}Kr^{82}$ (11.56)	nα (16.48)	Se^{77m} 17.5s	IT	0.161	100.0	11.56
	np (20.07)	Br^{80} 17.6m	EC, β^+, β^-	0.618 0.666	6.0 1.0	0.69 0.12
	n (10.99)	Kr^{81m} 13s	IT	0.190	100.0	11.56
$_{36}Kr^{83}$ (11.55)	α (6.49)	Se^{79m} 3.9m	IT	0.096	100.0	11.55
	2p (18.17)	Se^{81m} 57m	IT	0.103	100.0	11.55
	T (19.05)	Br^{80} 17.6m	EC, β^+, β^-	0.618 0.666	6.0 1.0	0.69 0.12
$_{36}Kr^{84}$ (56.90)	nα (17.01)	Se^{79m} 3.9m	IT	0.096	100.0	56.90
	He^3 (20.97)	Se^{81m} 57m	IT	0.103	100.0	56.90
$_{36}Kr^{86}$ (17.37)	nα (17.36)	Se^{81m} 57m	IT	0.103	100.0	17.37

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{36}Kr^{86}$ (Cont.) (17.37)	2p (*)	Se^{84} 3.3m	β^- to Br^{84} 31.8m	0.88	28.8	5.00
				1.90	14.6	2.54
				3.91	10.5	1.82
				2.47	7.8	1.36
	np (20.89)	Br^{84} 31.8m	β^-	0.88	28.8	5.00
				1.90	14.6	2.54
				3.91	10.5	1.82
				2.47	7.8	1.36
	p (11.87)	Br^{85} 3.0m	β^- to Kr^{85m} 4.4h	0.1495	77.0	13.37
				0.3050	23.0	4.00
	n (9.85)	Kr^{85m} 4.4h	IT, β^-	0.1495	77.0	13.37
				0.3050	23.0	4.00
$_{37}Rb^{85}$ (72.15)	nα (16.77)	Br^{80} 17.6m	EC, β^+, β^-	0.618	6.0	4.33
				0.666	1.0	0.72
	n (10.47)	Rb^{84m} 20m	IT	0.464	52.0	37.50
				0.250	48.0	34.65
				0.214	48.0	34.65
$_{37}Rb^{87}$ (27.85)	He^3 (21.79)	Br^{84} 31.8m	β^-	0.88	28.8	8.02
				1.90	14.6	4.07
				3.91	10.5	2.92
				2.47	7.8	2.17
	2p (20.49)	Br^{85} 3.0m	β^- to Kr^{85m} 4.4h	0.1495	77.0	21.42
				0.3050	23.0	6.43
	np (18.49)	Kr^{85m} 4.4h	IT, β^-	0.1495	77.0	21.42
				0.3050	23.0	6.43
	n (9.94)	Rb^{86m} 1.04m	IT	0.56	100.0	27.85
$_{38}Sr^{84}$ (0.56)	He^3 (17.90)	Kr^{81m} 13s	IT	0.190	100.0	0.56
	T (20.16)	Rb^{81m} 31m	IT	0.085	100.0	0.56
		Rb^{81} 4.7h	β^+, EC	0.190	74.0	0.41

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Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{39}Y^{89}$ (Cont.) (100.0)	He^3 (19.89)	Rb^{86m} 1.04m	IT	0.56	100.0	100.0
	n,p (18.17)	Sr^{87m} 2.83h	IT	0.388	99.0	99.0
	2n (20.67)	Y^{87m} 14h	IT	0.381	100.0	100.0
	n (11.48)	Y^{88m} 0.30ms	IT	0.394	100.0	100.0
	γ' M4	Y^{89m} 16s	IT	0.91	100.0	100.0
$_{40}Zr^{90}$ (51.46)	nα (18.21)	Sr^{85m} 70m	IT	0.237 and 0.231	86.0	44.26
	He^3 (18.84)	Sr^{87m} 2.83h	IT	0.388	99.0	50.95
	np (19.88)	Y^{88m} 0.30ms	IT	0.394	100.0	51.46
	n (12.00)	Zr^{89m} 4.18m	IT	0.588	94.0	48.40
	γ' E5	Zr^{90m} 0.81s	IT	2.32	94.0	48.40
$_{40}Zr^{91}$ (11.23)	α (5.45)	Sr^{87m} 2.83h	IT	0.388	99.0	11.12
	T (18.57)	Y^{88m} 0.30ms	IT	0.394	100.0	11.23
	p (8.71)	Y^{90m} 3.1h	IT	0.4826 0.2024	99.6 99.6	11.19 11.19
	2n (19.19)	Zr^{89m} 4.18m	IT	0.588	94.0	10.56
	n (7.19)	Zr^{90m} 0.81s	IT	2.32	94.0	10.56
$_{40}Zr^{92}$ (17.11)	n,α (14.09)	Sr^{87m} 2.83h	IT	0.388	99.0	16.94
	np (17.34)	Y^{90m} 3.1h	IT	0.4826 0.2024	99.6 99.6	17.04 17.04

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{40}Zr^{92}$ (Cont.) (17.11)	p (9.40)	Y^{91m} 50m	IT	0.551	100.0	17.11
$_{40}Zr^{94}$ (17.40)	He^3 (18.51)	Sr^{91} 9.67h	β^-	0.551	59.0	10.26
				1.025	30.0	5.22
				0.748	29.0	5.04
				0.645	14.0	2.44
				1.413	7.0	1.22
				0.93	3.0	0.52
	2p (18.93)	Sr^{92} 2.71h	β^- to Y^{92} 3.53h	1.37	90.0	15.66
	T (15.86)	Y^{91m} 50m	IT	0.551	100.0	17.40
	np (17.79)	Y^{92} 3.53h	β^-	0.934	14.0	2.44
				1.40	4.5	0.77
				0.448	2.3	0.40
	p (10.29)	Y^{93} 10.2h	β^-	0.267	6.0	1.04
				0.94	2.0	0.35
$_{40}Zr^{96}$ (2.80)	nα (12.24)	Sr^{91} 9.67h	β^-	0.551	59.0	1.65
				1.025	30.0	0.84
				0.748	29.0	0.81
				0.645	14.0	0.39
				1.413	7.0	0.196
				0.93	3.0	0.084
	α (4.93)	Sr^{92} 2.71h	β^- to Y^{92} 3.53h	1.37	90.0	2.52
	He^3 (20.91)	Sr^{93} 8m	β^-	0.600	95.0	2.66
				0.800	70.0	1.96
				1.100	16.0	0.45
	2p (21.19)	Sr^{94} 1.3m	β^-	1.42	100.0	2.80
	T (16.13)	Y^{93} 10.2h	β^-	0.267	6.0	0.168
				0.94	2.0	0.056
	np (18.52)	Y^{94} 18.7m	β^-	0.912	77.4	2.17
				1.139	8.2	0.23
$_{41}Nb^{93}$ (100.0)	nα (13.43)	Y^{88m} 0.30ms	IT	0.394	100.0	100.0

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{41}Nb^{93}$ (Cont.) (100.0)	α (1.95)	Y^{89m} 16s	IT	0.91	100.0	100.0
	He^3 (15.66)	Y^{90m} 3.1h	IT	0.4826 0.2024	99.6 99.6	99.6 99.6
	2p (15.43)	Y^{91m} 50m	IT	0.551	100.0	100.0
	T (13.38)	Zr^{90m} 0.81s	IT	2.32	94.0	94.0
$_{42}Mo^{92}$ (15.84)	nα (17.65)	Zr^{87} 1.6h	β^+, EC to Y^{87m} 14h	0.381	100.0	15.84
	He^3 (16.89)	Zr^{89m} 4.18m	IT	0.588	94.0	14.89
	T (20.79)	Nb^{89m} 42m	β^+, EC	0.588	94.0	14.89
		Nb^{89} 1.9h	β^+, EC	1.626 3.577 3.838	– – –	
	np (19.50)	Nb^{90m} (1) 10ms	IT	0.257	100.0	15.84
		(2) 18.8s	IT	0.122	100.0	15.84
		Nb^{90} 14.6h	EC, β^+	1.14 0.1415 2.32 2.18 0.1327	97.0 95.0 91.0 8.8 5.8	15.36 15.05 14.41 1.39 0.92
	2n (22.79)	Mo^{90} 5.7h	EC, β^+	0.1224 0.2574 0.1630 0.9415 0.4454 1.271 1.387	100.0 90.0 9.4 9.1 9.1 7.0 3.9	15.84 14.26 1.49 1.44 1.44 1.11 0.62
	n (12.59)	Mo^{91m} 66s	IT EC, β^+	0.658 1.53 1.21	57.0 22.0 16.0	9.02 3.48 2.53
$_{42}Mo^{94}$ (9.04)	nα (14.06)	Zr^{89m} 4.18m	IT	0.588	94.0	8.49

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{42}Mo^{94}$ (Cont.) (9.04)	n (9.69)	Mo^{93m} 6.9h	IT	1.479	100.0	9.04
				0.685	100.0	9.04
				0.264	100.0	9.04
$_{42}Mo^{95}$ (15.72)	2n (17.07)	Mo^{93m} 6.9h	IT	1.479	100.0	15.72
				0.685	100.0	15.72
				0.264	100.0	15.72
$_{42}Mo^{97}$ (9.46)	p (9.18)	Nb^{96} 23.4h	β^-	0.788	80.0	7.57
				0.569	58.0	5.48
				0.720	42.0	3.97
				0.456	26.0	2.46
				1.200	20.0	1.89
				1.499	19.0	1.80
				0.851	18.0	1.70
				0.811	15.0	1.42
$_{42}Mo^{98}$ (23.78)	np (17.83)	Nb^{96} 23.4h	β^-	0.788	80.0	19.02
				0.569	58.0	13.80
				0.720	42.0	9.99
				0.456	26.0	6.18
				1.200	20.0	4.76
				1.499	19.0	4.52
				0.851	18.0	4.28
				0.811	15.0	3.57
	p (9.79)	Nb^{97m} 1.0m	IT	0.747	100.0	23.78
		Nb^{97} 72m	β^-	0.665	98.0	23.30
				1.02	2.0	0.48
$_{42}Mo^{100}$ (9.63)	He^3 (18.18)	Zr^{97} 17.0h	β^-	0.747	95.7	9.29
				1.35	2.7	0.26
	T (15.53)	Nb^{97m} 1.0m	IT	0.747	100.0	9.63
		Nb^{97} 72m	β^-	0.665	98.0	9.44
				1.02	2.0	0.19
	np (18.04)	Nb^{98} 51m	β^-	0.7868	–	
				0.72	–	
$_{44}Ru^{96}$ (5.51)	nα (14.24)	Mo^{91m} 66s	IT	0.658	57.0	3.14
			EC, β^+	1.53	22.0	1.21
				1.21	16.0	0.88

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{44}Ru^{96}$ (Cont.) (5.51)	T (17.42)	Tc^{83m} 43m	IT EC	0.390 2.66	82.0 18.0	4.52 0.99
		Tc^{93} 2.7h	EC,β^+	1.35 1.479	65.0 32.0	3.59 1.76
	np (17.29)	Tc^{94m} 53m	EC,β^+	0.871 1.53 1.87 2.74	90.7 10.0 8.7 4.9	4.99 0.55 0.48 0.27
		Tc^{94} 293m (4.8h)	EC,β^+	0.871 0.849 0.702	100.0 100.0 100.0	5.51 5.51 5.51
	p (7.31)	Tc^{95} 20.0h	EC	0.7645 0.822 1.06	82.0 7.2 5.0	4.52 0.40 0.28
	n (10.12)	Ru^{95} 1.7h	EC,β^+	0.340 1.09 0.625 1.43	75.0 21.0 14.0 5.0	4.13 1.16 0.77 0.28
$_{44}Ru^{98}$ (1.87)	T (17.12)	Tc^{95} 20.0h	EC	0.7645 0.822 1.06	82.0 7.2 5.0	1.53 0.13 0.09
$_{44}Ru^{100}$ (12.62)	p (9.18)	Tc^{99m} 6.0h	IT	0.1405	100.0	12.62
$_{44}Ru^{101}$ (17.07)	np (15.99)	Tc^{99m} 6.0h	IT	0.1405	100.0	17.07
	p (9.39)	Tc^{100} 17s	β^-	0.540 0.60	– –	
$_{44}Ru^{102}$ (31.61)	T (16.72)	Tc^{99m} 6.0h	IT	0.1405	100.0	31.61
	np (18.61)	Tc^{100} 17s	β^-	0.540 0.60	– –	
	p (10.06)	Tc^{101m} 0.7ms	IT	0.191	100.0	31.61
		Tc^{101} 14.0m	β^-	0.3067 0.5449	88.0 7.0	27.80 2.21

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{44}Ru^{104}$ (18.58)	He^3 (19.52)	Mo^{101} 14.6m	β^-	0.191	28.0	5.20
				1.02	26.0	4.83
				0.59	20.5	3.81
				2.08	16.0	2.97
				0.51	15.3	2.84
				1.56	11.0	2.04
				1.18	11.0	2.04
				0.70	11.0	2.04
				1.38	9.0	1.67
	T (16.72)	Tc^{101m} 0.7ms	IT	0.191	100.0	18.58
		Tc^{101} 14.0m	β^-	0.3067	88.0	16.35
				0.5449	7.0	1.30
	p (10.46)	Tc^{103} 50s	β^-	0.135	–	
				0.21	–	
				0.35	–	
$_{45}Rh^{103}$ (100.0)	α (3.11)	Tc^{99m} 6.0h	IT	0.1405	100.0	100.0
	He^3 (17.10)	Tc^{100} 17s	β^-	0.540	–	
				0.60	–	
	2p (16.27)	Tc^{101m} 0.7ms	IT	0.191	100.0	100.0
		Tc^{101} 14.0m	β^-	0.3067	88.0	88.0
				0.5449	7.0	7.0
$_{46}Pd^{102}$ (0.96)	T (17.35)	Rh^{99m} 4.7h	EC, β^+	0.340	70.0	0.67
				0.615	20.0	0.19
	n (10.36)	Pd^{101} 8.4h	EC, β^+	0.2961	28.0	0.27
				0.5903	24.0	0.23
$_{46}Pd^{105}$ (22.23)	p (8.78)	Rh^{104m} 4.41m	IT	0.09711	–	
				0.07755	–	
				0.05143	–	
		Rh^{104} 43s	β^-	0.05555	2.0	0.44
$_{46}Pd^{106}$ (27.33)	np (18.32)	Rh^{104m} 4.41m	IT	0.09711	–	
				0.07755	–	
				0.05143	–	
		Rh^{104} 43s	β^-	0.5555	2.0	0.54

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{46}Pd^{106}$ (Cont.) (27.33)	p (9.33)	Rh^{105m} 45s	IT	0.1294	100.0	27.33
$_{46}Pd^{108}$ (26.71)	He^3 (18.46)	Ru^{105} 4.44h	β^-	0.726	50.0	13.36
				0.1294	29.6	7.81
				0.47	18.4	4.92
				0.68	12.0	3.21
				0.315	9.4	2.51
				0.263	7.6	2.03
	T (16.61)	Rh^{105m} 45s	IT	0.1294	100.0	26.71
	np (18.52)	Rh^{106} 30s	β^-	0.5118	18.0	4.81
				0.622	8.0	2.14
				1.278	3.0	0.80
		Rh^{106} 130m	β^-	0.5118	59.0	15.76
				0.735	28.0	7.48
				0.82	24.0	6.42
				0.45	21.0	5.61
				0.62	19.0	5.08
				1.055	17.0	4.54
				1.555	12.0	3.20
				0.470	12.0	3.20
				0.220	12.0	3.20
				1.225	11.0	2.94
	p (9.96)	Rh^{107} 22m	β^-	0.307	73.0	19.50
				0.39	10.0	2.67
	n (9.23)	Pd^{107m} 22s	IT	0.21	100.0	26.71
$_{46}Pd^{110}$ (11.81)	nα (12.84)	Ru^{105} 4.44h	β^-	0.726	50.0	5.91
				0.1294	29.6	3.50
				0.47	18.4	2.17
				0.68	12.0	1.42
				0.315	9.4	1.11
				0.263	7.6	0.90
	He^3 (19.56)	Ru^{107} 4.2m	β^- to Rh^{107} 22m	0.195	14.0	1.65
				0.86	7.0	0.83
				0.37	6.0	0.71
				1.29	4.0	0.47
				1.03	4.0	0.47
				0.93	4.0	0.47

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{46}Pd^{110}$ (Cont.) (11.81)	2p (19.22)	Ru^{108} 4.5m	β^- to Rh^{108} 17s	0.4338 0.165 0.615	39.0 28.0 22.0	4.61 3.31 2.60
	np (18.70)	Rh^{108} 17s	β^-	0.4338 0.615	39.0 22.0	4.61 2.60
	p (10.53)	Rh^{109m} 50s	IT	0.11	–	
		Rh^{109} 30s	β^-	0.49 0.31	– –	
	n (8.81)	Pd^{109m} 4.7m	IT	0.188	100.0	11.81
		Pd^{109} 13.47h	β^- to Ag^{109m} 40s	0.0877	100.0	11.81
$_{47}Ag^{107}$ (51.82)	He^3 (16.39)	Rh^{104m} 4.41m	IT	0.09711 0.07755 0.05143	– – –	
		Rh^{104} 43s	β^-	0.5555	2.0	1.04
	2p (15.11)	Rh^{105m} 45s	IT	0.1294	100.0	51.82
	n (9.53)	Ag^{106} 24.0m	EC, β^+	0.5118	16.0	8.29
	γ' E3	Ag^{107m} 44.3s	IT	0.0931	100.0	51.82
$_{47}Ag^{109}$ (48.18)	nα (12.27)	Rh^{104m} 4.41m	IT	0.09711 0.07755 0.05143	– – –	
		Rh^{104} 43s	β^-	0.5555	2.0	0.96
	α (3.28)	Rh^{105m} 45s	IT	0.1294	100.0	48.18
	He^3 (17.28)	Rh^{106} 30s	β^-	0.5118 0.622 1.278	18.0 8.0 3.0	8.67 3.75 1.45
		Rh^{106} 130m	β^-	0.5118 0.735 0.82	59.0 28.0 24.0	28.42 13.49 11.56

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{47}Ag^{109}$ (Cont.) (48.18)	He^3 (Cont.) (17.28)	Rh^{106} (Cont.) 130m		0.45	21.0	10.12
				0.62	19.0	9.16
				1.055	17.0	8.19
				1.555	12.0	5.78
				0.470	12.0	5.78
				0.220	12.0	5.78
				1.225	11.0	5.30
	2p (16.44)	Rh^{107} 22m	β^-	0.307	73.0	35.18
				0.39	10.0	4.82
	np (15.71)	Pd^{107m} 22s	IT	0.21	100.0	48.18
	2n (16.46)	Ag^{107m} 44.3s	IT	0.0931	100.0	48.18
	n (9.18)	Ag^{108} 2.42m	β^-	0.6332	1.8	0.87
	γ' E3	Ag^{109m} 40s	IT	0.0877	100.0	48.18
$_{48}Cd^{106}$ (1.22)	nα (11.99)	Pd^{101} 8.4h	EC, β^+	0.2961	28.0	0.34
				0.5903	24.0	0.29
	T (17.21)	Ag^{103m} 5.7s	IT	0.138	100.0	1.22
		Ag^{103} 66m	EC, β^+	0.27	–	
				0.15	–	
				0.12	–	
	np (17.35)	Ag^{104m} 30m	EC, β^+	0.5555	70.0	0.84
		Ag^{104} 67m	EC, β^+	0.5555	–	
				0.767	–	
				0.938	–	
	2n (19.33)	Cd^{104} 57m	EC to Ag^{104m} 30m	0.0836	100.0	1.22
				0.5555	70.0	0.84
$_{48}Cd^{108}$ (0.88)	np (17.67)	Ag^{106} 24.0m	EC, β^+	0.5118	16.0	0.05
	p (8.13)	Ag^{107m} 44.3s	IT	0.0931	100.0	0.88
	n (10.33)	Cd^{107} 6.5h	EC, β^+ to Ag^{107m}	0.0931	99.6	0.88

NRL Report 7554

Photonuclear Activation Analysis with Ge(Li) Detectors

A Compilation

M. ELAINE TOMS

Linac Branch
Nuclear Sciences Division

February 20, 1973

NAVAL RESEARCH LABORATORY
Washington, D.C.

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{48}Cd^{113}$ (12.26)	α (3.86)	Pd^{109m} 4.7m	IT	0.188	100.0	12.26
		Pd^{109} 13.47h	β−	0.0877	100.0	12.26
	T (16.52)	Ag^{110} 24.4s	β−	0.6575	4.5	0.55
	np (16.21)	Ag^{111m} 74s	IT	0.07	100.0	12.26
	p (9.76)	Ag^{112} 3.2h	β−	0.617	40.0	4.90
	2n (15.94)	Cd^{111m} 48.6m	IT	0.247 0.150	100.0 100.0	12.26 12.26
$_{49}Cd^{114}$ (28.85)	nα (12.91)	Pd^{109m} 4.7m	IT	0.188	100.0	28.85
		Pd^{109} 13.47h	β−	0.0877	100.0	28.85
	He^3 (18.94)	Pd^{111} 22m	β− to Ag^{111m} 74s	0.07	100.0	28.85
	T (16.77)	Ag^{111m} 74s	IT	0.07	100.0	28.85
	np (18.81)	Ag^{112} 3.2h	β−	0.617	40.0	11.54
	p (10.27)	Ag^{113} 1.2m	β−	0.30 0.56 0.70	– – –	
		Ag^{113} 5.3h	β−	0.30 0.67 0.12	– – –	
$_{48}Cd^{116}$ (7.58)	nα (13.20)	Pd^{111} 22m	β− to Ag^{111m} 74s	0.07	100.0	7.58
	T (16.62)	Ag^{113} 1.2m	β−	0.30 0.56 0.70	– – –	
		Ag^{113} 5.3h	β−	0.30 0.67 0.12	– – –	

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Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{50}Sn^{112}$ (0.96)	nα (12.15)	Cd^{107} 6.5h	EC, β^+ to Ag^{107m}	0.0931	99.6	0.96
	np (17.59)	In^{110} 67m	EC, β^+	0.6576	99.0	0.95
		In^{110} 4.9h	EC, β^+	0.6576	–	
				0.8845	–	
				0.9374	–	
				0.642	–	
				0.707	–	
	2n (*)	Sn^{110} 4.0h	EC	0.283	100.0	0.96
				0.6575	–	
	n (11.08)	Sn^{111} 35m	EC, β^+	1.14	1.7	0.02
$_{50}Sn^{114}$ (0.66)	He^3 (16.25)	Cd^{111m} 48.6m	IT	0.247	100.0	0.66
				0.150	100.0	0.66
	np (17.94)	In^{112m} 20.7m	IT	0.156	100.0	0.66
	p (8.52)	In^{113m} 100m	IT	0.393	100.0	0.66
	n (10.32)	Sn^{113m} 20m	IT	0.079	91.0	0.60
$_{50}Sn^{115}$ (0.35)	α (3.21)	Cd^{111m} 48.6m	IT	0.247	100.0	0.35
				0.150	100.0	0.35
	T (17.00)	In^{112m} 20.7m	IT	0.156	100.0	0.35
	np (16.05)	In^{113m} 100m	IT	0.393	100.0	0.35
	p (8.74)	In^{114m} 42ms	IT	0.502	100.0	0.35
	2n (17.86)	Sn^{113m} 20m	IT	0.079	91.0	0.32
$_{50}Sn^{116}$ (14.30)	nα (12.77)	Cd^{111m} 48.6m	IT	0.247	100.0	14.30
				0.150	100.0	14.30
	T (17.13)	In^{113m} 100m	IT	0.393	100.0	14.30

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{50}Sn^{116}$ (Cont.) (14.30)	np (18.30)	In^{114m} 42ms	IT	0.502	100.0	14.30
	p (9.26)	In^{115m} 4.50h	IT	0.355	95.0	13.58
$_{50}Sn^{117}$ (7.61)	T (16.76)	In^{114m} 42ms	IT	0.502	100.0	7.61
	np (16.21)	In^{115m} 4.50h	IT	0.355	95.0	7.23
	p (9.49)	In^{116m} 2.16s	IT to level 54.0m	0.164	100.0	7.61
		54.0m	β^-	1.293	80.0	6.09
				1.097	52.0	3.96
				0.417	37.0	2.82
				2.109	21.0	1.60
				0.8187	17.0	1.29
				1.508	11.0	0.84
$_{50}Sn^{118}$ (24.03)	T (17.06)	In^{115m} 4.50h	IT	0.355	95.0	22.82
	np (18.82)	In^{116m} 2.16s	IT to level 54.0m	0.164	100.0	24.03
		54.0m	β^-	1.293	80.0	19.22
				1.097	52.0	12.50
				0.417	37.0	8.89
				2.109	21.0	5.04
				0.8187	17.0	4.09
				1.508	11.0	2.64
	p (10.02)	In^{117m} 1.93h	IT	0.314	47.0	11.29
			β^-	0.158	16.0	3.84
		In^{117} 44m	β^-	0.56	100.0	24.03
				0.158	100.0	24.03
$_{50}Sn^{119}$ (8.58)	2p (18.24)	Cd^{117m} 3.4h	β^-	0.314	39.2	3.36
				0.273	16.5	1.42
				1.998	13.9	1.19
				0.345	11.9	1.02
				0.880	10.5	0.90
				1.433	10.4	0.89
				1.065	9.3	0.80
				1.723	7.8	0.67
				1.408	7.1	0.61

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{50}Sn^{119}$	2p	Cd^{117m}		1.338	7.1	0.61
(Cont.)	(Cont.)	(Cont.)		1.233	7.1.	0.61
(8.58)	(18.24)	3.4h		0.748	7.0	0.60
				0.434	3.8	0.33
				0.089	2.1	0.18
		Cd^{117}	β^-	0.314	93.3	8.00
		2.4h		0.273	28.0	2.40
				1.303	19.0	1.63
				0.345	17.2	1.48
				1.577	16.0	1.37
				0.434	13.9	1.19
				0.089	7.6	0.65
				0.880	2.2	0.19
	T	In^{116m}	IT to level	0.164	100.0	8.58
	(16.82)	2.16s	54.0m			
		54.0m		1.293	80.0	6.86
				1.097	52.0	4.46
				0.417	37.0	3.18
				2.109	21.0	1.80
				0.8187	17.0	1.46
				1.508	11.0	0.94
	np	In^{117m}	IT	0.314	47.0	4.03
	(16.50)	1.93h	β^-	0.158	16.0	1.37
		In^{117}	β^-	0.56	100.0	8.58
		44m		0.158	100.0	8.58
	p	In^{118}	β^-	1.230	15.0	1.29
	(9.90)	5s				
		In^{118}	β^-	1.230	96.7	8.30
		4.4m		1.049	83.6	7.17
				0.69	42.4	3.64
				0.64	10.1	0.87
				0.44	7.0	0.60
				1.25	6.0	0.51
				0.81	5.0	0.43
$_{50}Sn^{120}$	He^3	Cd^{117m}	β^-	0.314	39.2	12.88
(32.85)	(19.63)	3.4h		0.273	16.5	5.42
				1.998	13.9	4.57
				0.345	11.9	3.91
				0.880	10.5	3.45
				1.433	10.4	3.42
				1.065	9.3	3.11
				1.723	7.8	2.56

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{50}Sn^{120}$ (Cont.) (32.85)	He^3 (Cont.) (19.63)	Cd^{117m} (Cont.) 3.4h		1.408	7.1	2.33
				1.338	7.1	2.33
				1.233	7.1	2.33
				0.748	7.0	2.30
				0.434	3.8	1.25
				0.089	2.1	0.69
		Cd^{117} 2.4h	β^-	0.314	93.3	30.65
				0.273	28.0	9.20
				1.303	19.0	6.24
				0.345	17.2	5.65
				1.577	16.0	5.26
				0.434	13.9	4.57
				0.089	7.6	2.50
				0.880	2.2	0.72
	T (17.13)	In^{117m} 1.93h	IT	0.314	47.0	15.44
			β^-	0.158	16.0	5.26
		In^{117} 44m	β^-	0.56	100.0	32.85
				0.158	100.0	32.85
	np (19.01)	In^{118} 5s	β^-	1.230	15.0	4.92
		In^{118} 4.4m	β^-	1.230	96.7	31.77
				1.049	83.6	27.47
				0.69	42.4	13.92
				0.64	10.1	3.32
				0.44	7.0	2.30
				1.25	6.0	1.97
				0.81	5.0	1.64
	p (10.82)	In^{119m} 18m	IT	0.30	5.0	1.64
			β^-	0.82	4.75	1.56
				0.922	2.5	0.82
				0.898	2.5	0.82
		In^{119} 2.1m	β^-	0.82	95.0	31.21
				0.73	5.0	1.64
$_{50}Sn^{122}$ (4.72)	nα (14.03)	Cd^{117m} 3.4h	β^-	0.314	39.2	1.85
				0.273	16.5	0.78
				1.998	13.9	0.66
				0.345	11.9	0.56
				0.880	10.5	0.50
				1.433	10.4	0.49
				1.065	9.3	0.44
				1.723	7.8	0.37
				1.408	7.1	0.34

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{50}Sn^{122}$	nα	Cd^{117m}		1.338	7.1	0.34
(Cont.)	(Cont.)	(Cont.)		1.233	7.1	0.34
(4.72)	(14.03)	3.4h		0.748	7.0	0.33
				0.434	3.8	0.18
				0.089	2.1	0.10
		Cd^{117}	β^-	0.314	93.3	4.41
		2.4h		0.273	28.0	1.32
				1.303	19.0	0.90
				0.345	17.2	0.81
				1.577	16.0	0.76
				0.434	13.9	0.66
				0.089	7.6	0.36
				0.880	2.2	0.10
	He^3	Cd^{119}	β^- to	0.30	5.0	0.24
	(20.80)	10m	In^{119m}	0.82	4.75	0.22
			18m	0.922	2.5	0.12
				0.898	2.5	0.12
	T	In^{119m}	IT	0.30	5.0	0.24
	(17.32)	18m		0.82	4.75	0.22
			β^-	0.922	2.5	0.12
				0.898	2.5	0.12
		In^{119}	β^-	0.82	95.0	4.48
		2.1m		0.73	5.0	0.24
	np	In^{120}	β^-	1.171	15.0	0.71
	(19.60)	3.2s				
		In^{120}	β^-	1.171	100.0	4.72
		46s		1.03	61.0	2.88
				0.86	34.0	1.60
				1.87	7.0	0.33
	p	In^{121}	β^-	0.94	100.0	4.72
	(11.62)	30s				
$_{50}Sn^{124}$	nα	Cd^{119}	β^- to	0.30	5.0	0.30
(5.94)	(14.66)	10m	In^{119m}	0.82	4.75	0.28
			18m	0.922	2.5	0.15
				0.898	2.5	0.15
	T	In^{121}	β^-	0.94	100.0	5.94
	(17.58)	30s				
	np	In^{122}	β^-	1.41	–	
	(20.28)	8s		0.99	–	

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{50}Sn^{124}$ (Cont.) (5.94)	p (12.23)	In^{123} 10s	β^-	1.1	–	
	n (8.51)	Sn^{123m} 40m	β^-	0.1602	100.0	5.94
$_{51}Sb^{121}$ (57.25)	nα (11.89)	In^{116m} 2.16s	IT to level 54.0m	0.164	100.0	57.25
		54.0m	β^-	1.293	80.0	45.80
				1.097	52.0	29.77
				0.417	37.0	21.18
				2.109	21.0	12.02
				0.8187	17.0	9.74
				1.508	11.0	6.30
	α (3.09)	In^{117m} 1.93h	IT	0.314	47.0	26.90
			β^-	0.158	16.0	9.16
		In^{117} 44m	β^-	0.56	100.0	57.25
				0.158	100.0	57.25
	He^3 (17.07)	In^{118} 5s	β^-	1.230	15.0	8.59
		In^{118} 4.4m	β^-	1.230	96.7	55.36
				1.049	83.6	47.87
				0.69	42.4	24.28
				0.64	10.1	5.78
				0.44	7.0	4.01
				1.25	6.0	3.43
				0.81	5.0	2.86
	n (9.25)	Sb^{120} 15.9m	EC, β^+	1.171	1.3	0.74
$_{51}Sb^{123}$ (42.75)	nα (12.27)	In^{118} 5s	β^-	1.230	15.0	6.41
		In^{118} 4.4m	β^-	1.230	96.7	41.34
				1.049	83.6	35.73
				0.69	42.4	18.12
				0.64	10.1	4.32
				0.44	7.0	2.99
				1.25	6.0	2.57
				0.81	5.0	2.14
	α (4.08)	In^{119m} 18m	IT	0.30	5.0	2.14
			β^-	0.82	4.75	2.03
				0.922	2.5	1.07
				0.898	2.5	1.07

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{51}Sb^{123}$ (Cont.) (42.75)	α (Cont.) (4.08)	In^{119m} 2.1m	β^-	0.82 0.73	95.0 5.0	40.61 2.14
	He^3 (18.46)	In^{120} 3.2s	β^-	1.171	15.0	6.42
		In^{120} 46s	β^-	1.171 1.03 0.86 1.87	100.0 61.0 34.0 7.0	42.75 26.08 14.54 2.99
	n (8.98)	Sb^{122m} 4.2m	IT	0.075 0.061	100.0 100.0	42.75 42.75
$_{52}Te^{120}$ (0.089)	T (15.78)	Sb^{117} 2.8h	EC,β^+	0.158	100.0	0.089
	np (16.80)	Sb^{118m} 5.1h	EC,β^+	1.230 0.2535 1.049	99.0 99.0 91.0	0.088 0.088 0.081
	n (10.28)	Te^{119} 15.9h	EC,β^+	0.645	85.0	0.076
$_{52}Te^{122}$ (2.46)	np (17.24)	Sb^{120} 15.9m	EC,β^+	1.171	1.3	0.32
$_{52}Te^{123}$ (0.87)	T (15.70)	Sb^{120} 15.9m	EC,β^+	1.171	1.3	0.011
	p (8.13)	Sb^{122m} 4.2m	IT	0.075 0.061	100.0 100.0	0.87 0.87
$_{52}Te^{124}$ (4.61)	np (17.54)	Sb^{122m} 4.2m	IT	0.075 0.061	100.0 100.0	4.61 4.61
$_{52}Te^{125}$ (6.99)	T (15.66)	Sb^{122m} 4.2m	IT	0.075 0.061	100.0 100.0	6.99 6.99
	p (8.74)	Sb^{124m} 21m	IT to level 93s	<0.050		
		93s	IT,β^-	0.644 0.603 0.505	20.0 20.0 20.0	1.40 1.40 1.40
$_{52}Te^{126}$ (18.71	He^3 (17.18)	Sn^{123m} 40m	β^-	0.1602	100.0	18.71

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{52}Te^{126}$ (Cont.) (18.71)	np (17.83)	Sb^{124m} 21 m	IT to level 93s	<0.050		
		93s	IT, β^-	0.644	20.0	3.74
				0.603	20.0	3.74
				0.505	20.0	3.74
$_{52}Te^{128}$ (31.79)	nα (11.67)	Sb^{123m} 40 m	β^-	0.1602	100.0	31.79
	He^3 (17.98)	Sn^{125m} 9.7 m	β^-	0.325	98.0	31.15
	np (18.01)	Sb^{126m} 19 m	β^-	0.41	–	
				0.67	–	
$_{52}Te^{130}$ (34.48)	nα (11.90)	Sn^{125m} 9.7 m	β^-	0.325	98.0	33.79
	He^3 (18.67)	Sn^{127} 4 m	β^-	0.49	100.0	34.48
	np (18.00)	Sb^{128} 11 m	β^-	0.743	100.0	34.48
				0.75	39.0	13.45
				0.320	58.0	20.00
		Sb^{128} 9h	β^-	0.75	–	
				0.64	–	
				0.53	–	
				0.310	–	
	n (8.39)	Te^{129} 69 m	β^-	0.460	13.5	4.66
				0.487	2.5	0.86
				1.083	1.0	0.34
$_{53}I^{127}$ (100.0)	nα (11.16)	Sb^{122m} 4.2 m	IT	0.075	100.0	100.0
				0.061	100.0	100.0
	He^3 (16.33)	Sb^{124m} 21 m	IT to level 93s	<0.050		
		93s	IT, β^-	0.644	20.0	20.0
				0.603	20.0	20.0
				0.505	20.0	20.0
$_{54}Xe^{124}$ (0.096)	nα (10.76)	Te^{119} 15.9h	EC, β^+	0.645	85.0	0.082
	T (16.45)	I^{121} 2.1h	EC, β^+	0.2122	90.0	0.086

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{54}Xe^{124}$ (Cont.) (0.096)	np (16.66)	I^{122} 3.5m	β^+	0.564	10.0	0.010
	p (6.93)	I^{123} 13.3h	EC	0.159	99.0	0.095
	n (10.5)	Xe^{123} 2.1h	EC,β^+	0.1486 0.329 0.178	– – –	
$_{54}Xe^{126}$ (0.090)	T (16.29)	I^{123} 13.3h	EC	0.159	99.0	0.089
	n (10.25)	Xe^{125m} 55s	IT	0.110 0.075	100.0 100.0	0.090 0.090
		Xe^{125} 17h	EC	0.2424 0.1876 0.1131 0.0746 0.0547	– – – – –	
$_{54}Xe^{128}$ (1.92)	n (9.64)	Xe^{127m} 75s	IT	0.175 0.124	100.0 100.0	1.92 1.92
$_{54}Xe^{129}$ (26.44)	p (8.27)	I^{128} 25.0m	β^-	0.441 0.528	14.4 1.4	3.81 0.37
	2n (16.56)	Xe^{127m} 75s	IT	0.175 0.124	100.0 100.0	26.44 26.44
$_{54}Xe^{130}$ (4.08)	np (17.53)	I^{128} 25.0m	β^-	0.441 0.528	14.4 1.4	0.59 0.057
$_{54}Xe^{131}$ (21.18)	2p (16.17)	Te^{129} 69m	β^-	0.460 0.487 1.083	13.5 2.5 1.0	2.86 0.53 0.21
	T (15.65)	I^{128} 25.0m	β^-	0.441 0.528	14.4 1.4	3.05 0.30
	p (8.77)	I^{130m} 8.9m	IT,β^-	0.536	14.0	2.97
		I^{130} 12.4h	β^-	0.536 0.669 0.743 0.419 1.15	100.0 100.0 87.0 35.0 13.0	21.18 21.18 18.43 7.42 2.75

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{54}Xe^{132}$ (26.69)	He^3 (17.18)	Te^{129} 69m	β^-	0.460	13.5	2.60
				0.487	2.5	0.67
				1.083	1.0	0.27
	np (17.70)	I^{130m} 8.9m	IT, β^-	0.536	14.0	3.73
		I^{130} 12.4h	β^-	0.536	100.0	26.69
				0.669	100.0	26.69
				0.743	87.0	23.21
				0.419	35.0	9.34
				1.15	13.0	3.47
$_{54}Xe^{134}$ (10.44)	nα (11.58)	Te^{129} 69m	β^-	0.460	13.5	1.41
				0.487	2.5	0.26
				1.083	1.0	0.10
	He^3 (17.89)	Te^{131} 25m	β^-	0.150	68.0	7.10
				0.453	16.0	1.67
				1.147	6.0	0.63
				0.493	5.0	0.52
				0.603	4.0	0.42
	np (17.77)	I^{132} 2.3h	β^-	0.668	100.0	10.44
				0.773	65.0	6.78
				0.523	21.0	2.19
				0.955	20.0	2.09
				0.728	14.0	1.46
				0.630	10.0	1.04
				0.651	8.0	0.84
$_{54}Xe^{136}$ (8.87)	nα (11.76)	Te^{131} 25m	β^-	0.150	68.0	6.03
				0.453	16.0	1.42
				1.147	6.0	0.53
				0.493	5.0	0.44
				0.603	4.0	0.35
	He^3 (18.07)	Te^{133m} 50m	IT	0.334	13.0	1.15
			β^-	0.754	85.0	7.54
		Te^{133} 12.5m	β^-	0.91	57.0	5.06
				0.432	50.0	4.44
				0.557	35.0	3.10
				0.70	24.0	2.13
				0.47	22.0	1.95
				0.31	21.0	1.86
				0.63	18.0	1.60

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{54}Xe^{136}$ (Cont.) (8.87)	2p (*)	Te^{134} 42m	β^- to I^{134} 52.8m	0.85	95.0	8.42
				0.89	67.0	5.94
				1.15	23.0	2.04
				1.07	12.0	1.06
				0.61	8.0	0.71
				0.86	5.0	0.44
				1.79	4.6	0.41
	np (17.81)	I^{134} 52.8m	β^-	0.85	95.0	8.42
				0.89	67.0	5.94
				1.15	23.0	2.04
				1.07	12.0	1.06
				0.61	8.0	0.71
				0.86	5.0	0.44
				1.79	4.6	0.41
	p (9.90)	I^{135} 6.7h	β^-	1.14	37.0	3.28
				1.28	34.0	3.02
				1.72	19.0	1.69
				1.46	12.0	1.06
				1.80	11.0	0.98
				0.86	11.0	0.98
	n (7.88)	Xe^{135m} 15.6m	IT	0.527	100.0	8.87
		Xe^{135} 9.2h	β^-	0.250	97.0	8.60
				0.61	3.0	0.27
$_{55}Cs^{133}$ (100.0)	nα (10.94)	I^{128} 25.0m	β^-	0.441	14.4	14.4
				0.528	1.4	1.4
	He^3 (16.16)	I^{130m} 8.9m	IT, β^-	0.536	14.0	14.0
		I^{130} 12.4h	β^-	0.536	100.0	100.0
				0.669	100.0	100.0
				0.743	87.0	87.0
				0.419	35.0	35.0
				1.15	13.0	13.0
$_{56}Ba^{130}$ (0.101)	nα (10.85)	Xe^{125m} 55s	IT	0.110	100.0	0.101
				0.075	100.0	0.101
		Xe^{125} 17h	EC	0.2424	–	
				0.1876	–	
				0.1131	–	
				0.0746	–	
				0.0547	–	

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{56}Ba^{130}$ (Cont.) (0.101)	He^3 (13.98)	Xe^{127m} 75s	IT	0.175 0.124	100.0 100.0	0.101 0.101
	T (16.10)	Cs^{127} 6.2h	EC,β^+	0.411 0.124	– –	
	n (10.26)	Ba^{129} 2.1h 2.6h	EC,β^+	0.182 0.21 1.45 0.172	– – – –	
$_{56}Ba^{132}$ (0.097)	nα (10.60)	Xe^{127m} 75s	IT	0.175 0.124	100.0 100.0	0.097 0.097
$_{56}Ba^{135}$ (6.59)	p (8.48)	Cs^{134m} 2.9h	IT	0.127 0.137	– –	
$_{56}Ba^{136}$ (7.61)	np (17.71)	Cs^{134m} 2.9h	IT	0.127 0.137	– –	
	p (8.66)	Cs^{135m} 53m	IT	0.840 0.781	100.0 100.0	7.61 7.61
$_{56}Ba^{137}$ (11.32)	2p (15.99)	Xe^{135m} 15.6m	IT	0.527	100.0	11.32
		Xe^{135} 9.2h	β^-	0.250 0.61	97.0 3.0	11.98 0.34
	T (16.18)	Cs^{134m} 2.9h	IT	0.127 0.137	– –	
	np (15.61)	Cs^{135m} 53m	IT	0.840 0.781	100.0 100.0	11.32 11.32
	n (6.95)	Ba^{136m} 0.32s	IT	1.05 0.818 0.1637	100.0 100.0 100.0	11.32 11.32 11.32
$_{56}Ba^{138}$ (71.66)	He^3 (16.82)	Xe^{135m} 15.6m	IT	0.527	100.0	71.66
		Xe^{135} 9.2h	β^-	0.250 0.61	97.0 3.0	69.51 2.15
	T (15.67)	Cs^{135m} 53m	IT	0.840 0.781	100.0 100.0	71.66 71.66
	2n (15.49)	Ba^{136m} 0.32s	IT	1.05 0.818 0.1637	100.0 100.0 100.0	71.66 71.66 71.66

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{56}Ba^{138}$ (Cont.) (71.66)	n (8.54)	Ba^{137m} 2.55m	IT	0.6616	100.0	71.66
$_{57}La^{138}$ (0.089)	α (2.34)	Cs^{134m} 2.9h	IT	0.127 0.137	– –	
	He^3 (13.87)	Cs^{135m} 53m	IT	0.840 0.781	100.0 100.0	0.089 0.089
	np (12.93)	Ba^{136m} 0.32s	IT	1.05 0.818 0.1637	100.0 100.0 100.0	0.089 0.089 0.089
	p (5.58)	Ba^{137m} 2.55m	IT	0.6616	100.0	0.089
	2n (16.58)	La^{136m} 0.11s	IT	0.10	–	
		La^{136} 9.5m	EC, β^+	0.818	2.7	0.002
$_{57}La^{139}$ (99.91)	nα (11.13)	Cs^{134m} 2.9h	IT	0.127 0.137	– –	
	α (2.08)	Cs^{135m} 53m	IT	0.840 0.781	100.0 100.0	99.91 99.91
	T (13.24)	Ba^{136m} 0.32s	IT	1.05 0.818 0.1637	100.0 100.0 100.0	99.91 99.91 99.91
	np (14.77)	Ba^{137m} 2.55m	IT	0.6616	100.0	99.91
$_{58}Ce^{136}$ (0.193)	np (16.83)	La^{134} 6.7m	β^+, EC	0.6046	6.2	0.012
	p (7.11)	La^{135} 19.5h	EC	0.481	2.0	0.004
	n (9.99)	Ce^{135} 17.2h	EC, β^+	0.265 0.118 0.087 0.300	– – – –	
$_{58}Ce^{138}$ (0.250)	2p (13.16)	Ba^{136m} 0.32s	IT	1.05 0.818 0.1637	100.0 100.0 100.0	0.25 0.25 0.25

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{58}Ce^{138}$ (Cont.) (0.250)	T (15.94)	La^{135} 19.5h	EC	0.481	2.0	0.005
	np (16.81)	La^{136m} 0.11s	IT	0.10	–	
		La^{136} 9.5m	EC,β^+	0.818	2.7	0.007
	n (9.47)	Ce^{137} 9.0h	EC,β^+	0.482	2.0	0.005
$_{58}Ce^{140}$ (88.48)	α (1.41)	Ba^{136m} 0.32s	IT	1.05 0.818 0.1637	100.0 100.0 100.0	88.48 88.48 88.48
	He^3 (15.04)	Ba^{137m} 2.55m	IT	0.6616	100.0	88.48
	n (9.04)	Ce^{139m} 55s	IT	0.746	100.0	88.48
$_{58}Ce^{142}$ (11.07)	nα (7.11)	Ba^{137m} 2.55m	IT	0.6616	100.0	11.07
	He^3 (14.43)	Ba^{139} 82.9m	β^-	0.16584	27.0	2.99
$_{59}Pr^{141}$ (100.0)	nα (10.30)	La^{136m} 0.22s	IT	0.10	–	
		La^{136} 9.5m	EC,β^+	0.818	2.7	2.70
	np (14.27)	Ce^{139m} 55s	IT	0.746	100.0	100.0
	2n (17.06)	Pr^{139} 4.5h	EC	1.35 1.61 0.27	0.6 0.3 0.3	0.60 0.30 0.30
$_{60}Nd^{142}$ (27.11)	nα (10.19)	Ce^{137} 9.0h	EC,β^+	0.482	2.0	0.54
	He^3 (13.78)	Ce^{139m} 55s	IT	0.746	100.0	27.11
	T (15.80)	Pr^{139} 4.5h	EC	1.35 1.61 0.27	0.6 0.3 0.3	0.16 0.08 0.08

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{60}Nd^{142}$ (Cont.) (27.11)	n (9.81)	Nd^{141} 2.5h	EC	1.13 1.30	1.0 0.6	0.27 0.16
$_{60}Nd^{143}$ (12.17)	α (−0.69)	Ce^{139m} 55s	IT	0.746	100.0	12.17
	p (7.47)	Pr^{142} 19.2h	β^-	1.57	3.7	0.45
$_{60}Nd^{144}$ (23.85)	nα (7.14)	Ce^{139m} 55s	IT	0.746	100.0	23.85
	np (15.30)	Pr^{142} 19.2h	β^-	1.57	3.7	0.88
$_{60}Nd^{145}$ (8.30)	T (12.57)	Pr^{142} 19.2h	β^-	1.57	3.7	0.31
	p (7.95)	Pr^{144} 17.3m	β^-	0.695 2.184	2.0 0.7	0.17 0.06
$_{60}Nd^{146}$ (17.22)	np (15.51)	Pr^{144} 17.3m	β^-	0.695 2.184	2.0 0.7	0.34 0.12
$_{60}Nd^{148}$ (5.73)	2p (16.25)	Ce^{146} 14m	β^-	0.32 0.22 0.142	– – –	
	np (16.04)	Pr^{146} 24m	β^-	0.453 1.51 0.745 0.78 0.59 1.37 0.92	83.0 28.0 20.0 16.0 12.0 6.0 6.0	4.76 1.61 1.15 0.92 0.69 0.34 0.34
	p (9.09)	Pr^{147} 12m	β^-	0.078 0.56 0.34 0.65 0.31 1.26 0.61	41.0 39.0 25.0 24.0 20.0 11.0 10.0	2.35 2.24 1.43 1.38 1.15 0.63 0.57

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{60}Nd^{150}$ (5.60)	α (0.33)	Ce^{146} 14m	β^-	0.32	–	
				0.22	–	
				0.142	–	
	T (12.99)	Pr^{147} 12m	β^-	0.078	41.0	2.30
				0.56	39.0	2.18
				0.34	25.0	1.40
				0.65	24.0	1.34
				0.31	20.0	1.12
				1.26	11.0	0.62
				0.61	10.0	0.56
	np (16.30)	Pr^{148} 2.0m	β^-	0.300	100.0	5.60
	p (*)	Pr^{149} 2.3m	β^-	0.745	–	
				0.155	–	
				0.325	–	
				0.36	–	
				0.08	–	
	n (7.33)	Nd^{149} 1.8h	β^-	0.114	36.4	2.04
				0.210	28.6	1.60
				0.269	20.4	1.14
				0.654	8.5	0.48
				0.424	8.2	0.46
				0.541	7.8	0.44
				0.156	7.5	0.42
				0.327	4.8	0.27
$_{62}Sm^{144}$ (3.09)	nα (10.12)	Nd^{139} 30m	β^+, EC	0.708	–	
				0.983	–	
				0.824	–	
				0.773	–	
				0.737	–	
	He^3 (12.64)	Nd^{141} 2.5h	EC	1.13	1.0	0.031
				1.30	0.6	0.018
	n (10.46)	Sm^{143m} 64s	IT	0.748	100.0	3.09
$_{62}Sm^{152}$ (26.72)	He^3 (15.27)	Nd^{149} 1.8h	β^-	0.114	36.4	9.73
				0.210	28.6	7.64
				0.269	20.4	5.45
				0.654	8.5	2.27
				0.424	8.2	2.19

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-· reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{62}Sm^{152}$	He^3	Nd^{149}		0.541	7.8	2.08
(Cont.)	(Cont.)	(Cont.)		0.156	7.5	2.09
(26.72)	(15.27)	1.8h		0.327	4.8	1.28
	np	Pm^{150}	β^-	0.3340	77.0	20.60
	(16.48)	2.7h		0.831	22.2	5.94
				1.33	22.0	5.88
				1.165	18.9	5.05
				0.88	12.1	3.24
				1.75	9.9	2.65
				0.464	6.7	1.79
$_{62}Sm^{154}$	$n\alpha$	Nd^{149}	β^-	0.114	36.4	8.27
(22.71)	(8.48)	1.8h		0.210	28.6	6.49
				0.269	20.4	4.63
				0.654	8.5	1.93
				0.424	8.2	1.86
				0.541	7.8	1.77
				0.156	7.5	1.70
				0.327	4.8	1.09
	He^3	Nd^{151}	β^-	0.118	53.0	12.04
	(16.32)	12m		0.256	28.0	6.36
				1.180	22.0	5.00
				0.170	20.0	4.54
				0.138	16.0	3.63
				0.737	12.0	2.72
				0.425	12.0	2.72
				1.122	6.0	1.36
				0.176	6.0	1.36
				0.340	3.0	0.68
	np	Pm^{152}	β^-	0.122	–	
	(16.50)	6m		0.245	–	
	p	Pm^{153}	β^-	0.182	–	
	(8.92)	5.5m		0.125	–	
$_{63}Eu^{151}$	n	Eu^{150}	EC,β^+	0.334	3.5	1.66
(47.82)	(7.93)	12.6h		0.464	3.0	1.43
				1.165	0.5	0.24
				0.831	0.5	0.24
$_{63}Eu^{153}$	He^3	Pm^{150}	β^-	0.3340	77.0	40.18
(52.18)	(14.66)	2.7h		0.831	22.2	11.58
				1.33	22.0	11.48
				1.165	18.9	9.86

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{63}Eu^{153}$ (Cont.) (52.18)	He^3 (Cont.) (14.66)	Pm^{150} (Cont.) 2.7h		0.88 1.75 0.464	12.1 9.9 6.7	6.32 5.16 3.49
	n (8.54)	Eu^{152m} 92m	IT	0.0895	100.0	52.18
		Eu^{152m} 9.3h	EC,β^+,β^-	0.12178 0.8416 0.9633 0.34424 1.3893 1.3150	13.6 11.1 9.9 2.8 1.2 1.0	7.10 5.79 5.17 1.46 0.63 0.52
$_{64}Gd^{152}$ (0.20)	np (15.26)	Eu^{150} 12.6h	EC,β^+	0.334 0.464	3.5 3.0	0.007 0.006
$_{64}Gd^{154}$ (2.15)	np (16.12)	Eu^{152m} 96m	IT	0.0895	100.0	2.15
		Eu^{152m} 9.3h	EC,β^+,β^-	0.12178 0.8416 0.9633 0.34424 1.3893 1.3150	13.6 11.1 9.9 2.8 1.2 1.0	0.292 0.239 0.213 0.060 0.026 0.022
$_{64}Gd^{155}$ (14.73)	T (14.10)	Eu^{152m} 96m	IT	0.0895	100.0	14.73
		Eu^{152m} 9.3h	EC,β^+,β^-	0.12178 0.8416 0.9633 0.34424 1.3893 1.3150	13.6 11.1 9.9 2.8 1.2 1.0	2.00 1.64 1.46 0.41 0.18 0.15
$_{64}Gd^{158}$ (24.87)	He^3 (15.42)	Sm^{155} 23m	β^-	0.10435 0.246 0.142	94.0 4.0 2.0	23.38 0.99 0.50
	p (8.42)	Eu^{157} 15.2h	β^-	0.6040 0.0518 0.4773 0.4131 0.3728 0.3618 0.3205	80.0 22.0 10.0 10.0 10.0 10.0 10.0	19.9 5.5 2.5 2.5 2.5 2.5 2.5

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{64}Gd^{160}$ (21.90)	nα (8.25)	Sm^{155} 23m	β^-	0.10435 0.246 0.142	94.0 4.0 2.0	20.59 0.88 0.44
	He^3 (*)	Sm^{157} 0.5m		0.57	–	
	T (13.44)	Eu^{157} 15.2h	β^-	0.6040 0.0518 0.4773 0.4131 0.3728 0.3618 0.3205	80.0 22.0 10.0 10.0 10.0 10.0 10.0	17.52 4.82 2.19 2.19 2.19 2.19 2.19
	np (16.12)	Eu^{158} 46m	β^-	0.080 0.945 1.185 0.898 1.110 0.760 0.610	80.0 36.0 23.0 19.0 7.0 6.0 6.0	17.52 7.88 5.04 4.16 1.53 1.31 1.31
	n (7.38)	Gd^{159} 18.0h	β^-	0.0580 0.363	24.3 12.6	5.32 2.76
$_{65}Tb^{159}$ (100.0)	n (8.18)	Tb^{158m} 11s	IT	0.110	100.0	100.0
$_{66}Dy^{156}$ (0.052)	np (15.97)	Tb^{154} 8.5h Tb^{154} 21h	EC EC	0.1231 0.2481 0.1231 0.2481	– – – –	
	n (9.89)	Dy^{155} 10.2h	EC,β^+	0.2270 1.000 1.091	– – –	
$_{66}Dy^{158}$ (0.090)	n (8.8)	Dy^{157} 8.1h		0.3267	92.14	0.083
$_{66}Dy^{160}$ (2.29)	np (15.61)	Tb^{158m} 11s	IT	0.110	100.0	2.29
$_{66}Dy^{161}$ (18.88)	2p (14.04)	Gd^{159} 18.0h	β^-	0.0580 0.363	24.3 12.6	4.59 2.38

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{66}Dy^{161}$ (Cont.) (18.88)	T (13.57)	Tb^{158m} 11s	IT	0.110	100.0	18.88
$_{66}Dy^{162}$ (25.53)	He^3 (14.53)	Gd^{159} 18.0h	β^-	0.0580 0.363	24.3 12.6	6.21 3.22
$_{66}Dy^{163}$ (24.97)	α (0.20)	Gd^{159} 18.0h	β^-	0.0580 0.363	24.3 12.6	6.07 3.15
	2p (15.48)	Gd^{161} 3.7m	β^-	0.0566 0.3610 0.3153 0.1024 0.2838 0.1653	73.0 70.0 15.0 12.0 8.0 5.0	18.23 17.48 3.75 3.00 2.00 1.25
	p (8.27)	Tb^{162} 7.5m	β^-	0.258 0.0807 0.808 0.887 0.1852	80.0 56.0 44.0 36.0 20.0	19.98 13.98 10.99 8.99 4.99
$_{66}Dy^{164}$ (28.18)	nα (7.86)	Gd^{159} 18.0h	β^-	0.058 0.363	24.3 12.6	6.85 3.55
	He^3 (15.42)	Gd^{161} 3.7m	β^-	0.0566 0.3610 0.3153 0.1024 0.2838 0.1653	73.0 70.0 15.0 12.0 8.0 5.0	19.81 19.72 4.23 3.38 2.25 1.41
	np (15.93)	Tb^{162} 7.5m	β^-	0.258 0.0807 0.808 0.887 0.1852	80.0 56.0 44.0 36.0 20.0	22.54 15.78 12.40 10.15 5.64
	p (8.56)	Tb^{163} 7m	β^-	0.18	–	
		Tb^{163} 6.5h	β^-	0.330 0.235 0.510	41.4 15.0 12.9	11.67 4.23 3.64
$_{67}Ho^{165}$ (100.0)	He^3 (14.36)	Tb^{162} 7.5m	β^-	0.258 0.0807	80.0 56.0	80.0 56.0

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{67}Ho^{165}$	He^3	Tb^{162}		0.808	44.0	44.0
(Cont.)	(Cont.)	(Cont.)		0.887	36.0	36.0
(100.0)	(14.36)	7.5m		0.1852	20.0	20.0
	2p	Tb^{163}	β^-	0.18	–	
	(14.71)	7m				
		Tb^{163}	β^-	0.330	41.4	41.4
		6.5h		0.235	15.0	15.0
				0.510	12.9	12.9
	2n	Ho^{163m}	IT	0.299	100.0	100.0
	(14.60)	1.1s				
	n	Ho^{164}	EC, β^-	0.0915	53.0	53.0
	(8.04)	37m		0.0734	47.0	47.0
$_{68}Er^{162}$	np	Ho^{160m}	IT, EC, β^+	0.0601	66.0	0.090
(0.136)	(15.36)	5.0h		0.729	–	
		Ho^{160}	EC, β^+	0.965	–	
		26m		0.646	–	
				0.1970	–	
	p	Ho^{161m}	IT	0.211	100.0	0.136
	(6.41)	6s				
		Ho^{161}	EC	0.0774	12.2	0.017
		2.5h		0.0438	4.8	0.007
				0.05924	4.8	0.007
				0.10305	3.0	0.004
$_{68}Er^{164}$	T	Ho^{161m}	IT	0.211	100.0	1.56
(1.56)	(13.57)	6s				
		Ho^{161}	EC	0.0774	12.2	0.190
		2.5h		0.05924	4.8	0.075
				0.0438	4.8	0.075
				0.10305	3.0	0.047
	np	Ho^{162m}	IT, EC	0.0578	63.0	0.984
	(15.21)	68m		0.1852	37.0	0.578
				0.0807	37.0	0.578
				1.224	24.0	0.375
				0.940	13.0	0.203
				0.2832	13.0	0.203
		Ho^{162}	EC, β^+	0.0807	56.0	0.874
		15m				
	p	Ho^{163m}	IT	0.299	100.0	1.56
	(6.80)	1.1s				

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{68}Er^{166}$ (33.41)	T (13.52)	Ho^{163m} 1.1s	IT	0.299	100.0	33.41
	np (15.44)	Ho^{164} 37m	EC,β^-	0.0915 0.0734	53.0 47.0	17.71 15.70
$_{68}Er^{167}$ (22.94)	2p (14.35	Dy^{165m} 1.26m Dy^{165} 139.2m	IT,β^- β^-	0.1082 0.514 0.947	97.5 1.7 15.0	22.37 0.39 3.44
	T (13.40)	Ho^{164} 37m	EC,β^-	0.0915 0.0734	53.0 47.0	12.16 10.78
$_{68}Er^{168}$ (27.07)	He^3 (14.40)	Dy^{165m} 1.26m Dy^{165} 139.2m	IT,β^- β^-	0.1082 0.514 0.947	97.5 1.7 15.0	26.39 0.46 4.06
	p (7.99)	Ho^{167} 3.1h	β^-	0.3466 0.3207 0.2078 0.2377 0.0834 0.4034 0.0571 0.3866 0.0737	40.0 34.0 9.5 6.0 6.0 5.0 5.0 4.5 4.5	10.83 9.20 2.57 1.62 1.62 1.35 1.35 1.22 1.22
	n (7.77)	Er^{167m} 2.3s	IT	0.2078	100.0	27.07
$_{68}Er^{170}$ (14.88)	nα (7.00)	Dy^{165m} 1.26m Dy^{165} 139.2m	IT,β^- β^-	0.1082 0.514 0.947	97.5 1.7 15.0	14.51 0.25 2.23
	He^3 (*)	Dy^{167} 4.4m	β^-	0.19 0.57	– –	
	T (12.69)	Ho^{167} 3.1h	β^-	0.3466 0.3207 0.2078 0.2377 0.0834 0.4034 0.0571	40.0 34.0 9.5 6.0 6.0 5.0 5.0	5.96 5.06 1.41 0.89 0.89 0.74 0.74

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{68}Er^{170}$ (Cont.) (14.88)	T (Cont.) (12.69)	Ho^{167} (Cont.) 3.1h		0.3866 0.0737	4.5 4.5	0.67 0.67
	np (15.70)	Ho^{168} 3.3m	β^-	0.85	–	
	p (8.50)	Ho^{169} 4.8m	β^-	0.08 0.76 0.15 0.84 0.68 0.92	66.25 37.5 27.5 18.75 12.5 6.25	9.86 5.58 4.09 2.79 1.86 0.93
$_{69}Tm^{169}$ (100.0)	nα (6.91)	Ho^{164} 37m	EC,β^-	0.0915 0.0734	53.0 47.0	53.0 47.0
	2p (13.55)	Ho^{167} 3.1h	β^-	0.3466 0.3207 0.2078 0.2377 0.0834 0.4034 0.0571 0.3866 0.0737	40.0 34.0 9.5 6.0 6.0 5.0 5.0 4.5 4.5	40.0 34.0 9.5 6.0 6.0 5.0 5.0 4.5 4.5
	np (13.32)	Er^{167m} 2.3s	IT	0.2078	100.0	100.0
$_{70}Yb^{168}$ (0.135)	np (14.75)	Tm^{166} 7.7h	EC,β^+	0.08056 0.1844 0.780 0.7063 0.692 1.277	strong – – – – –	
	n (8.98)	Y^{167} 18m		0.1133 0.1060 0.063 0.0371	92.0 85.0 71.0 21.0	0.124 0.115 0.096 0.028
$_{70}Yb^{170}$ (3.03)	He^3 (12.18)	Er^{167m} 2.3s	IT	0.2078	100.0	3.03
$_{70}Yb^{171}$ (14.31)	α (−1.64)	Er^{167m} 2.3s	IT	0.2078	100.0	14.31

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{70}Yb^{172}$ (22.82)	nα (6.49)	Er^{167m} 2.3s	IT	0.2078	100.0	22.82
$_{70}Yb^{174}$ (31.84)	He^3 (14.36)	Er^{171} 7.52h	β−	0.308	63.0	20.05
				0.116	63.0	20.05
				0.2956	28.0	8.92
				0.124	10.0	3.18
	p (7.98)	Tm^{173} 8.2h	β−	0.399	78.2	24.90
				0.465	19.8	6.30
				0.066	3.2	1.02
$_{70}Yb^{176}$ (12.73)	nα (6.26)	Er^{171} 7.52h	β−	0.308	63.0	8.02
				0.116	63.0	8.02
				0.2956	28.0	3.57
				0.124	10.0	1.27
	He^3 (*)	Er^{173} 12.0m	β− to Tm^{173} 8.2h	0.20	–	
				0.40	–	
				0.18	–	
	T (11.97)	Tm^{173} 8.2h	β−	0.399	78.2	9.96
				0.465	19.8	2.52
				0.066	3.2	0.41
	np (12.69)	Tm^{174} 5.2m	β−	0.273	100.0	12.73
				0.176	100.0	12.73
				0.0765	100.0	12.73
				0.994	98.0	12.35
				0.366	96.2	12.25
				0.50	14.2	1.81
				0.87	5.8	0.74
				0.63	2.0	0.25
	p (8.36)	Tm^{175} 20m	β−	0.513	100.0	12.73
	2n (12.47)	Yb^{174m} 0.8ms	IT	0.273	100.0	12.73
				0.176	100.0	12.73
				0.0765	100.0	12.73
				0.994	98.0	12.48
				0.63	2.0	0.25
	n (6.64)	Yb^{175m} 67ms	IT	0.513	100.0	12.73
$_{71}Lu^{175}$ (97.41)	2p (13.50)	Tm^{173} 8.2h	β−	0.399	78.2	76.20
				0.465	19.8	19.30
				0.066	3.2	3.12

Table 1 (Continued)

Target Nucleus (Abundance)	Photo- · reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{71}Lu^{175}$ (Cont.) (97.41)	p (5.52)	Yb^{174m} 0.8 ms	IT	0.273	100.0	97.41
				0.176	100.0	97.41
				0.0765	100.0	97.41
				0.994	98.0	95.46
				0.63	2.0	1.95
$_{71}Lu^{176}$ (2.59)	He^3 (11.97)	Tm^{173} 8.2 h	β^-	0.399	78.2	2.03
				0.465	19.8	0.51
				0.066	3.2	0.08
	2p (13.93)	Tm^{174} 5.2 m	β^-	0.273	100.0	2.59
				0.176	100.0	2.59
				0.0765	100.0	2.59
				0.994	98.0	2.54
				0.366	96.2	2.47
				0.50	14.2	0.37
				0.87	5.8	0.15
				0.63	2.0	0.05
	np (11.71)	Yb^{174m} 0.8 ms	IT	0.273	100.0	2.59
				0.176	100.0	2.59
				0.0765	100.0	2.59
				0.994	98.0	2.54
				0.63	2.0	0.05
	p (5.88)	Yb^{175m} 67 ms	IT	0.513	100.0	2.59
$_{72}Hf^{174}$ (0.17)	T (12.88)	Lu^{171m} 76 s	IT	0.0712	100.0	0.17
$_{72}Hf^{176}$ (5.20)	2p (11.95)	Yb^{174m} 0.8 ms	IT	0.273	100.0	5.20
				0.176	100.0	5.20
				0.0765	100.0	5.20
				0.994	98.0	5.10
				0.63	2.0	0.10
$_{72}Hf^{177}$ (18.50)	He^3 (10.59)	Yb^{174m} 0.8 ms	IT	0.273	100.0	18.50
				0.176	100.0	18.50
				0.0765	100.0	18.50
				0.994	98.0	18.13
				0.63	2.0	0.37
	2p (12.48)	Yb^{175m} 67 ms	IT	0.513	100.0	18.50

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{72}Hf^{177}$ (Cont.) (18.50)	p (6.60)	Lu^{176m} 3.7h	β^-	0.08836	60.0	11.10
$_{72}Hf^{178}$ (27.14)	α (−2.37)	Yb^{174m} 0.8ms	IT	0.273	100.0	27.14
				0.176	100.0	27.14
				0.0765	100.0	27.14
				0.994	98.0	26.60
				0.63	2.0	0.54
	He^3 (12.38)	Yb^{175m} 67ms	IT	0.513	100.0	27.14
	2p (13.46)	Yb^{176m} 11s	IT	0.38	100.0	27.14
				0.294	100.0	27.14
				0.187	100.0	27.14
				0.093	100.0	27.14
				0.0821	100.0	27.14
	np (14.22)	Lu^{176m} 3.7h	β^-	0.08836	60.0	16.29
$_{72}Hf^{179}$ (13.75)	nα (3.71)	Yb^{174m} 0.8ms	IT	0.273	100.0	13.75
				0.176	100.0	13.75
				0.0765	100.0	13.75
				0.994	98.0	13.47
				0.63	2.0	0.28
	α (−2.13)	Yb^{175m} 67ms	IT	0.513	100.0	13.75
	He^3 (11.81)	Yb^{176m} 11s	IT	0.38	100.0	13.75
				0.294	100.0	13.75
				0.187	100.0	13.75
				0.093	100.0	13.75
				0.0821	100.0	13.75
	2p (14.00)	Yb^{177m} 6.5s	IT	0.228	100.0	13.75
				0.104	100.0	13.75
		Yb^{177} 1.9h	β^-	0.1508	24.5	3.37
				0.1216	9.4	1.29
				1.080	4.7	0.65
				0.1384	2.8	0.39
				1.241	2.6	0.36
	T (11.81)	Lu^{176m} 3.7h	β^-	0.08836	60.0	8.25

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{72}Hf^{179}$ (Cont.) (13.75)	p (7.54)	Lu^{178} 20m	β^- to Hf^{178m} 4.3s	0.4268	100.0	13.75
				0.3257	100.0	13.75
				0.2136	100.0	13.75
				0.0932	100.0	13.75
				0.0888	100.0	13.75
	n (6.07)	Hf^{178m} 4.3s	IT	0.4268	100.0	13.75
				0.3257	100.0	13.75
				0.2136	100.0	13.75
				0.0932	100.0	13.75
				0.0888	100.0	13.75
$_{72}Hf^{180}$ (35.24)	nα (5.21)	Yb^{175m} 67ms	IT	0.513	100.0	35.24
	α (−1.44)	Yb^{176m} 11s	IT	0.38	100.0	35.24
				0.294	100.0	35.24
				0.187	100.0	35.24
				0.093	100.0	35.24
				0.0821	100.0	35.24
	He^3 (13.61)	Yb^{177m} 6.5s	IT	0.228	100.0	35.24
				0.104	100.0	35.24
		Yb^{177} 1.9h	β^-	0.1504	24.5	8.64
				0.1216	9.4	3.31
				1.080	4.7	1.66
				0.1384	2.8	0.99
				1.241	2.6	0.92
	np (14.87)	Lu^{178} 20m	β^- to Hf^{178m} 4.3s	0.4268	100.0	35.24
				0.3257	100.0	35.24
				0.2136	100.0	35.24
				0.0932	100.0	35.24
				0.0888	100.0	35.24
	p (7.89)	Lu^{179} 4.6h	β^-	0.217	13.0	4.58
	2n (13.40)	Hf^{178m} 4.3s	IT	0.4268	100.0	35.24
				0.3257	100.0	35.24
				0.2136	100.0	35.24
				0.0932	100.0	35.24
				0.0888	100.0	35.24
	n (7.33)	Hf^{179m} 18.6s	IT	0.217	99.5	35.06
				0.161	99.5	35.06
				0.375	0.5	0.18

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{73}Ta^{180}$ (0.012)	α (−2.12)	Lu^{176m} 3.7h	β−	0.08836	60.0	0.007
	2p (13.42)	Lu^{178} 20m	β− to Hf^{178m} 4.3s	0.4268	100.0	0.012
				0.3257	100.0	0.012
				0.2136	100.0	0.012
				0.0932	100.0	0.012
				0.0888	100.0	0.012
	np (11.95)	Hf^{178m} 4.3s	IT	0.4268	100.0	0.012
				0.3257	100.0	0.012
				0.2136	100.0	0.012
				0.0932	100.0	0.012
				0.0888	100.0	0.012
	p (5.88)	Hf^{179m} 18.6s	IT	0.217	99.5	0.012
				0.161	99.5	0.012
$_{73}Ta^{181}$ (99.988)	nα (5.52)	Lu^{176m} 3.7h	β−	0.08836	60.0	59.993
	He^3 (13.34)	Lu^{178} 20m	β− to Hf^{178m} 4.3s	0.4268	100.0	99.988
				0.3257	100.0	99.988
				0.2136	100.0	99.988
				0.0932	100.0	99.988
				0.0888	100.0	99.988
	2p (14.08)	Lu^{179} 4.6h	β−	0.217	13.0	13.998
	T (11.11)	Hf^{178m} 4.3s	IT	0.4268	100.0	99.988
				0.3257	100.0	99.988
				0.2136	100.0	99.988
				0.0932	100.0	99.988
				0.0888	100.0	99.988
	np (13.52)	Hf^{179m} 18.6s	IT	0.217	99.5	99.488
				0.161	99.5	99.488
				0.375	0.5	0.50
	p (6.19)	Hf^{180m} 5.5h	IT	0.3325	100.0	99.988
				0.2153	100.0	99.988
				0.0933	100.0	99.988
				0.4436	74.0	73.991
				0.0574	74.0	73.991
				0.512	26.0	25.997
	n (7.64)	Ta^{180m} 8.1h	EC, β−	0.0933	27.0	27.0
				0.103	3.0	3.0

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{74}W^{180}$ (0.14)	2p (11.67)	Hf^{178m} 4.3s	IT	0.4268	100.0	0.14
				0.3257	100.0	0.14
				0.2136	100.0	0.14
				0.0932	100.0	0.14
				0.0888	100.0	0.14
	n (*)	W^{179m} 5.2m	IT	0.2218	100.0	0.14
$_{74}W^{182}$ (26.41)	α (−1.69)	Hf^{178m} 4.3s	IT	0.4268	100.0	26.41
				0.3257	100.0	26.41
				0.2136	100.0	26.41
				0.0932	100.0	26.41
				0.0888	100.0	26.41
	He^3 (12.82)	Hf^{179m} 18.6s	IT	0.217	99.5	26.28
				0.161	99.5	26.28
				0.375	0.5	0.13
	2p (13.20)	Hf^{180m} 5.5h	IT	0.3325	100.0	26.41
				0.2153	100.0	26.41
				0.0933	100.0	26.41
				0.4436	74.0	19.54
				0.0574	74.0	19.54
				0.512	26.0	6.87
	np (14.65)	Ta^{180m} 8.1h	EC,β^-	0.0933	27.0	7.13
				0.103	3.0	0.79
$_{74}W^{183}$ (14.40)	nα (4.50)	Hf^{178m} 4.3s	IT	0.4268	100.0	14.40
				0.3257	100.0	14.40
				0.2136	100.0	14.40
				0.0932	100.0	14.40
				0.0888	100.0	14.40
	α (−1.57)	Hf^{179m} 18.6s	IT	0.217	99.5	14.33
				0.161	99.5	14.33
				0.375	0.5	0.07
	He^3 (11.67)	Hf^{180m} 5.5h	IT	0.3325	100.0	14.40
				0.2153	100.0	14.40
				0.0933	100.0	14.40
				0.4436	74.0	10.66
				0.0574	74.0	10.66
				0.512	26.0	3.74
	T (12.36)	Ta^{180m} 8.1h	EC,β^-	0.0933	27.0	3.89
				0.103	3.0	0.43

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{74}W^{183}$ (Cont.) (14.40)	p (7.14)	Ta^{182m} 16.5m	IT	0.184	99.0	14.26
				0.172	89.0	12.82
				0.147	89.0	12.82
				0.319	11.0	1.58
				0.356	1.0	0.14
$_{74}W^{184}$ (30.64)	nα (5.85)	Hf^{179m} 16s	IT	0.217	99.5	30.49
				0.161	99.5	30.49
				0.375	0.5	0.15
	α (−1.49)	Hf^{180m} 5.5h	IT	0.3325	100.0	30.64
				0.2153	100.0	30.64
				0.0933	100.0	30.64
				0.4436	74.0	22.67
				0.0574	74.0	22.67
				0.512	26.0	7.97
	np (14.56)	Ta^{182m} 16.5m	IT	0.184	99.0	30.33
				0.172	89.0	27.27
				0.147	89.0	27.27
				0.319	11.0	3.37
				0.356	1.0	0.31
	n (7.42)	W^{183m} 5.3s	IT	0.2103	88.5	27.12
				0.0991	54.6	16.73
				0.0526	43.0	13.17
				0.1025	11.5	3.52
				0.1079	9.1	2.79
				0.1605	2.4	0.74
$_{74}W^{186}$ (28.41)	He^3 (14.37)	Hf^{183} 65m	β^-	0.82	–	
				0.46	–	
				0.90	–	
				0.72	–	
				0.40	–	
				0.32	–	
	np (14.93)	Ta^{184} 8.7h	β^-	0.90	–	
				0.41	–	
				0.25	–	
				0.111	–	
				1.16	–	
				0.30	–	
				0.79	–	

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{74}W^{186}$ (Cont.) (28.41)	p (8.33)	Ta^{185} 50m	β^-	0.060	90.0	25.57
				0.175	84.0	23.87
				0.131	10.0	2.84
				0.100	6.0	1.70
				0.075	6.0	1.70
	n (7.21)	W^{185m} 1.6m	IT	0.131	100.0	28.41
				0.060	100.0	28.41
				0.175	93.0	26.42
				0.100	7.0	1.99
				0.075	7.0	1.99
$_{75}Re^{185}$ (37.07)	nα (5.36)	Ta^{180m} 8.1h	EC, β^-	0.0933	27.0	1.00
				0.103	3.0	1.11
	He^3 (12.24)	Ta^{182m} 16.5m	IT	0.184	99.0	36.70
				0.172	89.0	32.99
				0.147	89.0	32.99
				0.319	11.0	4.08
				0.356	1.0	0.37
	np (12.81)	W^{183m} 5.3s	IT	0.2103	88.5	32.81
				0.0991	54.6	20.28
				0.0526	43.0	15.96
				0.1025	11.5	4.27
				0.1079	9.1	3.37
				0.1605	2.4	0.89
	2n (14.47)	Re^{183m} 1.0ms	IT	From 0.11 to 0.30	– –	
$_{75}Re^{187}$ (62.93)	nα (5.22)	Ta^{182m} 16.5m	IT	0.184	99.0	62.30
				0.172	89.0	56.01
				0.147	89.0	56.01
				0.319	11.0	6.92
				0.356	1.0	0.63
	He^3 (13.20)	Ta^{184} 8.7h	β^-	0.90	–	
				0.41	–	
				0.25	–	
				0.111	–	
				1.16	–	
				0.30	–	
				0.79	–	
	2p (14.32)	Ta^{185} 50m	β^-	0.060	90.0	56.64
				0.175	84.0	52.86
				0.131	10.0	6.29

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{75}Re^{187}$ (Cont.) (62.93)	2p (Cont.) (14.32)	Ta^{185} (Cont.) 50m		0.100 0.075	6.0 6.0	3.78 3.78
	np (13.20)	W^{185m} 1.6m	IT	0.131 0.060 0.175 0.100 0.075	100.0 100.0 93.0 7.0 7.0	62.93 62.93 58.52 4.41 4.41
$_{76}Os^{184}$ (0.018)	T (*)	Re^{181} 19h	EC	0.3655 0.1099 0.0650 0.1103 0.1133	– – – – –	
	pn (14.07)	Re^{182} 12.7h	EC, β^+	0.1000 0.0678 0.0847 0.1137	– – – –	
	2n (*)	Os^{182} 22h	EC	0.5099 0.0555 0.1802	– – –	
	n (*)	Os^{183m} 9.9h	IT, EC	0.1707 1.108 1.102 1.035	46.0 22.0 – –	0.008 0.004
		Os^{183} 12h	EC	0.3818 0.1144 0.1679 0.851 0.2362	84.0 84.0 18.0 6.0 6.0	0.015 0.015 0.003 0.001 0.001
$_{76}Os^{186}$ (1.59)	He^3 (11.63)	W^{183m} 5.3s	IT	0.2103 0.0991 0.0526 0.1025 0.1079 0.1605	88.5 54.6 43.0 11.5 9.1 2.4	1.407 0.868 0.684 0.183 0.145 0.038
$_{76}Os^{187}$ (1.64)	α (–2.71)	W^{183m} 5.3s	IT	0.2103 0.0991 0.0526	88.5 54.6 43.0	1.451 0.894 0.705

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{76}Os^{187}$	α	W^{183m}		0.1025	11.5	0.189
(Cont.)	(Cont.)	(Cont.)		0.1079	9.1	0.149
(1.64)	(−2.71)	5.3s		0.1605	2.4	0.039
	2p	W^{185m}	IT	0.131	100.0	1.64
	(12.42)	1.6m		0.060	100.0	1.64
				0.175	93.0	1.525
				0.100	7.0	0.115
				0.075	7.0	0.115
$_{76}Os^{188}$	nα	W^{183m}	IT	0.2103	88.5	11.76
(13.29)	(5.13)	5.3s		0.0991	54.6	7.26
				0.0526	43.0	5.72
				0.1025	11.5	1.53
				0.1079	9.1	1.21
				0.1605	2.4	0.32
	He^3	W^{185m}	IT	0.131	100.0	13.29
	(12.54)	1.6m		0.060	100.0	13.29
				0.175	93.0	12.36
				0.100	7.0	0.93
				0.075	7.0	0.93
$_{76}Os^{189}$	α	W^{185m}	IT	0.131	100.0	16.09
(16.09)	(−2.02)	1.6m		0.060	100.0	16.09
				0.175	93.0	14.96
				0.100	7.0	1.13
				0.075	7.0	1.13
	2p	W^{187}	β^-	0.134	37.0	5.95
	(13.59)	23.9h		0.686	33.0	5.31
				0.480	29.0	4.66
				0.072	29.0	4.66
				0.552	8.0	1.29
				0.619	7.0	1.13
				0.773	5.0	0.80
	p	Re^{188m}	IT	0.064	100.0	16.09
	(7.34)	18.7m		0.106	67.0	10.78
				0.092	33.0	5.31
		Re^{188}	β^-	0.1550	18.0	2.90
		16.7h				
$_{76}Os^{190}$	nα	W^{185m}	IT	0.131	100.0	26.39
(26.39)	(5.74)	1.6m		0.060	100.0	26.39

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{76}Os^{190}$	nα	W^{185m}		0.175	93.0	24.54
(Cont.)	(Cont.)	(Cont.)		0.100	7.0	1.85
(26.39)	(5.74)	1.6m		0.075	7.0	1.85
	He^3	W^{187}	β^-	0.134	37.0	9.76
	(13.64)	23.9h		0.686	33.0	8.71
				0.480	29.0	7.65
				0.072	29.0	7.65
				0.552	8.0	2.11
				0.619	7.0	1.85
				0.773	5.0	1.32
	np	Re^{188m}	IT	0.064	100.0	26.39
	(15.11)	18.7m		0.106	67.0	17.68
				0.092	33.0	8.71
		Re^{188}	β^-	0.1550	18.0	4.75
		16.7h				
$_{76}Os^{192}$	nα	W^{187}	β^-	0.134	37.0	15.16
(40.98)	(6.58)	23.9h		0.686	33.0	13.52
				0.480	29.0	11.88
				0.072	29.0	11.88
				0.552	8.0	3.28
				0.619	7.0	2.87
				0.773	5.0	2.05
	He^3	W^{189}	β^-	0.258	–	
	(*)	11.5m		0.417	–	
				0.55	–	
				0.86	–	
				0.96	–	
				0.178	–	
	np	Re^{190m}	IT	0.82	100.0	40.98
	(15.83)	2.8h				
		Re^{190}	β^-	0.57	–	
		2.8m		0.392	–	
				0.191	–	
				0.83	–	
	2n	Os^{190m}	IT	0.6165	100.0	40.98
	(13.51)	9.9m		0.5025	100.0	40.98
				0.3612	100.0	40.98
				0.1867	100.0	40.98
	n	Os^{191m}	IT	0.0742	100.0	40.98
	(7.62)	13.0h				

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{77}Ir^{191}$ (37.3)	He^3 (12.81)	Re^{188m} 18.7m	IT	0.064	100.0	37.3
				0.106	67.0	24.99
				0.093	33.0	12.31
		Re^{188} 16.7h	β^-	0.1550	18.0	6.71
	p (5.42)	Os^{190m} 9.9m	IT	0.6165	100.0	37.3
				0.5025	100.0	37.3
				0.3612	100.0	37.3
				0.1867	100.0	37.3
	2n (14.54)	Ir^{189m} 14ms	IT	0.1138	100.0	37.3
				0.2582	–	
				0.0716	–	
				0.1867	–	
				0.3004	–	
	n (8.25)	Ir^{190m} 3.2h	IT	0.6165	94.0	35.06
			EC to Os^{190m} 9.9m	0.5025	94.0	35.06
				0.3612	94.0	35.06
				0.1867	94.0	35.06
				0.1487	6.0	2.24
$_{77}Ir^{193}$ (62.7)	nα (6.16)	Re^{188m} 18.7m	IT	0.064	100.0	62.7
				0.106	67.0	42.01
				0.093	33.0	20.69
		Re^{188} 16.7h	β^-	0.1550	18.0	11.29
	He^3 (13.95)	Re^{190m} 2.8h	IT	0.82	100.0	62.7
		Re^{190} 2.8m	β^-	0.57	–	
				0.392	–	
				0.191	–	
				0.83	–	
	T (10.86)	Os^{190m} 9.9m	IT	0.6165	100.0	62.7
				0.5025	100.0	62.7
				0.3612	100.0	62.7
				0.1867	100.0	62.7
	np (13.45)	Os^{191m} 13.0h	IT	0.0742	100.0	62.7
	2n (13.93)	Ir^{191m} 4.9s	IT	0.1294	–	
				0.823	–	
	n (7.79)	Ir^{192m} 1.4m	IT	0.058	100.0	62.7

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{78}Pt^{190}$ (0.0127)	T (12.72)	Ir^{187m} 29ms	IT	0.115	100.0	0.0127
		Ir^{187} 10.5h	EC	0.0743	–	
				0.0750	–	
				0.0645	–	
				0.0653	–	
				0.988	–	
				0.501	–	
				0.978	–	
				0.492	–	
	n (8.68)	Pt^{189} 10.9h	EC	0.0942	–	
				0.0716	–	
				0.1138	–	
				0.0821	–	
				0.1763	–	
				0.1867	–	
				0.2037	–	
				0.1411	–	
$_{78}Pt^{192}$ (0.78)	2p (12.23)	Os^{190m} 9.9m	IT	0.6165	100.0	0.78
				0.5025	100.0	0.78
				0.3612	100.0	0.78
				0.1867	100.0	0.78
	np (15.06)	Ir^{190m} 3.2h	IT, EC to Os^{190m} 9.9m	0.6165	94.0	0.733
				0.5025	94.0	0.733
				0.3612	94.0	0.733
				0.1867	94.0	0.733
				0.1487	6.0	0.047
	p (6.81)	Ir^{191m} 4.9s	IT	0.1294	–	
				0.0823	–	
$_{78}Pt^{194}$ (32.9)	α (−1.39)	Os^{190m} 9.9m	IT	0.6165	100.0	32.9
				0.5025	100.0	32.9
				0.3612	100.0	32.9
				0.1867	100.0	32.9
	He^3 (13.29)	Os^{191m} 13.0h	IT	0.0742	100.0	32.9
	T (13.00)	Ir^{191m} 4.9s	IT	0.1294	–	
				0.0823	–	
	np (15.34)	Ir^{192m} 1.4m	IT	0.058	100.0	32.9

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{78}Pt^{195}$ (33.8)	nα (4.73)	Os^{190m} 9.9m	IT	0.6165	100.0	33.8
				0.5025	100.0	33.8
				0.3612	100.0	33.8
				0.1867	100.0	33.8
	α (−1.16)	Os^{191m} 13.0h	IT	0.0742	100.0	33.8
	T (12.99)	Ir^{192m} 1.4m	IT	0.058	100.0	33.8
	p (7.58)	Ir^{194m} 31ms	IT	0.112	–	
				0.084	–	
		Ir^{194} 17.8h	β−	0.3285	6.8	2.33
				0.6453	1.3	0.44
				0.2936	1.0	0.34
$_{78}Pt^{196}$ (25.3)	nα (6.78)	Os^{191m} 13.0h		0.0742	100.0	25.3
	np (15.51)	Ir^{194m} 31ms	IT	0.112	–	
				0.084	–	
		Ir^{194} 17.8h	β−	0.3285	6.8	1.72
				0.6453	1.3	0.33
				0.2936	1.0	0.25
	p (8.14)	Ir^{195m} 4.1h	IT	0.685	–	
				0.433	–	
				0.319	–	
				0.120	–	
				0.800	–	
		Ir^{195} 2.8h	β−	0.0987	–	
				0.1296	–	
$_{78}Pt^{198}$ (7.21)	T (13.08)	Ir^{195m} 4.1h	IT	0.685	–	
				0.433	–	
				0.319	–	
				0.120	–	
				0.800	–	
		Ir^{195} 2.8h	β−	0.0987	–	
				0.1296	–	
	np (15.70)	Ir^{196} 120m	β−	0.632	100.0	7.21
				0.522	100.0	7.21
				0.445	100.0	7.21
				0.395	100.0	7.21
				0.356	100.0	7.21
				0.100	100.0	7.21

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{78}Pt^{198}$ (Cont.) (7.21)	p (8.77)	Ir^{197} 7m	β^-	0.50	50.0	3.21
	n (7.56)	Pt^{197m} 80m	IT, β^-	0.364	97.0	6.99
				0.0529	97.0	6.99
				0.2793	3.0	0.22
				0.1302	3.0	0.22
		Pt^{197} 18h	β^-	0.0773	99.3	7.16
				0.1915	9.3	0.67
				0.268	0.7	0.05
$_{79}Au^{197}$ (100.0)	nα (6.92)	Ir^{192m} 1.4m	IT	0.058	100.0	100.0
	He^3 (13.61)	Ir^{194m} 31ms	IT	0.112	–	
				0.084	–	
		Ir^{194} 17.8h	β^-	0.3285	6.8	6.8
				0.6453	1.3	1.3
				0.2936	1.0	1.0
	2p (13.96)	Ir^{195m} 4.1h	IT	0.685	–	
				0.433	–	
				0.319	–	
				0.120	–	
				0.800	–	
		Ir^{195} 2.8h	β^-	0.0987	–	
				0.1296	–	
	2n (14.75)	Au^{195m} 31s	IT	0.3185	–	
				0.0567	–	
				0.2615	–	
				0.2005	–	
				0.0615	–	
	n (8.08)	Au^{196m} 9.7h	IT	0.1749	100.0	100.0
				0.0846	100.0	100.0
				0.1478	–	
				0.1882	–	
				0.0505	–	
				0.2855	–	
				0.3161	–	
$_{80}Hg^{196}$ (0.146)	T (13.48)	Au^{193m} 3.9s	IT	0.258	–	
				0.220	–	
		Au^{193} 16h	EC	0.1861	22.0	0.032
				0.2683	7.0	0.010
				0.2556	7.0	0.010

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{80}Hg^{196}$ (Cont.) (0.146)	T (Cont.) (13.48)	Au^{193} (Cont.) 16h		0.1735 0.1125 0.0999	5.0 – –	0.007
	p (6.57)	Au^{195m} 31s	IT	0.3185 0.0567 0.2615 0.2005 0.0615	– – – – –	
	2n (16.12)	Hg^{194m} 0.4s	IT	0.134	–	
	n (8.82)	Hg^{195} 9.5h	EC	0.2615 0.0615 0.5600 0.1726	– – – –	
$_{80}Hg^{198}$ (10.02)	T (13.36)	Au^{195m} 31s	IT	0.3185 0.0567 0.2615 0.2005 0.0615	– – – – –	
	np (15.17)	Au^{196m} 9.7h	IT	0.1749 0.0846 0.1478 0.1882 0.0505 0.2855 0.3161	100.0 100.0 – – – – –	10.02 10.02
	p (7.09)	Au^{197m} 7.2s	IT	0.1302 0.2793 0.202 0.0773	100.0 99.0 1.0 1.0	10.02 9.92 0.10 0.10
$_{80}Hg^{199}$ (16.84)	2p (13.71)	Pt^{197m} 80m	IT, β^-	0.364 0.0529 0.2793 0.1302	97.0 97.0 3.0 3.0	16.33 16.33 0.51 0.51
		Pt^{197} 18h	β^-	0.0773 0.1915 0.268	99.3 9.3 0.7	16.72 1.57 0.12

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{80}Hg^{199}$ (Cont.) (16.84)	np (13.74)	Au^{197m} 7.2s	IT	0.1302	100.0	16.84
				0.2793	99.0	16.67
				0.202	1.0	0.17
				0.0773	1.0	0.17
$_{80}Hg^{200}$ (23.13)	He^3 (14.02)	Pt^{197m} 80m	IT, β^-	0.364	97.0	22.44
				0.0529	97.0	22.44
				0.2793	3.0	0.69
				0.1302	3.0	0.69
		Pt^{197} 18h	β^-	0.0773	99.3	22.97
				0.1915	9.3	2.15
				0.268	0.7	0.16
	T (13.29)	Au^{197m} 7.2s	IT	0.1302	100.0	23.13
				0.2793	99.0	22.90
				0.202	1.0	0.23
				0.0773	1.0	0.23
	p (7.70)	Au^{199m} 0.44ms	IT	0.494	–	
				0.055	–	
	n (8.03)	Hg^{199m} 43m	IT	0.375	100.0	23.13
				0.158	100.0	23.13
$_{80}Hg^{201}$ (13.22)	α (−0.33)	Pt^{197m} 80m	IT, β^-	0.364	97.0	12.82
				0.0529	97.0	12.82
				0.2793	3.0	0.40
				0.1302	3.0	0.40
		Pt^{197} 18h	β^-	0.0773	99.3	13.13
				0.1915	9.3	1.23
				0.268	0.7	0.09
	2p (14.83)	Pt^{199m} 14.1s	IT	0.393	100.0	13.22
		Pt^{199} 30m	β^-	0.540	22.0	2.91
				0.197	8.0	1.06
				0.475	–	
				0.320	–	
				0.315	–	
				0.075	–	
				0.245	—	
				0.715	–	
				0.79	–	
				0.96	–	
	np (13.93)	Au^{199m} 0.44ms	IT	0.494	–	
				0.055	–	

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{80}Hg^{201}$ (Cont.) (13.22)	p (7.66)	Au^{200m} 19h	IT	0.368	–	
				0.580	–	
				0.256	–	
				0.498	–	
		Au^{200} 48.4m	β^-	0.368	29.0	3.83
				1.227	23.0	3.04
	2n (14.25)	Hg^{199m} 43m	IT	0.375	100.0	13.22
				0.158	100.0	13.22
$_{80}Hg^{202}$ (29.80)	nα (7.43)	Pt^{197m} 80m	IT, β^-	0.364	97.0	28.91
				0.0529	97.0	28.91
				0.2793	3.0	0.89
				0.1302	3.0	0.89
		Pt^{197} 18h	β^-	0.0773	99.3	29.59
				0.1915	9.3	2.77
				0.268	0.7	0.21
	He^3 (14.87)	Pt^{199m} 14.1s	IT	0.393	100.0	29.80
		Pt^{199} 30m	β^-	0.540	22.0	6.56
				0.197	8.0	2.39
				0.475	–	
				0.320	–	
				0.315	–	
				0.075	–	
				0.245	–	
				0.715	–	
				0.79	–	
				0.96	–	
	2p (15.31)	Pt^{200} 12h	β^- to Au^{200} 48.4m	0.368	–	
				1.60	–	
	T (13.21)	Au^{199m} 0.44ms	IT	0.494	–	
				0.055	–	
	np (15.42)	Au^{200m} 19h	IT	0.368	–	
				0.580	–	
				0.256	–	
				0.498	–	
		Au^{200} 48.4m	β^-	0.368	29.0	8.64
				1.227	23.0	6.87
	p (8.48)	Au^{201} 26m	β^-	0.53	–	

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{80}Hg^{204}$ (6.85)	nα (7.78)	Pt^{199m} 14.1s	IT	0.393	100.0	6.85
		Pt^{199} 30m	β^-	0.540	22.0	1.51
				0.197	8.0	0.55
				0.475	–	
				0.320	–	
				0.315	–	
				0.075	–	
				0.245	–	
				0.715	–	
				0.79	–	
				0.96	–	
	α (0.50)	Pt^{200} 12h	β^- to Au^{200} 48.4m	0.368	–	
				1.60	–	
	He^3 (16.12)	Pt^{201} 2.5m	β^- to Au^{201} 26m	1.76	–	
				0.23	–	
				0.15	–	
	T (13.48)	Au^{201} 26m	β^-	0.53	–	
	np (15.94)	Au^{202} 29s	β^-	0.44	–	
				0.52	–	
	p (8.82)	Au^{203} 55s	β^-	0.69	–	
$_{81}Tl^{203}$ (29.50)	α (−0.91)	Au^{199m} 0.44ms	IT	0.494	–	
				0.055	–	
	He^3 (13.39)	Au^{200m} 19h	IT	0.368	–	
				0.580	–	
				0.256	–	
				0.498	–	
		Au^{200} 48.4m	β^-	0.368	29.0	8.56
				1.227	23.0	6.79
	2p (14.17)	Au^{201} 26m	β^-	0.53	–	
	2n (14.65)	Tl^{201m} 2.1ms	IT	0.3312	–	
				0.60	–	
				0.23	–	
				0.693	–	
				0.361	–	

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{81}Tl^{203}$ (Cont.) (29.50)	n (7.70)	Tl^{202m} 0.5 ms	IT	0.490 0.460	100.0 100.0	29.50 29.50
$_{81}Tl^{205}$ (70.50)	nα (7.01)	Au^{200m} 19h	IT	0.368 0.580 0.256 0.498	– – – –	
		Au^{200} 48.4 m		0.368 1.227	29.0 23.0	20.45 16.22
	α (0.07)	Au^{201} 26 m	β^-	0.53	–	
	He^3 (14.63)	Au^{202} 29 s	β^-	0.44 0.52	– –	
	2p (15.23)	Au^{203} 55 s	β^-	0.69	–	
$_{82}Pb^{204}$ (1.48)	nα (6.06)	Hg^{199} 43 m	IT	0.375 0.158	100.0 100.0	1.48 1.48
	T (12.81)	Tl^{201m} 2.1 ms	IT	0.3312 0.60 0.23 0.693 0.361	– – – – –	
	np (14.34)	Tl^{202m} 0.5 ms	IT	0.490 0.460	100.0 100.0	1.48 1.48
	2n (15.17)	Pb^{202m} 3.61h	IT, EC	0.961 0.4221 0.6576 0.1293 0.7872 0.4904 0.4598 0.3899 0.2411 0.1489	90.0 90.0 78.2 78.2 11.3 9.0 9.0 5.6 3.4 3.4	1.33 1.33 1.17 1.17 0.17 0.13 0.13 0.08 0.05 0.05
	n (8.24)	Pb^{203m} 6.2 s	IT	0.8252	100.0	1.48
$_{82}Pb^{206}$ (23.6)	n (8.08)	Pb^{205m} 4.4 ms	IT	0.7033 0.988	63.0 37.0	14.86 8.74

Table 1 (Continued)

Target Nucleus (Abundance)	Photo-reaction (Separation Energy)	Residual Nucleus 1/2 Life	Decay Mode	Principal Gammas		Percentage Intensity × Abundance
				Energy (MeV)	Percent	
$_{82}Pb^{207}$ (22.6)	2n (14.82)	Pb^{205m} 4.4ms	IT	0.7033 0.988	63.0 37.0	14.24 8.36
	n (6.73)	Pb^{206m} 0.126ms	IT	0.8033 0.5163 0.8808 0.5376 0.2027 0.6573 0.3435 0.3137	100.0 65.0 57.0 43.0 35.0 23.0 20.0 13.0	22.6 14.70 12.89 9.72 7.91 5.20 4.52 2.94
$_{82}Pb^{208}$ (52.3)	He^3 (14.52)	Hg^{205} 5.5m	β^-	0.205	–	
	2p (15.38)	Hg^{206} 8.2m	β^-	0.305	–	
	p (8.03)	Tl^{207m} 1.3s	IT	1.00 0.351	100.0 100.0	52.3 52.3
	2n (14.11)	Pb^{206m} 0.126ms	IT	0.8033 0.5163 0.8808 0.5376 0.2027 0.6573 0.3435 0.3137	100.0 65.0 57.0 43.0 35.0 23.0 20.0 13.0	52.3 34.0 29.8 22.5 18.3 12.0 10.5 6.8
	n (7.38)	Pb^{207m} 0.80s	IT	1.0634 0.5696	100.0 100.0	52.3 52.3
$_{83}Bi^{209}$ (100.0)	2p (11.84)	Tl^{207m} 1.3s	IT	1.00 0.351	100.0 100.0	100.0 100.0
	T (9.43)	Pb^{206m} 0.126ms	IT	0.8033 0.5163 0.8808 0.5376 0.2027 0.6573 0.3435 0.3137	100.0 65.0 57.0 43.0 35.0 23.0 20.0 13.0	100.0 65.0 57.0 43.0 35.0 23.0 20.0 13.0
	np (11.18)	Pb^{207} 0.80s	IT	1.0634 0.5696	100.0 100.0	100.0 100.0
	n (7.45)	Bi^{208m} 2.6ms	IT	0.92 0.51	100.0 100.0	100.0 100.0

Table 2
Gamma Rays Produced by Photonuclear Reactions — (by gamma-ray energy)
Part A — Half-lives from 100 μsec to 1 min

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.0526	W^{184}	n	13.2	0.0821	Hf^{178}	2p	27.1
	Re^{185}	np	16.0		Hf^{179}	He^3	13.8
	Os^{186}	He^3	0.7		Hf^{180}	α	35.2
	Os^{187}	α	0.7				
	Os^{188}	nα	5.7	0.0823	Ir^{193}	2n	—
					Pt^{192}	p	—
0.054	Ge^{74}	n	36.5		Pt^{194}	T	—
	As^{75}	np	100.0				
	Se^{76}	He^3	9.0	0.084	Pt^{195}	p	—
	Se^{77}	α	7.6		Pt^{196}	np	—
	Se^{78}	nα	23.5		Au^{197}	He^3	—
0.055	Hg^{200}	p	—	0.0877	Ag^{109}	γ′	48.2
	Hg^{201}	np	—		Cd^{110}	p	12.4
	Hg^{202}	T	—		Cd^{111}	np	12.8
	Tl^{203}	α	—		Cd^{112}	T	24.1
					In^{113}	α	4.3
0.0567	Au^{197}	2n	—				
	Hg^{196}	p	—	0.0888	Hf^{179}	n	13.8
	Hg^{198}	T	—		Hf^{180}	2n	35.2
					Ta^{181}	T	100.0
0.0615	Au^{197}	2n	—		W^{180}	2p	0.1
	Hg^{196}	p	—		W^{182}	α	26.4
	Hg^{198}	T	—		W^{183}	nα	14.4
0.0716	In^{191}	2n	—	0.093	Hf^{178}	2p	27.1
					Hf^{179}	He^3	13.8
0.074	Mg^{24}	2n	75.3		Hf^{180}	α	35.2
0.075	Xe^{126}	n	0.1	0.0931	Ag^{107}	γ′	51.8
	Ba^{130}	nα	0.1		Ag^{109}	2n	48.2
					Cd^{108}	p	0.9
0.0765	Yb^{176}	2n	12.7		Cd^{110}	T	12.4
	Lu^{175}	p	97.4				
	Lu^{176}	np	2.6	0.0932	Hf^{179}	n	13.8
	Hf^{176}	2p	5.2		Hf^{180}	2n	35.2
	Hf^{177}	He^3	18.5		Ta^{181}	T	100.0
	Hf^{178}	α	27.1		W^{180}	2p	0.1
	Hf^{179}	nα	13.8		W^{182}	α	26.4
					W^{183}	nα	14.4
0.0773	Hg^{198}	p	0.1	0.099	Ge^{73}	p	7.8
	Hg^{199}	np	0.2		Ge^{74}	np	36.5
	Hg^{200}	T	0.2		As^{75}	He^3	100.0

Table 2, Part A (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.0991	W^{184}	n	16.7
	Re^{185}	np	20.3
	Os^{186}	He^3	0.9
	Os^{187}	α	0.9
	Os^{188}	nα	7.3
0.10	La^{138}	2n	—
	Ce^{138}	np	—
	Pr^{141}	nα	—
0.1025	W^{184}	n	3.5
	Re^{185}	np	4.3
	Os^{186}	He^3	0.2
	Os^{187}	α	0.2
	Os^{188}	nα	1.5
0.104	Hf^{179}	2p	13.8
	Hf^{180}	He^3	35.2
0.1079	W^{184}	n	2.8
	Re^{185}	np	3.4
	Os^{186}	He^3	0.1
	Os^{187}	α	0.1
	Os^{188}	nα	1.2
0.11	Pd^{110}	p	—
0.11	Re^{185}	2n	—
0.110	Xe^{126}	n	0.1
	Ba^{130}	nα	0.1
0.110	Tb^{159}	n	100.0
	Dy^{160}	np	2.3
	Dy^{161}	T	18.9
0.112	Pt^{195}	p	—
	Pt^{196}	np	—
	Au^{197}	He^3	—
0.1138	Ir^{191}	2n	37.3
0.122	Mo^{92}	np	15.8
0.127	Kr^{80}	n	2.3
0.1294	Pd^{106}	p	27.3
	Pd^{108}	T	26.7
	Ag^{107}	2p	51.8
	Ag^{109}	α	48.2
0.1294	Ir^{193}	2n	—
	Pt^{192}	p	—
	Pt^{194}	T	—
0.1302	Hg^{198}	p	10.0
	Hg^{199}	np	16.8
	Hg^{200}	T	23.1
0.134	Hg^{196}	2n	—
0.135	Ru^{104}	p	—
0.138	Cd^{106}	T	1.2
0.139	Ge^{76}	n	7.8
	Se^{78}	He^3	23.5
	Se^{80}	nα	49.8
0.142	Ti^{47}	p	7.3
	Ti^{48}	np	73.9
	V^{50}	α	0.2
	V^{51}	nα	99.8
0.159	Se^{80}	He^3	17.9
	Se^{82}	nα	3.3
0.1605	W^{184}	n	0.7
	Re^{185}	np	0.9
	Os^{188}	nα	0.3
0.161	Se^{77}	γ'	7.6
	Se^{78}	n	23.5
	Bi^{79}	np	50.7
	Ki^{82}	nα	11.6

Table 2, Part A (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.161	Hf^{180}	n	35.1	0.191	Ru^{102}	p	31.6
	Ta^{181}	np	99.5		Ru^{104}	T	18.6
	W^{182}	He^3	26.3		Rh^{103}	2p	100.0
	W^{183}	α	14.3				
	W^{184}	nα	30.5	0.20	Ne^{21}	2p	0.3
					Ne^{22}	He^3	8.9
0.1637	Ba^{137}	n	11.3				
	Ba^{138}	2n	71.7	0.2005	Au^{197}	2n	—
	La^{138}	np	0.1		Hg^{196}	p	—
	La^{139}	T	99.9		Hg^{198}	T	—
	Ce^{138}	2p	0.3				
	Ce^{140}	α	88.5	0.202	Hg^{198}	p	0.1
					Hg^{199}	np	0.2
0.164	Sn^{117}	p	7.6		Hg^{200}	T	0.2
	Sn^{118}	np	24.0				
	Sn^{119}	T	8.6	0.2027	Pb^{207}	n	7.9
	Sb^{121}	nα	57.3		Pb^{208}	2n	18.3
					Bi^{209}	T	35.0
0.1750	Ge^{72}	n	27.4				
	Ge^{73}	2n	7.8	0.2078	Er^{168}	n	27.1
	Se^{74}	He^3	0.9		Tm^{169}	np	100.0
	Se^{76}	nα	9.0		Yb^{170}	He^3	3.0
					Yb^{171}	α	14.3
0.176	Yb^{176}	2n	12.7		Yb^{172}	nα	22.8
	Lu^{175}	p	97.4				
	Lu^{176}	np	2.6	0.21	Ru^{104}	p	—
	Hf^{176}	2p	5.2				
	Hf^{177}	He^3	18.5	0.21	Br^{79}	γ'	50.7
	Hf^{178}	α	27.1		Br^{81}	2n	49.3
	Hf^{179}	nα	13.8		Kr^{80}	p	2.3
0.1867	Ir^{191}	2n	—	0.21	Pd^{108}	n	26.7
					Ag^{109}	np	48.2
0.187	Hf^{178}	2p	27.1		Cd^{110}	He^3	12.4
	Hf^{179}	He^3	13.8		Cd^{111}	α	12.8
	Hf^{180}	α	35.2		Cd^{112}	nα	24.1
				0.210	Se^{78}	p	23.5
0.190	Kr^{82}	n	11.6		Se^{80}	T	49.8
	Sr^{84}	He^3	0.6		Br^{79}	2p	50.7
	Sr^{86}	nα	9.9		Br^{81}	α	49.3

Table 2, Part A (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.2103	W^{184}	n	27.1
	Re^{185}	np	32.8
	Os^{186}	He^3	1.4
	Os^{187}	α	1.5
	Os^{188}	nα	11.8
0.211	Er^{162}	p	0.1
	Er^{164}	T	1.6
0.2136	Hf^{179}	n	13.8
	Hf^{180}	2n	35.2
	Ta^{181}	T	100.0
	W^{180}	2p	0.1
	W^{182}	α	26.4
	W^{183}	nα	14.4
0.215	Se^{80}	He^3	9.0
	Se^{82}	nα	1.7
0.217	Hf^{180}	n	35.1
	Ta^{181}	np	99.5
	W^{182}	He^3	26.3
	W^{183}	α	14.3
	W^{184}	nα	30.5
0.220	Hg^{196}	T	0.1
0.228	Hf^{179}	2p	13.8
	Hf^{180}	He^3	32.5
0.23	Tl^{203}	2n	—
	Pb^{204}	T	—
0.257	Mo^{92}	np	15.8
0.258	Hg^{196}	T	0.1
0.2582	Ir^{191}	2n	—
0.2615	Au^{197}	2n	—
	Hg^{196}	p	—
	Hg^{198}	T	—
0.263	Se^{78}	p	23.5
	Se^{80}	T	49.8
	Br^{79}	2p	50.7
	Br^{81}	α	49.3
0.273	Yb^{176}	2n	12.7
	Lu^{175}	p	97.4
	Lu^{176}	np	2.6
	Hf^{176}	2p	5.2
	Hf^{177}	He^3	18.5
	Hf^{178}	α	27.1
	Hf^{179}	nα	13.8
0.2793	Hg^{198}	p	9.9
	Hg^{199}	np	16.7
	Hg^{200}	T	22.9
0.283	As^{75}	n	100.0
	Se^{76}	np	9.0
	Se^{77}	T	7.6
	Br^{79}	nα	50.7
0.294	Hf^{178}	2p	27.1
	Hf^{179}	He^3	13.8
	Hf^{180}	α	35.2
0.299	Ho^{165}	2n	100.0
	Er^{164}	p	1.6
	Er^{166}	T	33.4
0.30	Re^{185}	2n	—
0.3044	Ir^{191}	2n	—
0.304	As^{75}	γ'	100.0
	Se^{76}	p	9.0
	Se^{77}	np	7.6
	Se^{78}	T	23.5
	Br^{79}	α	50.7
0.31	Pd^{110}	p	—

Table 2, Part A (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.3137	Pb^{207}	n	2.9	0.393	Hg^{201}	2p	13.2
	Pb^{208}	2n	6.8		Hg^{202}	He^3	29.8
	Bi^{209}	T	13.0		Hg^{204}	nα	6.9
0.3185	Au^{197}	2n	—	0.394	Y^{89}	n	100.0
	Hg^{196}	p	—		Zr^{90}	np	51.5
	Hg^{198}	T	—		Zr^{91}	T	11.2
					Nb^{93}	nα	100.0
0.3257	Hf^{179}	n	13.8				
	Hf^{180}	2n	35.2	0.40	Mg^{26}	p	1.5
	Ta^{181}	T	100.0		Al^{27}	2p	14.0
	W^{180}	2p	0.1				
	W^{182}	α	26.4	0.4268	Hf^{179}	n	13.8
	W^{183}	nα	14.4		Hf^{180}	2n	35.2
					Ta^{181}	T	100.0
0.3312	Tl^{203}	2n	—		W^{180}	2p	0.1
	Pb^{204}	T	—		W^{182}	α	26.4
					W^{183}	nα	14.4
0.3435	Pb^{207}	n	4.5				
	Pb^{208}	2n	10.5	0.4338	Pd^{110}	np	4.6
	Bi^{209}	T	20.0				
				0.439	Mg^{24}	n	7.1
0.35	Ru^{104}	p	—		Mg^{25}	2n	0.9
					Mg^{26}	He^3	3.5
0.350	Na^{23}	2n	2.3		Si^{28}	nα	8.3
	Ne^{22}	p	9.0				
	Mg^{24}	T	1.8	0.44	Hg^{204}	np	—
	Na^{23}	2p	99.0		Tl^{205}	He^3	—
				0.460	Tl^{203}	n	29.5
0.351	Pb^{208}	p	52.3		Pb^{204}	np	1.5
	Bi^{209}	2p	100.0				
				0.473	Mg^{25}	p	10.0
0.361	Tl^{203}	2n	—		Mg^{26}	np	11.0
	Pb^{204}	T	—		Al^{27}	He^3	100.0
0.375	Hf^{180}	n	0.2	0.49	Pd^{110}	p	—
	Ta^{181}	np	0.5				
	W^{182}	He^3	0.1	0.490	Tl^{204}	n	29.5
	W^{183}	α	0.1		Pb^{204}	np	1.5
	W^{184}	nα	0.2				
				0.494	Hg^{200}	p	—
0.38	Hf^{178}	2p	27.1		Hg^{201}	np	—
	Hf^{179}	He^3	13.8		Hg^{202}	T	—
	Hf^{180}	α	35.2		Tl^{203}	α	—

Table 2, Part A (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.502	In^{115}	n	95.7
	Sn^{115}	p	0.4
	Sn^{116}	np	14.3
	Sn^{117}	T	7.6
0.51	Bi^{209}	n	100.0
0.5118	Pd^{108}	np	4.8
	Ag^{109}	He^3	8.7
0.513	Yb^{176}	n	12.7
	Lu^{176}	p	2.6
	Hf^{177}	2p	18.5
	Hf^{178}	He^3	27.1
	Hf^{179}	α	13.8
	Hf^{180}	$n\alpha$	35.2
0.5163	Pb^{207}	n	17.4
	Pb^{208}	2n	34.0
	Bi^{209}	T	65.0
0.52	Hg^{204}	np	—
	Tl^{205}	He^3	—
0.5376	Pb^{207}	n	9.7
	Pb^{208}	2n	22.5
	Bi^{209}	T	43.0
0.540	Ru^{101}	p	—
	Ru^{102}	np	—
	Rh^{103}	He^3	—
0.5555	Pd^{105}	p	0.4
	Pd^{106}	np	0.4
	Ag^{107}	He^3	1.0
	Ag^{109}	$n\alpha$	1.0
0.5696	Pb^{208}	n	52.3
	Bi^{209}	np	100.0
0.57	Gd^{160}	He^3	—
0.58	Mg^{26}	p	1.5
	Al^{27}	2p	14.0
0.583	Mg^{24}	2n	75.3
0.60	Ru^{101}	p	—
	Ru^{102}	np	—
	Rh^{103}	He^3	—
0.60	Tl^{203}	2n	—
	Pb^{204}	T	—
0.615	Pd^{110}	np	2.6
0.622	Pd^{108}	np	2.1
	Ag^{109}	He^3	3.8
0.63	Yb^{176}	2n	0.3
	Lu^{175}	p	2.0
	Lu^{176}	np	0.1
	Hf^{176}	2p	0.1
	Hf^{177}	He^3	0.4
	Hf^{178}	α	0.5
	Hf^{179}	$n\alpha$	0.3
0.6573	Pb^{207}	n	5.2
	Pb^{208}	2n	12.0
	Bi^{209}	T	23.0
0.6575	Cd^{111}	p	0.6
	Cd^{112}	np	1.1
	Cd^{113}	T	0.6
	In^{113}	He^3	0.2
	In^{115}	$n\alpha$	4.3
0.684	S^{32}	2n	76.0
0.69	Hg^{204}	p	—
	Tl^{205}	2p	—
0.693	Tl^{203}	2n	—
	Pb^{204}	T	—
0.7033	Pb^{206}	n	14.9
	Pb^{207}	2n	14.2

Table 2, Part A (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.746	Ce^{140}	n	88.5	0.98	Mg^{26}	p	1.7
	Pr^{141}	np	100.0		Al^{27}	2p	15.0
	Nd^{142}	He^3	27.1				
	Nd^{143}	α	12.2	0.988	Pb^{206}	n	8.7
	Nd^{144}	nα	23.9		Pb^{207}	2n	8.4
0.80	Zn^{70}	np	0.1	0.99	Sn^{124}	np	—
	Ga^{71}	He^3	6.1				
				0.994	Yb^{176}	2n	12.5
0.8033	Pb^{207}	n	22.6		Lu^{175}	p	95.5
	Pb^{208}	2n	52.3		Lu^{176}	np	2.5
	Bi^{209}	T	100.0		Hf^{176}	2p	5.1
					Hf^{177}	He^3	18.1
0.818	Ba^{137}	n	11.3		Hf^{178}	α	26.6
	Ba^{138}	2n	71.7		Hf^{179}	nα	13.5
	La^{138}	np	0.1				
	La^{139}	T	99.9	1.00	Pb^{208}	p	52.3
	Ce^{138}	2p	0.3		Bi^{209}	2p	100.0
	Ce^{140}	α	88.5				
				1.03	Sn^{122}	np	2.9
0.82	Si^{28}	2n	31.4		Sb^{123}	He^3	26.1
				1.043	Ne^{20}	2n	6.3
0.8252	Pb^{204}	n	1.5				
				1.05	Ba^{137}	n	11.3
0.86	Sn^{122}	np	1.6		Ba^{138}	2n	71.7
	Sb^{123}	He^3	14.5		La^{138}	np	0.1
					La^{139}	T	99.9
0.8808	Pb^{207}	n	12.9		Ce^{138}	2p	0.3
	Pb^{208}	2n	29.8		Ce^{140}	α	88.5
	Bi^{209}	T	57.0				
				1.06	Ne^{22}	2p	9.2
0.89	Zn^{70}	He^3	0.1				
				1.0634	Pb^{208}	n	52.3
0.90	Zn^{70}	He^3	0.3		Bi^{209}	np	100.0
0.91	Y^{89}	γ'	100.0	1.078	Zn^{70}	np	0.6
	Nb^{93}	α	100.0		Ga^{71}	He^3	36.8
0.92	Bi^{209}	n	100.0	1.1	Sn^{124}	p	—
0.94	Sn^{122}	p	4.7	1.171	Sn^{122}	np	4.7
	Sn^{124}	T	5.9		Sb^{123}	He^3	42.8

Table 2, Part A (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
1.220	Ca^{40}	nα	4.9	1.763	Ca^{40}	nα	1.9
1.230	Sn^{119}	p	1.3	1.87	Sn^{122}	np	0.3
	Sn^{120}	np	4.9		Sb^{132}	He^3	3.0
	Sb^{121}	He^3	8.6				
	Sb^{123}	nα	6.4	1.88	Ga^{71}	He^3	2.6
1.24	Ga^{71}	He^3	0.8				
				2.01	Ca^{48}	p	0.2
1.27	S^{32}	n	1.1				
				2.127	Cl^{37}	He^3	6.1
1.278	Pd^{108}	np	0.8				
	Ag^{109}	He^3	1.5	2.32	Zr^{90}	γ′	48.4
1.28	Mg^{24}	2n	3.6		Zr^{91}	n	10.6
					Nb^{93}	T	94.0
1.28	P^{31}	2n	0.8				
	S^{32}	T	0.8	2.43	P^{31}	2n	0.2
					S^{32}	T	0.2
1.37	Ne^{21}	2p	0.2				
	Ne^{22}	He^3	5.5	2.80	K^{39}	2n	1.7
					Ca^{40}	T	1.9
1.40	Ne^{22}	p	1.1				
	Na^{23}	2p	12.0	3.50	Ca^{40}	2n	—
1.41	Sn^{124}	np	—				
				4.444	N^{14}	2n	2.4
1.61	Mg^{26}	p	0.7		N^{14}	2p	1.5
	Al^{27}	2p	6.0				
				5.299	O^{18}	He^3	0.1
1.63	Ne^{21}	p	0.3				
	Ne^{22}	np	9.2				
	Ne^{22}	2p	9.2	6.131	O^{18}	np	0.1
	Na^{23}	He^3	100.0		F^{19}	He^3	68.0

Table 2
Gamma Rays Produced by Photonuclear Reactions — (by gamma-ray energy)
Part B — Half-lives from 1 min to 2 hr

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.0514	Pd^{105}	p	—
	Pd^{106}	np	—
	Ag^{107}	He^3	—
	Ag^{109}	nα	—
0.0529	Pt^{198}	n	7.0
	Hg^{199}	2p	16.3
	Hg^{200}	He^3	22.4
	Hg^{201}	α	12.8
	Hg^{202}	nα	28.9
0.0566	Dy^{163}	2p	18.2
	Dy^{164}	He^3	19.8
0.0578	Er^{164}	np	1.0
0.058	Ir^{193}	n	62.7
	Pt^{194}	np	32.9
	Pt^{195}	T	33.8
	Au^{197}	nα	100.0
0.0586	Ni^{61}	p	1.3
	Ni^{62}	np	3.7
	Cu^{63}	He^3	69.2
	Cu^{65}	nα	30.8
0.060	W^{186}	n	28.4
	W^{186}	p	25.6
	Re^{187}	np	62.9
	Re^{187}	2p	56.6
	Os^{187}	2p	1.6
	Os^{188}	He^3	13.3
	Os^{189}	α	16.1
	Os^{190}	nα	26.4
0.061	Sb^{123}	n	42.8
	Te^{123}	p	0.9
	Te^{124}	np	4.6
	Te^{125}	T	7.0
	I^{127}	nα	100.0
0.0623	Cr^{50}	n	0.7
	Fe^{54}	nα	0.9
0.063	Yb^{168}	n	0.1
0.064	Os^{189}	p	16.1
	Os^{190}	np	26.4
	Ir^{191}	He^3	37.3
	Ir^{193}	nα	62.7
0.0658	Se^{74}	n	0.7
	Kr^{78}	nα	0.3
0.0674	Ni^{62}	p	3.7
	Ni^{64}	T	1.2
	Cu^{63}	2p	69.2
	Cu^{65}	α	30.8
0.07	Cd^{112}	p	24.1
	Cd^{113}	np	12.3
	Cd^{114}	T	28.9
	Cd^{114}	He^3	28.9
	In^{115}	α	95.7
	Cd^{116}	nα	7.6
0.0712	Hf^{174}	T	0.2
0.0734	Ho^{165}	n	47.0
	Er^{166}	np	15.7
	Er^{167}	T	10.8
	Tm^{169}	nα	47.0
0.075	Sb^{123}	n	42.8
	Te^{123}	p	0.9
	Te^{124}	np	4.6
	Te^{125}	T	7.0
	I^{127}	nα	100.0
0.075	W^{186}	n	2.0
	W^{186}	p	1.7
	Re^{187}	np	4.4
	Re^{187}	2p	3.8
	Os^{187}	2p	0.1
	Os^{188}	He^3	0.9
	Os^{189}	α	1.1
	Os^{190}	nα	1.9

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.075	Hg^{201}	2p	—
	Hg^{202}	He^3	—
	Hg^{204}	nα	—
0.0765	Yb^{176}	np	12.7
	Lu^{176}	2p	2.7
0.0776	Pd^{105}	p	—
	Pd^{106}	np	—
	Ag^{107}	He^3	—
	Ag^{109}	nα	—
0.078	Nd^{148}	p	2.4
	Nd^{150}	T	2.3
0.079	Sn^{114}	n	0.6
	Sn^{115}	2n	0.3
0.08	Nd^{150}	p	—
0.08	Er^{170}	p	9.9
0.080	Gd^{160}	np	17.5
0.0807	Dy^{163}	p	14.0
	Dy^{164}	np	15.8
	Er^{164}	np	0.9
	Ho^{165}	He^3	56.0
0.0836	Cd^{106}	2n	1.2
0.085	Sr^{84}	T	0.6
0.0888	Hf^{179}	p	13.8
	Hf^{180}	np	35.2
	Ta^{181}	He^3	100.0
0.0895	Eu^{153}	n	52.2
	Gd^{154}	np	2.2
	Gd^{155}	T	14.7
0.0907	Cr^{50}	n	1.3
	Fe^{54}	nα	1.7
0.0915	Ho^{165}	n	53.0
	Er^{166}	np	17.7
	Er^{167}	T	12.2
	Tm^{169}	nα	53.0
0.092	Os^{189}	p	5.3
	Os^{190}	np	8.7
	Ir^{191}	He^3	12.3
	Ir^{193}	nα	20.7
0.0932	Hf^{179}	p	13.8
	Hf^{180}	np	35.2
	Ta^{181}	He^3	100.0
0.096	Se^{80}	n	49.8
	Se^{80}	p	49.8
	Br^{81}	np	49.3
	Se^{82}	T	9.2
	Br^{81}	2p	49.3
	Kr^{83}	α	11.6
	Kr^{84}	nα	56.9
0.0971	Pd^{105}	p	—
	Pd^{106}	np	—
	Ag^{107}	He^3	—
	Ag^{109}	nα	—
0.100	W^{186}	n	2.0
	W^{186}	p	1.7
	Re^{187}	np	4.4
	Re^{187}	2p	3.8
	Os^{187}	2p	0.1
	Os^{188}	He^3	0.9
	Os^{189}	α	1.1
	Os^{190}	nα	1.9
0.0124	Dy^{163}	2p	3.0
	Dy^{164}	He^3	3.4
0.103	Se^{82}	n	9.2
	Kr^{83}	2p	11.6
	Kr^{84}	He^3	56.9
	Kr^{86}	nα	17.4

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.1044	Gd^{158}	He^3	23.4
	Gd^{160}	nα	20.6
0.106	Os^{189}	p	10.8
	Os^{190}	np	17.7
	Ir^{191}	He^3	25.0
	Ir^{193}	nα	42.0
0.1060	Yb^{168}	n	0.1
0.108	Br^{79}	2n	50.7
	Kr^{78}	p	0.4
0.1082	Er^{167}	2p	22.4
	Er^{168}	He^3	26.4
	Er^{170}	nα	14.5
0.1133	Yb^{168}	n	0.1
0.114	Nd^{150}	n	2.0
	Sm^{152}	He^3	9.7
	Sm^{154}	nα	8.3
0.118	Sm^{154}	He^3	12.0
0.12	Cd^{106}	T	—
0.1216	Hf^{179}	2p	1.3
	Hf^{180}	He^3	3.3
0.1219	Fe^{58}	p	0.3
	Co^{59}	2p	89.0
0.122	Sm^{154}	np	—
0.124	Xe^{128}	n	1.9
	Xe^{129}	2n	26.4
	Ba^{130}	He^3	0.1
	Ba^{132}	nα	0.1
0.125	Sm^{154}	p	—
0.1302	Pt^{198}	n	0.2
	Hg^{199}	2p	0.5
	Hg^{200}	He^3	0.7
	Hg^{201}	α	0.4
	Hg^{202}	nα	0.9
0.131	W^{186}	n	28.4
	W^{186}	p	2.8
	Re^{187}	np	62.9
	Re^{187}	2p	6.3
	Os^{187}	2p	1.6
	Os^{188}	He^3	13.3
	Os^{189}	α	16.1
	Os^{190}	nα	26.4
0.1363	Co^{59}	2p	11.0
0.138	Sm^{154}	He^3	3.6
0.1384	Hf^{179}	2p	0.4
	Hf^{180}	He^3	1.0
0.139	Ge^{76}	p	0.3
0.14	Cd^{116}	p	0.6
0.142	Nd^{148}	2p	—
	Nd^{150}	α	—
0.142	Gd^{158}	He^3	0.5
	Gd^{160}	nα	0.4
0.145	Cl^{35}	n	34.1
	Ar^{36}	np	0.5
	K^{39}	nα	41.9
0.147	W^{183}	p	12.8
	W^{184}	np	27.3
	Re^{185}	He^3	33.0
	Re^{187}	nα	56.0
0.15	Cd^{106}	T	—

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.15	Er^{170}	p	4.1
0.15	Hg^{204}	He^3	—
0.150	Cd^{112}	n	24.1
	Cd^{113}	2n	12.3
	In^{113}	np	4.3
	Sn^{114}	He^3	0.7
	Sn^{115}	α	0.4
	Sn^{116}	nα	14.3
0.150	Xe^{134}	He^3	7.1
	Xe^{136}	nα	6.0
0.1508	Hf^{179}	2p	3.4
	Hf^{180}	He^3	8.6
0.153	Cr^{50}	n	0.6
	Fe^{54}	nα	0.8
0.155	Nd^{150}	p	—
0.156	In^{113}	n	4.3
	Sn^{114}	np	0.7
	Sn^{115}	T	0.4
0.156	Nd^{150}	n	0.4
	Sm^{152}	He^3	2.0
	Sm^{154}	nα	1.7
0.158	Sn^{118}	p	24.0
	Sn^{119}	np	8.6
	Sn^{120}	T	32.9
	Sb^{121}	α	57.3
0.158	Hg^{200}	n	23.1
	Hg^{201}	2n	13.2
	Pg^{204}	nα	1.5
0.1602	Sn^{124}	n	5.9
	Te^{126}	He^3	18.7
	Te^{128}	nα	31.8
0.165	Pd^{110}	2p	3.3
0.1653	Dy^{163}	2p	1.3
	Dy^{164}	He^3	1.4
0.1658	Ce^{142}	He^3	3.0
0.170	Sm^{154}	He^3	4.5
0.179	W^{183}	p	12.8
	W^{184}	np	27.3
	Re^{185}	He^3	33.0
	Re^{187}	nα	56.0
0.175	Xe^{128}	n	1.9
	Xe^{129}	2n	26.4
	Ba^{130}	He^3	0.1
	Ba^{132}	nα	0.1
0.175	W^{186}	n	26.4
	W^{186}	p	23.9
	Re^{187}	np	58.5
	Re^{187}	2p	52.7
	Os^{187}	2p	1.5
	Os^{188}	He^3	12.4
	Os^{189}	α	15.0
	Os^{190}	nα	24.5
0.176	Sm^{154}	He^3	1.4
0.176	Yb^{176}	np	12.7
	Lu^{176}	2p	2.6
0.178	Os^{192}	He^3	—
0.18	Dy^{164}	p	—
	Ho^{165}	2p	—
0.18	Yb^{176}	He^3	—
0.182	Sm^{154}	p	—

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.184	W^{183}	p	14.3
	W^{184}	np	30.3
	Re^{185}	He^3	36.7
	Re^{187}	nα	62.3
0.1852	Dy^{163}	p	5.0
	Dy^{164}	np	5.6
	Er^{164}	np	0.6
	Ho^{165}	He^3	20.0
0.1867	Os^{192}	2n	41.0
	Ir^{191}	p	37.3
	Ir^{193}	T	62.7
	Pt^{192}	2p	0.8
	Pt^{194}	α	32.9
	Pt^{195}	nα	33.8
0.188	Pd^{110}	n	11.8
	Cd^{111}	2p	12.8
	Cd^{112}	He^3	24.1
	Cd^{113}	α	12.3
	Cd^{114}	nα	28.9
0.19	Er^{170}	He^3	—
0.191	Ru^{104}	He^3	5.2
0.191	Os^{192}	np	—
	Ir^{193}	He^3	—
0.195	Pd^{110}	He^3	1.7
0.197	Hg^{201}	2p	1.1
	Hg^{202}	He^3	2.4
	Hg^{204}	nα	0.6
0.1970	Er^{162}	np	—
0.1986	Se^{78}	He^3	0.4
	Se^{80}	nα	0.9
0.20	Yb^{176}	He^3	—
0.205	Pb^{208}	He^3	—
0.210	Nd^{150}	n	1.6
	Sm^{152}	He^3	7.6
	Sm^{154}	nα	6.5
0.2136	Hf^{179}	p	13.8
	Hf^{180}	np	35.2
	Ta^{181}	He^3	100.0
0.214	Rb^{85}	n	34.7
	Sr^{86}	np	4.7
	Sr^{87}	T	3.4
	Y^{89}	nα	48.0
0.22	Cd^{116}	p	2.7
0.22	Nd^{148}	2p	—
	Nd^{150}	α	—
0.2218	W^{180}	n	0.1
0.23	Hg^{204}	He^3	—
0.231	Sr^{86}	n	4.2
	Sr^{87}	2n	3.0
	Zr^{90}	nα	22.1
0.237	Sr^{86}	n	4.2
	Sr^{87}	2n	3.0
	Zr^{90}	nα	22.1
0.24	Cd^{116}	p	0.5
0.245	Sm^{154}	np	—
0.245	Hg^{201}	2p	—
	Hg^{202}	He^3	—
	Hg^{204}	nα	—
0.246	Ar^{40}	p	42.8
	K^{41}	2p	3.0

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.246	Gd^{158}	He^3	1.0
	Gd^{160}	nα	0.9
0.247	Cd^{112}	n	24.1
	Cd^{113}	2n	12.3
	In^{113}	np	4.3
	Sn^{114}	He^3	0.7
	Sn^{115}	α	0.4
	Sn^{116}	nα	14.3
0.250	Rb^{85}	n	34.7
	Sr^{86}	np	4.7
	Sr^{87}	T	3.4
	Y^{89}	nα	48.0
0.256	Sm^{154}	He^3	6.4
0.258	Dy^{163}	p	20.0
	Dy^{164}	np	22.5
	Ho^{165}	He^3	80.0
0.258	Os^{192}	He^3	—
0.2646	Ge^{76}	n	0.8
	Se^{78}	He^3	2.5
	Se^{80}	nα	5.3
0.269	Nd^{150}	n	1.1
	Sm^{152}	He^3	5.5
	Sm^{154}	nα	4.6
0.27	Cd^{106}	T	—
0.27	Cd^{116}	p	1.0
0.270	Se^{80}	np	1.6
	Br^{81}	He^3	1.6
0.273	Yb^{176}	np	12.7
	Lu^{176}	2p	2.6
0.277	Se^{82}	α	8.6
0.2793	Pt^{198}	n	0.2
	Hg^{199}	2p	0.5
	Hg^{200}	He^3	0.7
	Hg^{201}	α	0.4
	Hg^{202}	nα	0.9
0.2832	Er^{164}	np	0.2
0.2838	Dy^{163}	2p	2.0
	Dy^{164}	He^3	2.3
0.285	Kr^{78}	T	0.3
0.294	Se^{82}	α	0.6
0.30	Cd^{114}	p	—
	Cd^{116}	T	—
	In^{115}	2p	—
0.30	Sn^{120}	p	1.6
	Sn^{122}	T	0.2
	Sn^{122}	He^3	0.2
	Sb^{123}	α	2.1
	Sn^{124}	nα	0.3
0.300	Nd^{150}	np	5.6
0.305	Pb^{208}	2p	—
0.3067	Ru^{102}	p	27.8
	Ru^{104}	T	16.4
	Rh^{103}	2p	88.0
0.307	Pd^{108}	p	19.5
	Ag^{109}	2p	35.2
0.31	Xe^{136}	He^3	1.9
0.31	Nd^{148}	p	1.2
	Nd^{150}	T	1.1

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.314	Sn^{118}	p	11.3
	Sn^{119}	np	4.0
	Sn^{120}	T	15.4
	Sn^{121}	α	26.9
0.315	Hg^{201}	2p	—
	Hg^{202}	He^3	—
	Hg^{204}	nα	—
0.3153	Dy^{163}	2p	3.8
	Dy^{164}	He^3	4.2
0.319	W^{183}	p	1.6
	W^{184}	np	3.4
	Re^{185}	He^3	4.1
	Re^{187}	nα	6.9
0.3194	Cr^{54}	He^3	2.3
0.32	Nd^{148}	2p	—
	Nd^{150}	α	—
0.32	W^{186}	He^3	—
0.320	Te^{130}	np	20.0
0.320	Hg^{201}	2p	—
	Hg^{202}	He^3	—
	Hg^{204}	nα	—
0.325	Te^{128}	He^3	31.2
0.325	Nd^{150}	p	—
0.3257	Hf^{179}	p	13.8
	Hf^{180}	np	35.2
	Ta^{181}	He^3	100.0
0.327	Nd^{150}	n	0.3
	Sm^{152}	He^3	1.3
	Sm^{154}	nα	1.1
0.334	Xe^{136}	He^3	1.2
0.34	Nd^{148}	p	1.4
	Nd^{150}	T	1.4
0.340	Ru^{96}	n	4.1
0.340	Sm^{154}	He^3	0.7
0.356	W^{183}	p	0.1
	W^{184}	np	0.3
	Re^{185}	He^3	0.4
	Re^{187}	nα	0.6
0.36	Se^{80}	p	0.8
	Se^{82}	T	0.1
	Br^{81}	2p	0.7
0.36	Cd^{116}	p	0.7
0.36	Nd^{150}	p	—
0.3610	Dy^{163}	2p	17.5
	Dy^{164}	He^3	19.7
0.3612	Os^{192}	2n	41.0
	Ir^{191}	p	37.3
	Ir^{193}	T	62.7
	Pt^{192}	2p	0.8
	Pt^{194}	α	32.9
	Pt^{195}	nα	33.8
0.364	Pt^{198}	n	7.0
	Hg^{199}	2p	16.3
	Hg^{200}	He^3	22.4
	Hg^{201}	α	12.8
	Hg^{202}	nα	28.9
0.366	Yb^{176}	np	12.3
	Lu^{176}	2p	2.5
0.368	Hg^{201}	p	3.8
	Hg^{202}	np	8.6
	Tl^{203}	He^3	8.6
	Tl^{205}	nα	20.5

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.37	Pd^{110}	He^3	0.7
0.375	Hg^{200}	n	23.1
	Hg^{201}	2n	13.2
	Pb^{204}	nα	1.5
0.383	Fe^{54}	n	2.9
	Ni^{58}	nα	33.9
0.39	Pd^{108}	p	2.7
	Ag^{109}	2p	4.8
0.390	Ru^{96}	T	4.5
0.392	Os^{192}	np	—
	Ir^{193}	He^3	—
0.393	In^{113}	γ'	4.3
	In^{115}	2n	95.7
	Sn^{114}	p	0.7
	Sn^{115}	np	0.4
	Sn^{116}	T	14.3
0.40	Yb^{176}	He^3	—
0.40	W^{186}	He^3	—
0.41	Te^{128}	np	—
0.417	Sn^{117}	p	2.8
	Sn^{118}	np	8.9
	Sn^{119}	T	3.2
	Sb^{121}	nα	21.2
0.417	Os^{192}	He^3	—
0.42	Cd^{116}	p	0.5
0.424	Nd^{150}	n	0.5
	Sm^{152}	He^3	2.2
	Sm^{154}	nα	1.9
0.425	Sm^{154}	He^3	2.7
0.4268	Hf^{179}	p	13.8
	Hf^{180}	np	35.2
	Ta^{181}	He^3	100.0
0.43	Se^{80}	p	1.0
	Se^{82}	T	0.2
	Br^{81}	2p	1.0
0.432	Xe^{136}	He^3	4.4
0.4338	Pd^{110}	2p	4.6
0.44	Sn^{119}	p	0.6
	Sn^{120}	np	2.3
	Sb^{121}	He^3	4.0
	Sb^{123}	nα	3.0
0.441	Xe^{129}	p	3.8
	Xe^{130}	np	0.6
	Xe^{131}	T	3.1
	Cs^{133}	nα	14.4
0.453	Xe^{134}	He^3	1.7
	Xe^{136}	nα	1.4
0.453	Nd^{148}	np	4.8
0.46	W^{186}	He^3	—
0.460	Te^{130}	n	4.7
	Xe^{131}	2p	2.9
	Xe^{132}	He^3	2.6
	Xe^{134}	nα	1.4
0.464	Rb^{85}	n	37.5
	Sr^{86}	np	5.1
	Sr^{87}	T	3.7
	Y^{89}	nα	52.0
0.47	Xe^{136}	He^3	2.0
0.473	Mg^{26}	2p	11.0

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.475	Hg^{201}	2p	—
	Hg^{202}	He^3	—
	Hg^{204}	nα	—
0.48	Cd^{116}	p	0.8
0.487	Te^{130}	n	0.9
	Xe^{131}	2p	0.5
	Xe^{132}	He^3	0.7
	Xe^{134}	nα	0.3
0.49	Te^{130}	He^3	34.5
0.493	Xe^{134}	He^3	0.5
	Xe^{136}	nα	0.4
0.50	Yb^{176}	np	1.8
	Lu^{176}	2p	0.4
0.50	Pt^{198}	p	3.2
0.5025	Os^{192}	2n	41.0
	Ir^{191}	p	37.3
	Ir^{193}	T	62.7
	Pt^{192}	2p	0.8
	Pt^{194}	α	32.9
	Pt^{195}	nα	33.8
0.505	Te^{125}	p	1.4
	Te^{126}	np	3.7
	I^{127}	He^3	20.0
0.51	Ru^{104}	He^3	2.8
0.5118	Ag^{107}	n	8.3
	Cd^{108}	np	0.1
0.513	Yb^{176}	p	12.73
0.514	Er^{169}	2p	0.4
	Er^{168}	He^3	0.5
	Er^{170}	nα	0.3
0.527	Xe^{136}	n	8.9
	Ba^{137}	2p	11.3
	Ba^{138}	He^3	71.7
0.528	Xe^{129}	p	0.4
	Xe^{130}	np	0.1
	Xe^{131}	T	0.3
	Cs^{133}	nα	1.4
0.53	Hg^{202}	p	—
	Hg^{204}	T	—
	Tl^{203}	2p	—
	Tl^{205}	α	—
0.536	Xe^{131}	p	3.0
	Xe^{132}	np	3.7
	Cs^{133}	He^3	14.0
0.540	Hg^{201}	2p	2.9
	Hg^{202}	He^3	6.6
	Hg^{204}	nα	1.5
0.541	Nd^{150}	n	0.4
	Sm^{152}	He^3	2.1
	Sm^{154}	nα	1.8
0.5449	Ru^{102}	p	2.2
	Ru^{104}	T	1.3
	Rh^{103}	2p	7.0
0.55	Os^{192}	He^3	—
0.551	Zr^{92}	p	17.1
	Zr^{94}	T	17.4
	Nb^{93}	2p	100.0
0.5555	Cd^{106}	2n	0.8
	Cd^{106}	np	0.8
0.557	Xe^{136}	He^3	3.1

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.56	Rb^{87}	n	27.9
	Sr^{87}	p	7.0
	Sr^{88}	np	82.5
	Y^{89}	He^3	100.0
0.56	Cd^{114}	p	—
	Cd^{116}	T	—
	In^{115}	2p	—
0.56	Sn^{118}	p	24.0
	Sn^{119}	np	8.6
	Sn^{120}	T	32.9
	Sb^{121}	α	57.3
0.56	Nd^{148}	p	2.2
	Nd^{150}	T	2.2
0.57	Er^{170}	He^3	—
0.57	Os^{192}	np	—
	Ir^{193}	He^3	—
0.588	Zr^{90}	n	48.4
	Zr^{91}	2n	10.6
	Mo^{92}	T	14.9
	Mo^{92}	He^3	14.9
	Mo^{94}	nα	8.5
0.59	Ru^{104}	He^3	3.8
0.59	Nd^{148}	np	0.7
0.596	Ge^{76}	np	6.9
0.600	Zr^{96}	He^3	2.7
0.603	Te^{125}	p	1.4
	Te^{126}	np	3.7
	I^{127}	He^3	20.0
0.603	Xe^{134}	He^3	0.4
	Xe^{136}	nα	0.4
0.61	Xe^{136}	np	0.7
	Xe^{136}	2p	0.7
0.61	Nd^{148}	p	0.6
	Nd^{150}	T	0.6
0.610	Gd^{160}	np	1.3
0.615	Br^{79}	n	6.6
	Se^{80}	np	19.7
	Kr^{80}	np	0.3
	Br^{81}	He^3	19.5
0.615	Pd^{110}	2p	2.6
0.6165	Os^{192}	2n	41.0
	Ir^{191}	p	37.3
	Ir^{193}	T	62.7
	Pt^{192}	2p	0.8
	Pt^{194}	α	32.9
	Pt^{195}	nα	33.8
0.6174	In^{113}	n	0.3
0.618	Br^{81}	n	3.0
	Kr^{82}	np	0.7
	Kr^{83}	T	0.7
	Rb^{85}	nα	4.3
0.625	Ru^{96}	n	0.8
0.63	Xe^{136}	He^3	1.6
0.63	Yb^{176}	np	0.3
	Lu^{176}	2p	0.1
0.6332	Ag^{109}	n	0.9
	Cd^{110}	np	0.2
	Cd^{111}	T	0.2
	In^{113}	nα	0.1

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.64	Sn^{119}	p	0.9	0.69	Sn^{119}	p	3.6
	Sn^{120}	np	3.3		Sn^{120}	np	13.9
	Sb^{121}	He^3	5.8		Sb^{121}	He^3	24.3
	Sb^{123}	nα	4.3		Sb^{123}	nα	18.1
0.644	Te^{125}	p	1.4	0.695	Se^{80}	np	5.5
	Te^{126}	np	3.7		Br^{81}	He^3	5.5
	I^{127}	He^3	20.0				
				0.695	Nd^{145}	p	0.2
0.646	Er^{162}	np	—		Nd^{146}	np	0.3
0.65	Nd^{148}	p	1.4	0.70	Ru^{104}	He^3	2.0
	Nd^{150}	T	1.3				
0.654	Nd^{150}	n	0.5	0.70	Cd^{114}	p	—
	Sm^{152}	He^3	2.3		Cd^{116}	T	—
	Sm^{154}	nα	1.9		In^{115}	2p	—
0.6576	Sn^{112}	np	1.0	0.70	Xe^{136}	He^3	2.1
0.658	Mo^{92}	n	9.0	0.702	Fe^{54}	n	5.8
	Ru^{96}	nα	3.1		Ni^{55}	nα	67.8
0.6616	Ba^{138}	n	71.7	0.708	Sm^{144}	nα	—
	La^{138}	p	0.1				
	La^{139}	np	99.9	0.715	Hg^{201}	2p	—
	Ce^{140}	He^3	88.5		Hg^{202}	He^3	—
	Ce^{142}	nα	11.1		Hg^{204}	nα	—
0.665	Mo^{98}	p	23.3	0.72	Mo^{100}	np	—
	Mo^{100}	T	9.4				
				0.72	W^{186}	He^3	—
0.666	Br^{81}	n	0.5				
	Kr^{82}	np	0.1	0.73	Sn^{120}	p	1.6
	Kr^{83}	T	0.1		Sn^{122}	T	0.2
	Rb^{85}	nα	0.7		Sb^{123}	α	2.1
0.669	Zn^{64}	n	3.9	0.737	Sm^{144}	nα	—
0.68	Te^{128}	np	—	0.737	Sm^{154}	He^3	2.7
0.68	Er^{170}	p	1.9	0.743	Te^{120}	np	34.5

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.745	Nd^{148}	np	1.2
0.745	Nd^{150}	p	—
0.747	Mo^{98}	p	23.8
	Mo^{100}	T	9.6
0.748	Sm^{144}	n	3.1
0.75	Te^{130}	np	13.5
0.754	Xe^{136}	He^3	7.5
0.76	Gd^{160}	np	1.3
0.76	Er^{170}	p	5.6
0.767	Cd^{106}	np	—
0.773	Sm^{144}	nα	—
0.7769	Sr^{84}	np	0.1
0.78	Nd^{148}	np	0.9
0.781	Ba^{136}	p	7.6
	Ba^{137}	np	11.3
	Ba^{138}	T	71.7
	La^{138}	He^3	0.1
	La^{139}	α	99.9
0.7868	Mo^{100}	np	—
0.79	Hg^{201}	2p	—
	Hg^{202}	He^3	—
	Hg^{204}	nα	—
0.800	Zr^{96}	He^3	2.0
0.808	Dy^{163}	p	11.0
	Dy^{164}	np	12.4
	Ho^{165}	He^3	44.0
0.81	Sn^{119}	p	0.4
	Sn^{120}	np	1.6
	Sb^{121}	He^3	2.9
	Sb^{123}	nα	2.1
0.818	Pr^{141}	nα	2.7
0.8187	Sn^{117}	p	1.3
	Sn^{118}	np	4.1
	Sn^{119}	T	1.5
	Sb^{121}	nα	9.7
0.82	Sn^{120}	p	31.2
	Sn^{122}	T	4.5
	Sn^{122}	He^3	0.2
	Sb^{123}	α	40.6
	Sn^{124}	nα	0.3
0.82	W^{186}	He^3	—
0.824	Sm^{144}	nα	—
0.83	Se^{80}	np	3.7
	Br^{81}	He^3	3.7
0.83	Os^{192}	np	—
	Ir^{193}	He^3	—
0.84	Er^{170}	p	2.8
0.840	Ba^{136}	p	7.6
	Ba^{137}	np	11.3
	Ba^{138}	T	71.7
	La^{138}	He^3	0.1
	La^{139}	α	99.9
0.842	Si^{30}	He^3	2.1
0.85	Xe^{136}	np	8.4
	Xe^{136}	2p	8.4
0.85	Er^{170}	np	—

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.86	Pd^{110}	He^3	0.8
0.86	Xe^{136}	np	0.4
	Xe^{136}	2p	0.4
0.86	Os^{192}	He^3	—
0.87	Yb^{176}	np	0.7
	Lu^{176}	2p	0.2
0.871	Ru^{96}	np	5.0
0.88	Mg^{26}	2p	0.9
0.88	Kr^{86}	np	5.0
	Kr^{86}	2p	5.0
	Rb^{87}	He^3	8.0
0.887	Dy^{163}	p	9.0
	Dy^{164}	np	10.2
	Ho^{165}	He^3	36.0
0.89	Xe^{136}	np	5.9
	Xe^{136}	2p	5.9
0.898	Sn^{120}	p	0.8
	Sn^{122}	T	0.1
	Sn^{122}	He^3	0.1
	Sb^{123}	α	1.1
	Sn^{124}	nα	0.2
0.898	Gd^{160}	np	4.2
0.90	W^{186}	He^3	—
0.91	Xe^{136}	He^3	5.1
0.912	Zr^{96}	np	2.2
0.915	Fe^{54}	n	0.6
	Ni^{58}	nα	7.5
0.92	Nd^{148}	np	0.3
0.92	Er^{170}	p	0.9
0.922	Sn^{120}	p	0.8
	Sn^{122}	T	0.1
	Sn^{122}	He^3	0.1
	Sb^{123}	α	1.1
	Sn^{124}	nα	0.2
0.928	Cr^{54}	He^3	0.1
0.93	Pd^{110}	He^3	0.5
0.938	Cd^{106}	np	—
0.940	Er^{164}	np	0.2
0.945	Gd^{160}	np	7.9
0.955	Se^{80}	np	1.9
	Br^{81}	He^3	1.9
0.96	Os^{192}	He^3	—
0.96	Hg^{201}	2p	—
	Hg^{202}	He^3	—
	Hg^{204}	nα	—
0.962	Zn^{64}	n	2.9
0.965	Er^{162}	np	—
0.983	Sm^{144}	nα	—
1.01	Cr^{54}	p	2.4
1.011	Fe^{54}	n	4.7
	Ni^{58}	nα	54.2
1.013	Si^{30}	He^3	1.0
1.02	Mo^{98}	p	0.5
	Mo^{100}	T	0.2

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
1.02	Ru^{104}	He^3	4.8
1.03	Pd^{110}	He^3	0.5
1.039	Zn^{67}	p	0.4
	Zn^{68}	np	1.7
	Ga^{71}	nα	3.6
1.040	Ga^{71}	n	0.2
	Ge^{72}	np	0.1
1.049	Sn^{119}	p	7.2
	Sn^{120}	np	27.5
	Sb^{121}	He^3	47.9
	Sb^{123}	nα	35.7
1.07	Xe^{136}	np	1.1
	Xe^{136}	2p	1.1
1.078	Ga^{69}	n	2.4
	Ge^{70}	np	0.8
1.080	Hf^{179}	2p	0.7
	Hf^{180}	He^3	1.7
1.083	Te^{130}	n	0.3
	Xe^{131}	2p	0.2
	Xe^{132}	He^3	0.3
	Xe^{134}	nα	0.1
1.09	Ru^{96}	n	1.2
1.097	Sn^{117}	p	4.0
	Sn^{118}	np	12.5
	Sn^{119}	T	4.5
	Sb^{121}	nα	29.8
1.100	Zr^{96}	He^3	0.5
1.110	Gd^{160}	np	1.5
1.122	Sm^{154}	He^3	1.4
1.139	Zr^{96}	np	0.2
1.147	Xe^{134}	He^3	0.6
	Xe^{136}	nα	0.5
1.15	Xe^{136}	np	2.0
	Xe^{136}	2p	2.0
1.17	Ni^{64}	np	0.9
	Cu^{65}	He^3	23.1
1.171	Sb^{121}	n	0.7
	Te^{122}	np	0.3
1.172	Cu^{63}	n	0.4
	Ni^{64}	np	1.2
	Zn^{64}	np	0.2
	Cu^{65}	He^3	30.8
1.177	Cl^{35}	n	9.2
	K^{39}	nα	11.4
1.18	Ru^{104}	He^3	2.0
1.180	Sm^{154}	He^3	5.0
1.185	Gd^{160}	np	5.0
1.20	Ge^{76}	np	0.8
1.21	Se^{80}	np	2.1
	Br^{81}	He^3	2.1
1.21	Mo^{92}	n	2.5
	Ru^{96}	nα	0.9
1.224	Er^{164}	np	0.4
1.227	Hg^{201}	p	3.0
	Hg^{202}	np	6.9
	Tl^{203}	He^3	6.8
	Tl^{205}	nα	16.2

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
1.230	Sn^{119}	p	8.3
	Sn^{120}	np	31.8
	Sb^{121}	He^3	55.4
	Sb^{123}	nα	41.3
1.241	Hf^{179}	2p	0.4
	Hf^{180}	He^3	0.9
1.25	Sn^{119}	p	0.5
	Sn^{120}	np	2.0
	Sb^{121}	He^3	3.4
	Sb^{123}	nα	2.6
1.26	Nd^{148}	p	0.6
	Nd^{150}	T	0.6
1.27	Ar^{40}	p	50.8
	K^{41}	2p	3.5
1.28	Si^{30}	p	2.9
	P^{31}	2p	93.0
1.29	Pd^{110}	He^3	0.5
1.293	Ca^{43}	2p	0.1
	Ca^{44}	He^3	2.0
1.293	Sn^{117}	p	6.1
	Sn^{118}	np	19.2
	Sn^{119}	T	6.9
	Sb^{121}	nα	45.8
1.307	Se^{80}	np	2.4
	Br^{81}	He^3	2.4
1.31	Se^{80}	np	1.7
	Br^{81}	He^3	1.7
1.328	Fe^{54}	n	4.7
	Ni^{58}	nα	54.2
1.347	Ca^{48}	np	0.2
1.37	Nd^{148}	np	0.3
1.38	Ru^{104}	He^3	1.7
1.42	Zr^{96}	2p	2.8
1.43	Ru^{96}	n	0.3
1.4336	Cr^{54}	p	9.5
	Cr^{54}	np	2.4
	Mn^{55}	He^3	100.0
1.47	Ni^{64}	np	0.2
	Cu^{65}	He^3	5.6
1.48	Cd^{116}	p	0.8
1.508	Sn^{117}	p	0.8
	Sn^{118}	np	2.6
	Sn^{119}	T	0.9
	Sb^{121}	nα	6.3
1.51	Nd^{148}	np	1.6
1.52	Ar^{40}	p	41.8
	K^{41}	2p	2.9
1.53	Mo^{92}	n	3.5
	Ru^{96}	nα	1.2
1.53	Ru^{96}	np	0.6
1.56	Ru^{104}	He^3	2.0
1.60	Ar^{40}	np	37.9
	K^{41}	He^3	2.6
1.626	Mo^{92}	T	—
1.66	Cd^{116}	p	0.5
1.74	Ni^{64}	np	0.2
	Cu^{65}	He^3	5.6

Table 2, Part B (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
1.76	Hg^{204}	He^3	—
1.780	Si^{29}	p	4.7
	Si^{30}	np	3.1
	P^{31}	He^3	100.0
1.79	Xe^{136}	np	0.4
	Xe^{136}	2p	0.4
1.87	Ru^{96}	np	0.5
1.90	Kr^{86}	np	2.5
	Kr^{86}	2p	2.5
	Rb^{87}	He^3	4.1
2.02	Cu^{65}	He^3	2.1
2.08	Ru^{104}	He^3	3.0
2.109	Sn^{117}	p	1.6
	Sn^{118}	np	5.0
	Sn^{119}	T	1.8
	Sb^{121}	nα	12.0
2.12	Cd^{116}	p	0.8
2.127	Cl^{35}	n	30.4
	Ar^{36}	np	0.1
	K^{39}	nα	37.4
2.170	K^{39}	n	93.1
	Ar^{40}	np	46.8
	Ca^{40}	np	97.0
	K^{41}	He^3	3.2
2.184	Nd^{145}	p	0.1
	Nd^{146}	np	0.1
2.23	P^{31}	n	0.5
	S^{32}	np	0.5
	Cl^{35}	nα	0.4
2.312	O^{16}	2n	99.2
2.339	Fe^{54}	n	1.2
	Ni^{58}	nα	13.6
2.43	Si^{30}	p	0.2
	P^{31}	2p	7.0
2.47	Kr^{86}	np	1.4
	Kr^{86}	2p	1.4
	Rb^{87}	He^3	2.2
2.66	Ru^{96}	T	1.0
2.74	Ru^{96}	np	0.3
2.97	Ge^{76}	np	0.8
3.09	Ar^{40}	He^3	89.6
3.23	Ge^{76}	np	1.0
3.304	Cl^{35}	n	11.2
	Ar^{36}	np	0.1
	K^{39}	nα	13.8
3.41	Ge^{76}	np	0.8
3.577	Mo^{92}	T	—
3.7	Ca^{48}	np	0.1
3.838	Mo^{92}	T	—
3.91	Kr^{86}	np	1.8
	Kr^{86}	2p	1.8
	Rb^{87}	He^3	2.9

Table 2
Gamma Rays Produced by Photonuclear Reactions — (by gamma-ray energy)
Part C — Half-lives from 2 to 24 hr

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.0505	Au^{197}	n	—
	Hg^{198}	np	—
0.0518	Gd^{158}	p	5.5
	Gd^{160}	T	4.8
0.054	Ge^{74}	p	36.5
	Ge^{76}	T	7.8
0.0547	Xe^{126}	n	—
	Ba^{130}	nα	—
0.0571	Er^{168}	p	1.4
	Er^{170}	T	0.7
	Tm^{169}	2p	5.0
0.0574	Ta^{181}	p	74.0
	W^{182}	2p	19.5
	W^{183}	He^3	10.7
	W^{184}	α	22.7
0.0580	Gd^{160}	n	5.3
	Dy^{161}	2p	4.6
	Dy^{162}	He^3	6.2
	Dy^{163}	α	6.1
	Dy^{164}	nα	6.9
0.0592	Er^{164}	T	0.1
0.0601	Er^{162}	np	0.1
0.0615	Hg^{196}	n	—
0.0645	Pt^{190}	T	—
0.0653	Pt^{190}	T	—
0.0658	Se^{74}	n	0.9
	Kr^{78}	nα	0.4
0.066	Yb^{174}	p	1.0
	Yb^{176}	T	0.4
	Lu^{175}	2p	3.1
	Lu^{176}	He^3	0.1
0.0716	Pt^{190}	n	—
0.072	Os^{189}	2p	4.7
	Os^{190}	He^3	7.7
	Os^{192}	nα	11.9
0.0737	Er^{168}	p	1.2
	Er^{170}	T	0.7
	Tm^{169}	2p	4.5
0.0742	Os^{192}	n	41.0
	Ir^{193}	np	62.7
	Pt^{194}	He^3	32.9
	Pt^{195}	α	33.8
	Pt^{196}	nα	25.3
0.0743	Pt^{190}	T	—
0.0746	Xe^{126}	n	—
	Ba^{130}	nα	—
0.0750	Pt^{190}	T	—
0.0773	Pt^{198}	n	7.2
	Hg^{199}	2p	16.7
	Hg^{200}	He^3	23.0
	Hg^{201}	α	13.1
	Hg^{202}	nα	29.6
0.0774	Er^{164}	T	0.2
0.0806	Yb^{168}	np	—
0.0821	Pt^{190}	n	—

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.0834	Er^{168}	p	1.6	0.100	Pt^{198}	np	7.2
	Er^{170}	T	0.9				
	Tm^{169}	2p	6.0	0.103	Ta^{181}	n	3.0
					W^{182}	np	0.8
0.0846	Au^{197}	n	100.0		Re^{185}	nα	1.1
	Hg^{198}	np	10.0				
				0.1031	Er^{164}	T	0.1
0.087	Ce^{137}	n	—				
				0.111	W^{186}	np	—
0.0877	Pd^{110}	n	11.8		Re^{187}	He^3	—
	Cd^{111}	2p	12.8				
	Cd^{112}	He^3	24.1	0.1131	Xe^{126}	n	—
	Cd^{113}	α	12.3		Ba^{130}	nα	—
	Cd^{114}	nα	28.9				
				0.1138	Pt^{190}	n	—
0.0884	Hf^{177}	p	11.1				
	Hf^{178}	np	16.3	0.116	Cr^{50}	2n	4.3
	Hf^{179}	T	8.3				
	Ta^{181}	nα	60.0	0.116	Yb^{174}	He^3	20.1
					Yb^{176}	nα	8.0
0.089	Sn^{119}	2p	0.7				
	Sn^{120}	He^3	2.5	0.118	Ce^{136}	n	—
	Sn^{122}	nα	0.4				
				0.12	Cd^{114}	p	—
0.093	Kr^{78}	2n	—		Cd^{116}	T	—
					In^{115}	2p	—
0.0931	Cd^{108}	n	0.9				
	Sn^{112}	nα	1.0	0.120	Pt^{196}	p	—
					Pt^{198}	T	—
0.0933	Ta^{181}	n	27.0		Au^{197}	2p	—
	Ta^{181}	p	100.0				
	W^{182}	np	7.1	0.1218	Eu^{153}	n	7.1
	W^{183}	T	3.9		Gd^{154}	np	0.3
	W^{182}	2p	26.4		Gd^{155}	T	2.0
	W^{183}	He^3	14.4				
	W^{184}	α	30.6	0.1224	Mo^{92}	2n.	15.8
	Re^{185}	nα	1.0				
				0.1231	Dy^{156}	np	—
0.0924	Pt^{190}	n	—				
				0.124	Ba^{130}	T	—
0.0987	Pt^{196}	p	—				
	Pt^{198}	T	—	0.124	Yb^{174}	He^3	3.2
	Au^{197}	2p	—		Yb^{176}	nα	1.3

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.127	Ba^{135}	p	—
	Ba^{136}	np	—
	Ba^{137}	T	—
	La^{138}	α	—
	La^{139}	nα	—
0.1293	Pb^{204}	2n	1.2
0.1294	Pd^{108}	He^3	7.8
	Pd^{110}	nα	3.5
0.1296	Pt^{196}	p	—
	Pt^{198}	T	—
	Au^{197}	2p	—
0.1327	Mo^{92}	np	0.9
0.134	Os^{189}	2p	6.0
	Os^{190}	He^3	9.8
	Os^{192}	nα	15.2
0.137	Ba^{135}	p	—
	Ba^{136}	np	—
	Ba^{137}	T	—
	La^{138}	α	—
	La^{139}	nα	—
0.1405	Ru^{100}	p	12.6
	Ru^{101}	np	17.1
	Ru^{102}	T	31.6
	Rh^{103}	α	100.0
0.1411	Pt^{190}	n	—
0.1415	Mo^{92}	np	15.1
0.1478	Au^{197}	n	—
	Hg^{198}	np	—
0.1486	Xe^{124}	n	—
0.1487	Ir^{191}	n	2.2
	Pt^{192}	np	0.1
0.1489	Pb^{204}	2n	0.1
0.1495	Kr^{86}	n	13.4
	Kr^{86}	p	13.4
	Rb^{87}	np	21.4
	Rb^{87}	2p	21.4
	Sr^{87}	2p	5.4
	Sr^{88}	He^3	63.6
0.1550	Os^{189}	p	2.9
	Os^{190}	np	4.8
	Ir^{191}	He^3	6.7
	Ir^{193}	nα	11.3
0.158	Te^{120}	T	0.1
0.159	Xe^{124}	p	0.1
	Xe^{126}	T	0.1
0.1630	Mo^{92}	2n	1.5
0.165	Fe^{54}	2n	5.8
0.172	Ba^{130}	n	—
0.1726	Hg^{196}	n	—
0.1749	Au^{197}	n	100.0
	Hg^{198}	np	100.0
0.1763	Pt^{190}	n	—
0.182	Ba^{130}	n	—
0.1844	Yb^{168}	np	—
0.1867	Pt^{190}	n	—
0.1867	Ir^{191}	n	35.1
	Pt^{192}	np	0.7
0.1876	Xe^{126}	n	—
	Ba^{130}	nα	—

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.1882	Au^{197}	n	—
	Hg^{198}	np	—
0.190	Sr^{84}	T	0.4
0.1915	Pt^{198}	n	0.7
	Hg^{199}	2p	1.6
	Hg^{200}	He^3	2.2
	Hg^{201}	α	1.2
	Hg^{202}	nα	2.8
0.2024	Zr^{91}	p	11.2
	Zr^{92}	np	17.0
	Nb^{93}	He^3	99.6
0.2037	Pt^{190}	n	—
0.2078	Er^{168}	p	2.6
	Er^{170}	T	1.4
	Tm^{169}	2p	9.5
0.21	Ba^{130}	n	—
0.210	Se^{80}	He^3	17.5
	Se^{82}	nα	3.2
0.2122	Xe^{124}	T	0.1
0.215	Se^{80}	He^3	13.5
	Se^{82}	nα	2.5
0.2153	Ta^{181}	p	100.0
	W^{182}	2p	26.4
	W^{183}	He^3	14.4
	W^{184}	α	30.6
0.217	Hf^{180}	p	4.6
	Ta^{181}	2p	13.0
0.220	Pd^{108}	np	3.2
	Ag^{109}	He^3	5.8
0.2270	Dy^{156}	n	—
0.235	Dy^{164}	p	4.2
	Ho^{165}	2p	15.0
0.2377	Er^{168}	p	1.6
	Er^{170}	T	0.9
	Tm^{169}	2p	6.0
0.2411	Pb^{204}	2n	0.1
0.2424	Xe^{126}	n	—
	Ba^{130}	nα	—
0.2481	Dy^{156}	np	—
0.25	W^{186}	np	—
	Re^{187}	He^3	—
0.250	Xe^{136}	n	8.6
	Ba^{137}	2p	12.0
	Ba^{138}	He^3	69.5
0.2535	Te^{120}	np	0.1
0.256	Hg^{201}	p	—
	Hg^{202}	np	—
	Tl^{203}	He^3	—
	Tl^{205}	nα	—
0.2574	Mo^{92}	2n	14.3
0.2615	Hg^{196}	n	—
0.263	Pd^{108}	He^3	2.0
	Pd^{110}	nα	0.9
0.264	Mo^{94}	n	9.0
	Mo^{95}	2n	15.7
0.264	Ce^{136}	n	—
0.265	Se^{80}	He^3	28.4
	Se^{82}	nα	5.2

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.267	Kr^{78}	2n	—
0.267	Zr^{94}	p	1.0
	Zr^{96}	T	0.2
0.268	Pt^{198}	n	0.1
	Hg^{199}	2p	0.1
	Hg^{200}	He^3	0.2
	Hg^{201}	α	0.1
	Hg^{202}	nα	0.2
0.27	Pr^{141}	2n	0.3
	Nd^{142}	T	0.1
0.273	Sn^{119}	2p	2.4
	Sn^{120}	He^3	9.2
	Sn^{122}	nα	1.3
0.283	Sn^{112}	2n	1.0
0.284	Cu^{63}	2n	8.3
	Zn^{64}	T	5.4
0.2855	Au^{197}	n	—
	Hg^{198}	np	—
0.2936	Pt^{195}	p	0.3
	Pt^{196}	np	0.3
	Au^{197}	He^3	1.0
0.295	Ge^{74}	p	36.2
	Ge^{76}	T	7.7
0.2956	Yb^{174}	He^3	8.9
	Yb^{176}	nα	3.6
0.2961	Pd^{102}	n	0.3
	Cd^{106}	nα	0.3
0.30	Cd^{114}	p	—
	Cd^{116}	T	—
	In^{115}	2p	—
0.30	W^{186}	np	—
	Re^{187}	He^3	—
0.300	Ce^{136}	n	—
0.3050	Kr^{86}	n	4.0
	Kr^{86}	p	4.0
	Rb^{87}	np	6.4
	Rb^{87}	2p	6.4
	Sr^{87}	2p	1.6
	Sr^{88}	He^3	19.0
0.308	Yb^{174}	He^3	20.1
	Yb^{176}	nα	8.0
0.31	Cr^{50}	2n	4.3
0.310	Te^{130}	np	—
0.314	Sn^{119}	2p	8.0
	Sn^{120}	He^3	30.7
	Sn^{122}	nα	4.4
0.315	Pd^{108}	He^3	2.5
	Pd^{110}	nα	1.1
0.3161	Au^{197}	n	—
	Hg^{198}	np	—
0.319	Pt^{196}	p	—
	Pt^{198}	T	—
	Au^{197}	2p	—
0.3205	Gd^{158}	p	2.5
	Gd^{160}	T	2.2
0.3207	Er^{168}	p	9.2
	Er^{170}	T	5.1
	Tm^{169}	2p	34.0
0.3267	Dy^{158}	n	0.1

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.3285	Pt^{195}	p	2.3	0.3618	Gd^{158}	p	2.5
	Pt^{196}	np	1.7		Gd^{160}	T	2.2
	Au^{197}	He^3	6.8				
				0.363	Gd^{160}	n	2.8
0.330	Dy^{164}	p	11.7		Dy^{161}	2p	2.4
	Ho^{165}	2p	41.4		Dy^{162}	He^3	3.2
					Dy^{163}	α	3.2
0.3325	Ta^{181}	p	100.0		Dy^{164}	nα	3.6
	W^{182}	2p	26.4				
	W^{183}	He^3	14.4	0.368	Zn^{68}	He^3	0.8
	W^{184}	α	30.6				
				0.368	Se^{80}	He^3	9.0
0.334	Eu^{151}	n	1.7		Se^{82}	nα	1.7
0.3340	Sm^{152}	np	20.6	0.368	Hg^{201}	p	—
	Eu^{153}	He^3	40.2		Hg^{202}	np	—
					Hg^{202}	2p	—
0.340	Pd^{120}	T	0.7		Tl^{203}	He^3	—
					Hg^{204}	α	—
0.3442	Eu^{153}	n	1.5		Tl^{205}	nα	—
	Gd^{154}	np	0.1				
	Gd^{155}	T	0.4	0.3728	Gd^{158}	p	2.5
					Gd^{160}	T	2.2
0.345	Sn^{119}	2p	1.5				
	Sn^{120}	He^3	5.7	0.374	Sc^{45}	2n	22.0
	Sn^{122}	nα	0.8		Ca^{44}	p	1.8
					Sc^{45}	2p	84.7
0.3466	Er^{168}	p	10.8				
	Er^{170}	T	6.0	0.38	Cu^{63}	2n	1.7
	Tm^{169}	2p	40.0		Zn^{64}	T	1.2
0.355	Sn^{116}	p	13.6	0.381	Y^{89}	2n	100.0
	Sn^{117}	np	7.2		Mo^{92}	nα	15.8
	Sn^{118}	T	22.8				
				0.383	Fe^{54}	2n	5.8
0.356	Pt^{198}	np	7.2				
				0.3866	Er^{168}	p	1.2
0.359	Se^{74}	n	0.9		Er^{170}	T	0.7
	Kr^{178}	nα	0.4		Tm^{169}	2p	4.5
0.3612	Ir^{191}	n	35.1	0.388	Ca^{44}	p	0.1
	Pt^{192}	np	0.7		Sc^{45}	2p	6.6

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.388	Sr^{87}	γ'	7.0
	Sr^{88}	n	81.7
	Y^{89}	np	99.0
	Zr^{90}	He^3	51.0
	Zr^{91}	α	11.1
	Zr^{92}	nα	16.9
0.3899	Pb^{204}	2n	0.1
0.394	Ca^{44}	p	0.2
	Sc^{45}	2p	11.2
0.395	Pt^{198}	np	7.2
0.399	Yb^{174}	p	24.9
	Yb^{176}	T	10.0
	Lu^{175}	2p	76.2
	Lu^{176}	He^3	2.0
0.4034	Er^{168}	p	1.4
	Er^{170}	T	0.7
	Tm^{169}	2p	5.0
0.41	W^{186}	np	—
	Re^{187}	He^3	—
0.411	Ba^{130}	T	—
0.4131	Gd^{158}	p	2.5
	Gd^{160}	T	2.2
0.416	Se^{80}	He^3	13.5
	Se^{82}	nα	2.5
0.419	Xe^{131}	p	7.4
	Xe^{132}	np	9.3
	Cs^{133}	He^3	35.0
0.42	Zn^{64}	2n	16.6
0.4221	Pb^{204}	2n	1.3
0.433	Pt^{196}	p	—
	Pt^{198}	T	—
	Au^{197}	2p	—
0.434	Sn^{119}	2p	1.2
	Sn^{120}	He^3	4.6
	Sn^{122}	nα	0.7
0.439	Zn^{70}	n	0.6
	Ga^{71}	np	39.8
	Ge^{72}	He^3	27.4
	Ge^{73}	α	7.8
	Ge^{74}	nα	36.5
0.4436	Ta^{181}	p	74.0
	W^{182}	2p	19.5
	W^{183}	He^3	10.7
	W^{184}	α	22.7
0.445	Pt^{198}	np	7.2
0.4454	Mo^{98}	2n	1.4
0.448	Zr^{94}	np	0.4
	Zr^{94}	2p	0.4
	Zr^{96}	α	0.1
0.45	Pd^{108}	np	5.6
	Ag^{109}	He^3	10.1
0.456	Mo^{97}	p	2.5
	Mo^{98}	np	6.2
0.4598	Pb^{204}	2n	0.1
0.464	Eu^{151}	n	1.4
	Sm^{152}	np	1.8
	Eu^{153}	He^3	3.5
0.465	Yb^{174}	p	6.3
	Yb^{176}	T	2.5
	Lu^{175}	2p	19.3
	Lu^{176}	He^3	0.5

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.47	Pd^{108}	He^3	4.9
	Pd^{110}	nα	2.2
0.470	Pd^{108}	np	3.2
	Ag^{109}	He^3	5.8
0.4773	Gd^{158}	p	2.5
	Gd^{160}	T	2.2
0.480	Ni^{58}	T	6.8
0.480	Os^{189}	2p	4.7
	Os^{190}	He^3	7.7
	Os^{192}	nα	11.9
0.482	Nd^{142}	nα	0.5
0.4826	Zr^{91}	p	11.2
	Zr^{92}	np	17.0
	Nb^{93}	He^3	99.6
0.4904	Pb^{204}	2n	0.1
0.492	Pt^{109}	T	—
0.498	Hg^{201}	p	—
	Hg^{202}	np	—
	Tl^{203}	He^3	—
	Tl^{205}	nα	—
0.501	Pt^{190}	T	—
0.5025	Ir^{191}	n	35.1
	Pt^{192}	np	0.7
0.51	Zn^{64}	2n	5.4
0.510	Dy^{164}	p	3.6
	Ho^{165}	2p	12.9
0.5118	Pd^{108}	np	15.8
	Ag^{109}	He^3	28.4
0.512	Ta^{181}	p	26.0
	W^{182}	2p	6.9
	W^{183}	He^3	3.7
	W^{184}	α	8.0
0.522	Pt^{198}	np	7.2
0.523	Xe^{134}	np	2.2
0.53	Te^{130}	np	—
0.536	Xe^{131}	p	21.2
	Xe^{132}	np	26.7
	Cs^{133}	He^3	100.0
0.551	Zr^{94}	He^3	10.3
	Zr^{96}	nα	1.7
0.552	Os^{189}	2p	1.3
	Os^{190}	He^3	2.1
	Os^{192}	nα	3.3
0.5541	Sr^{84}	np	0.4
0.5593	Kr^{78}	np	0.2
0.5600	Hg^{196}	n	—
0.563	Se^{80}	He^3	7.5
	Se^{82}	nα	1.4
0.569	Mo^{97}	p	5.5
	Mo^{98}	np	13.8
0.58	Cu^{63}	2n	1.0
	Zn^{64}	T	0.7
0.580	Hg^{201}	p	—
	Hg^{202}	np	—
	Tl^{203}	He^3	—
	Tl^{205}	nα	—
0.59	Zn^{64}	2n	10.8

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.5903	Pd^{102}	n	0.2	0.632	Se^{80}	He^3	5.5
	Cd^{106}	nα	0.3		Se^{82}	nα	1.0
0.594	Ca^{44}	p	0.3	0.632	Pt^{198}	np	7.2
	Sc^{45}	2p	14.0				
0.601	Ge^{73}	p	0.6	0.64	Te^{130}	np	—
	Ge^{74}	np	3.0	0.642	Sn^{112}	np	—
	As^{75}	He^3	8.2				
0.6040	Gd^{158}	p	19.9	0.645	Zr^{94}	He^3	2.4
	Gd^{160}	T	17.5		Zr^{96}	nα	0.4
0.61	Xe^{136}	n	0.3	0.645	Te^{120}	n	0.1
	Ba^{137}	2p	0.3		Xe^{124}	nα	0.1
	Ba^{138}	He^3	2.2				
0.615	Pd^{102}	T	0.2	0.6453	Pt^{195}	p	0.4
					Pt^{196}	np	0.3
0.6165	Ir^{191}	n	35.1		Au^{197}	He^3	1.3
	Pt^{192}	np	0.7	0.651	Xe^{134}	np	0.8
0.617	Cd^{113}	p	4.9	0.655	Cu^{63}	2n	7.6
	Cd^{114}	np	11.5		Zn^{64}	T	5.4
0.6187	Sr^{84}	np	0.2	0.6574	Kr^{78}	np	0.1
0.619	Ca^{44}	p	1.7	0.6575	Sn^{112}	2n	—
	Sc^{45}	2p	82.4				
				0.6576	Sn^{112}	np	—
0.619	Os^{189}	2p	1.1				
	Os^{190}	He^3	1.9	0.6576	Pb^{204}	2n	1.2
	Os^{192}	nα	2.9				
				0.668	Xe^{134}	np	10.4
0.62	Pd^{108}	np	5.1				
	Ag^{109}	He^3	9.2	0.669	Xe^{131}	p	21.2
					Xe^{132}	np	26.7
0.630	Ge^{73}	p	2.1		Cs^{133}	He^3	100.0
	Ge^{74}	np	9.7				
	As^{75}	He^3	26.7	0.67	Cd^{114}	p	—
					Cd^{116}	T	—
0.630	Xe^{134}	np	1.0		In^{115}	2p	—

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
0.674	Cu^{63}	2n	2.8	0.734	Xe^{131}	p	18.4
	Zn^{64}	T	2.0		Xe^{132}	np	23.2
					Cs^{133}	He^3	87.0
0.68	Pd^{108}	He^3	3.2				
	Pd^{110}	nα	1.4	0.747	Mo^{100}	He^3	9.3
0.685	Mo^{94}	n	9.0	0.748	Zr^{94}	He^3	5.0
	Mo^{95}	2n	15.7		Zr^{96}	nα	0.8
0.685	Pt^{196}	p	—	0.748	Sn^{119}	2p	0.6
	Pt^{198}	T	—		Sn^{120}	He^3	2.3
	Au^{197}	2p	—		Sn^{122}	nα	0.3
0.686	Os^{189}	2p	5.3				
	Os^{190}	He^3	8.7	0.75	Te^{130}	np	—
	Os^{192}	nα	13.5				
				0.7645	Ru^{96}	p	4.5
0.692	Yb^{168}	np	—		Ru^{98}	T	1.5
0.702	Ru^{96}	np	5.5	0.773	Xe^{134}	np	6.8
0.7063	Yb^{168}	np	—	0.773	Os^{189}	2p	0.8
					Os^{190}	He^3	1.3
0.707	Sn^{112}	np	—		Os^{192}	nα	2.1
0.709	Se^{80}	He^3	5.0	0.7769	Sr^{84}	np	0.5
	Se^{82}	nα	0.9				
				0.780	Yb^{168}	np	—
0.720	Mo^{97}	p	4.0				
	Mo^{98}	np	10.0	0.7872	Pb^{204}	2n	0.2
0.726	Pd^{108}	He^3	13.4	0.788	Mo^{97}	p	7.6
	Pd^{110}	nα	5.9		Mo^{98}	np	19.0
0.728	Xe^{134}	np	1.5	0.79	W^{186}	np	—
					Re^{187}	He^3	—
0.729	Er^{162}	np	—				
				0.800	Pt^{196}	p	—
0.735	Pd^{108}	np	7.5		Pt^{198}	T	—
	Ag^{109}	He^3	13.5		Au^{197}	2p	—
0.74	Ge^{74}	p	2.2	0.811	Mo^{97}	p	1.4
	Ge^{76}	T	0.5		Mo^{98}	np	3.6

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
0.82	Pd^{108}	np	6.4
	Ag^{109}	He^3	11.6
0.82	Os^{192}	np	41.0
	Ir^{193}	He^3	62.7
0.822	Ru^{96}	p	0.4
	Ru^{98}	T	0.1
0.831	Eu^{151}	n	0.2
	Sm^{152}	np	5.9
	Eu^{153}	He^3	11.6
0.835	Ge^{73}	p	6.5
	Ge^{74}	np	30.4
	As^{75}	He^3	83.3
0.8416	Eu^{153}	n	5.8
	Gd^{154}	np	0.2
	Gd^{155}	T	1.6
0.847	Fe^{57}	p	2.2
	Fe^{58}	np	0.3
	Co^{59}	He^3	99.0
0.849	Ru^{96}	np	5.5
0.851	Mo^{97}	p	1.7
	Mo^{98}	np	4.3
0.86	Xe^{136}	p	1.0
0.871	Ru^{96}	np	5.5
0.88	Sm^{152}	np	3.2
	Eu^{153}	He^3	6.3
0.880	Sn^{119}	2p	0.9
	Sn^{120}	He^3	3.5
	Sn^{122}	nα	0.5
0.8845	Sn^{112}	np	—
0.90	W^{186}	np	—
	Re^{187}	He^3	—
0.93	Zr^{94}	He^3	0.5
	Zr^{96}	nα	0.1
0.933	Ni^{58}	T	47.4
0.934	Zr^{94}	np	2.4
	Zr^{94}	2p	2.4
	Zr^{96}	α	0.3
0.9374	Sn^{112}	np	—
0.94	Cu^{63}	2n	1.0
	Zn^{64}	T	0.7
0.94	Zr^{94}	p	0.4
	Zr^{96}	T	0.1
0.9415	Mo^{92}	2n	1.4
0.947	Er^{167}	2p	3.4
	Er^{168}	He^3	4.1
	Er^{170}	nα	2.2
0.955	Xe^{134}	np	2.1
0.961	Pb^{204}	2n	1.3
0.9633	Eu^{153}	n	5.2
	Gd^{154}	np	0.2
	Gd^{155}	T	1.5
0.978	Pt^{190}	T	—
0.988	Pt^{190}	T	—
1.000	Dy^{156}	n	—
1.025	Zr^{94}	He^3	5.2
	Zr^{96}	nα	0.8

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
1.049	Te^{120}	np	0.1
1.050	Ge^{73}	p	0.5
	Ge^{74}	np	2.5
	As^{75}	He^3	6.9
1.055	Pd^{108}	np	4.5
	Ag^{109}	He^3	8.2
1.06	Ru^{96}	p	0.3
	Ru^{98}	T	0.1
1.065	Sn^{119}	2p	0.8
	Sn^{120}	He^3	3.1
	Sn^{122}	nα	0.4
1.091	Dy^{156}	n	—
1.115	Zn^{68}	He^3	3.0
	Zn^{70}	nα	0.1
1.13	Nd^{142}	n	0.3
1.14	Mo^{92}	np	15.4
1.14	Xe^{136}	p	3.3
1.15	Xe^{131}	p	2.8
	Xe^{132}	np	3.5
	Cs^{133}	He^3	13.0
1.156	Sc^{45}	n	99.8
	Ti^{46}	np	7.9
1.16	W^{186}	np	—
	Re^{187}	He^3	—
1.165	Eu^{151}	n	0.2
	Sm^{152}	np	5.1
	Eu^{153}	He^3	9.9
1.200	Mo^{97}	p	1.9
	Mo^{98}	np	4.8
1.225	Pd^{108}	np	2.9
	Ag^{109}	He^3	5.3
1.230	Te^{120}	np	0.1
1.233	Sn^{119}	2p	0.6
	Sn^{120}	He^3	2.3
	Sn^{122}	nα	0.3
1.271	Mo^{92}	2n	1.1
1.277	Yb^{168}	np	—
1.28	Xe^{136}	p	3.0
1.30	Nd^{142}	n	0.2
1.303	Sn^{119}	2p	1.6
	Sn^{120}	He^3	6.2
	Sn^{122}	nα	0.9
1.3150	Eu^{153}	n	0.5
	Gd^{155}	T	0.2
1.322	Ni^{58}	T	3.4
1.33	Sm^{152}	np	5.9
	Eu^{153}	He^3	11.5
1.338	Sn^{119}	2p	0.6
	Sn^{120}	He^3	2.3
	Sn^{122}	nα	0.3
1.34	Cu^{65}	n	0.2
	Ga^{69}	nα	0.3
1.35	Ru^{96}	T	3.6
1.35	Mo^{100}	He^3	0.3
1.35	Pr^{141}	2n	0.6
	Nd^{142}	T	0.2

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity × Abundance
1.3685	Mg^{25}	p	9.9
	Mg^{26}	np	10.9
	Mg^{26}	2p	10.9
	Al^{27}	He^3	99.9
1.37	Zr^{94}	2p	15.7
	Zr^{96}	α	2.5
1.387	Mo^{92}	2n	0.6
1.3893	Eu^{153}	n	0.6
	Gd^{155}	T	0.2
1.40	Zr^{94}	np	0.8
	Zr^{94}	2p	0.8
	Zr^{96}	α	0.1
1.408	Sn^{119}	2p	0.6
	Sn^{120}	He^3	2.3
	Sn^{122}	nα	0.3
1.412	Ni^{58}	T	7.5
1.413	Zr^{94}	He^3	1.2
	Zr^{96}	nα	0.2
1.433	Sn^{119}	2p	0.9
	Sn^{120}	He^3	3.4
	Sn^{122}	nα	0.5
1.45	Ba^{130}	n	—
1.46	Xe^{136}	p	1.1
1.479	Mo^{94}	n	9.0
	Mo^{95}	2n	15.7
	Ru^{96}	T	1.8
1.481	Zn^{68}	He^3	4.6
	Zn^{70}	nα	0.2
1.499	Mo^{97}	p	1.8
	Mo^{98}	np	4.5
1.528	Ca^{44}	np	0.4
	Sc^{45}	He^3	18.0
1.555	Pd^{108}	np	3.2
	Ag^{109}	He^3	5.8
1.57	Nd^{143}	p	0.5
	Nd^{144}	np	0.9
	Nd^{145}	T	0.3
1.577	Sn^{119}	2p	1.4
	Sn^{120}	He^3	5.3
	Sn^{122}	nα	0.8
1.60	Hg^{202}	2p	—
	Hg^{204}	α	—
1.61	Pr^{141}	2n	0.3
	Nd^{142}	T	0.1
1.72	Xe^{136}	p	1.7
1.723	Sn^{119}	2p	0.7
	Sn^{120}	He^3	2.6
	Sn^{122}	nα	0.4
1.75	Sm^{152}	np	2.7
	Eu^{153}	He^3	5.2
1.80	Xe^{136}	p	1.0
1.811	Fe^{57}	p	0.6
	Fe^{58}	np	0.1
	Co^{59}	He^3	29.0
1.998	Sn^{119}	2p	1.2
	Sn^{120}	He^3	4.6
	Sn^{122}	nα	0.7
2.110	Fe^{57}	p	0.4
	Fe^{58}	np	0.1
	Co^{59}	He^3	15.5

Table 2, Part C (Continued)

Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance	Gamma Energy (MeV)	Target Nucleus	Photo-Reaction	Percent Intensity X Abundance
2.18	Mo^{92}	np	1.4	2.490	Ge^{73}	p	0.5
					Ge^{74}	np	2.5
					As^{74}	He^3	6.8
2.201	Ge^{73}	p	2.1	2.52	Ce^{59}	He^3	1.1
	Ge^{74}	np	10.0				
	As^{75}	He^3	27.3	2.7539	Mg^{25}	p	9.9
					Mg^{26}	np	10.9
					Mg^{26}	2p	10.9
2.32	Mo^{92}	np	14.4		Al^{27}	He^3	99.0

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