

List of Reactions in the JENDL Dosimetry File 99 (JENDL/D-99)

Nuclide	MAT	Reaction	Threshold energy (MeV) ⁺	Half-life of product	Data source ⁺⁺⁺	
					⁺⁺	sigma
	cov.					
Li-6	325	(n, t) α	10 ⁻⁵ eV		J3.2	I
		α production	10 ⁻⁵ eV		J3.2	I
Li-7	328	t production	2.822		J3.2	I
B-10	525	(n, α) Li-7		10 ⁻⁵ eV		J3.2
	I					
		α production	10 ⁻⁵ eV		J3.2	I
F-19	925	(n, 2n) F-18	10.9854	109.77 m	A	A
Na-23	1125	(n, 2n) Na-22	12.9633	2.6019 y	A	A
		(n, γ) Na-24	10 ⁻⁵ eV	14.9590 h		J3.2
	I					
Mg-24	1225	(n, p) Na-24	4.9306	14.9590 h		A
	A					
Al-27	1325	(n, p) Mg-27	1.8227	9.458 m	A	A
		(n, α) Na-24	3.2467	14.9590 h		I90.2
		I90.2				
P-31	1525	(n, p) Si-31	0.730746	157.3 m	A	A
S-32	1625	(n, p) P-32	0.958	14.262 d	J3.2	I
Sc-45	2125	(n, γ) Sc-46	10 ⁻⁵ eV	83.79 d	J3.2	I
Ti-nat	2200	(n, x) Sc-46	1.6184	83.79 d	A	A
		(n, x) Sc-47	10 ⁻⁵ eV	3.3492 d	A	A
		(n, x) Sc-48	3.2792	43.67 h	A	A
Ti-46	2225	(n, 2n) Ti-45	13.4865	184.8 m	A	A
		(n, p) Sc-46	1.6184	83.79 d	A	A
Ti-47	2228	(n, np) Sc-46	10.6858	83.79 d	A	A
		(n, p) Sc-47	10 ⁻⁵ eV	3.3492 d	A	A
Ti-48	2231	(n, np) Sc-47	11.6858	3.3492 d	A	A
		(n, p) Sc-48	3.2792	43.67 h	A	A
Ti-49	2234	(n, np) Sc-48	11.588	43.67 h	A	A
Cr-50	2425	(n, γ) Cr-51	10 ⁻⁵ eV	27.702 d	J3.2	B6
Cr-52	2431	(n, 2n) Cr-51	12.2721	27.702 d	A	A
Mn-55	2525	(n, 2n) Mn-54	10.4141	312.3 d	A	A
		(n, γ) Mn-56	10 ⁻⁵ eV	2.5785 h	J3.2	J3.2
Fe-54	2625	(n, p) Mn-54	10 ⁻⁵ eV	312.3 d	A	A
Fe-56	2631	(n, p) Mn-56	2.9662	2.5785 h	J3.2	I
Fe-57	2634	(n, np) Mn-56	10.7461	2.5785 h	J3.2	B6
Fe-58	2637	(n, γ) Fe-59	10 ⁻⁵ eV	44.503 d	J3.2	A
Co-59	2725	(n, 2n) Co-58	10.6323	70.82 d	A	A
		(n, γ) Co-60	10 ⁻⁵ eV	5.2714 y	J3.2	I
		(n, α) Mn-56	10 ⁻⁵ eV	2.5785 h	J3.2	I
Ni-58	2825	(n, 2n) Ni-57	12.4321	35.60 h	A	A
		(n, p) Co-58	10 ⁻⁵ eV	70.82 d	A	A
Ni-60	2831	(n, p) Co-60	2.075	5.2714 y	A	A
Cu-63	2925	(n, 2n) Cu-62	11.0263	9.74 m	A	A
		(n, γ) Cu-64	10 ⁻⁵ eV	12.700 h	J3.2	I
		(n, α) Co-60	10 ⁻⁵ eV	5.2714 y	A	A
Cu-65	2931	(n, 2n) Cu-64	10.0633	12.700 h	A	A
Zn-64	3025	(n, p) Cu-64	10 ⁻⁵ eV	12.700 h	A	A
Y-89	3925	(n, 2n) Y-88	11.6096	106.65 d	A	A
Zr-90	4025	(n, 2n) Zr-89	12.1057	78.41 h	A	A

(Continued)

Nuclide	MAT	Reaction	Threshold energy (MeV) ⁺	Half-life of product	Data source ⁺⁺⁺	
					⁺⁺	sigma
	cov.					
Nb-93	4125	(n, n') Nb-93m	0.03073	16.13 y	A	A
		(n, 2n) Nb-92m	9.0522	10.15 d	A	A
Rh-103	4525	(n, n') Rh-103m	0.04	56.12 m	I	I
Ag-109	4731	(n, γ) Ag-110m	10 ⁻⁵ eV	249.79 d	E	I90.2
In-115	4931	(n, n') In-115m	0.32	4.486 h	C	C
		(n, γ) In-116m	10 ⁻⁵ eV	54.29 m	J3F	I
I-127	5325	(n,2n) I-126	9.21779	13.11 d	A	A
Eu-151	6325	(n, γ) Eu-152	10 ⁻⁵ eV	13.537 y	J3.2	JD91
Tm-169	6925	(n,2n) Tm-168	8.08036	93.1 d	A	A
Ta-181	7328	(n, γ) Ta-182	10 ⁻⁵ eV	114.43 d	J3.2	JD91
W-186	7443	(n, γ) W-187	10 ⁻⁵ eV	23.72 h	A	JD91
Au-197	7925	(n, 2n) Au-196	8.11273	6.183 d	A	A
		(n, γ) Au-198	10 ⁻⁵ eV	2.69517 d		Y
	I					
Hg-199	8034	(n, n') Hg-199m	0.5337	42.6 m	JD91	JD91
Th-232	9040	fission	10 ⁻⁵ eV		J3.2	I
		(n, γ) Th-233	10 ⁻⁵ eV	22.3 m	J3.2	I
U-235	9228	fission	10 ⁻⁵ eV		J3.2	I
U-238	9237	fission	10 ⁻⁵ eV		J3.2	I
		(n, γ) U-239	10 ⁻⁵ eV	23.45 m	J3.2	I
Np-237	9346	fission	10 ⁻⁵ eV		A	A
Pu-239	9437	fission	10 ⁻⁵ eV		J3.2	I
Am-241	9543	fission	10 ⁻⁵ eV		J3.2	B6

For the nuclide with capture and/or fission cross sections, the total cross sections, which were taken from JENDL-3.2¹⁾, are also given in the library.

+ : The energy of 10⁻⁵ eV is the lowest energy of the data in the cases of reactions with a positive Q-value.

++ : Table of Isotopes Eighth Edition 1998 Upgrade²⁾

+++ : Data source

A : evaluated in the present work

J3.2 : JENDL-3.2 General Purpose File¹⁾

J3F : JENDL-3 Fission Product Nuclear Data File³⁾

JD91 : JENDL Dosimetry File 91⁴⁾

B6 : ENDF/B-VI⁵⁾

E : EAF-99⁶⁾

I : IRDF-85⁷⁾

I90 : IRDF-90⁸⁾

I90.2 : IRDF-90v2⁹⁾

C : evaluated by A.B. Smith et al.¹⁰⁾

Y : evaluated by N. Yamamuro¹¹⁾

References

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