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"ACTV-FUS/INT"

THE INTERNATIONAL LIBRARY OF NEUTRON ACTIVATION CROSS-SECTION DATA FOR FUSION REACTOR APPLICATION

(FENDL Activation Sublibrary)

Abstract: This document describes the contents of the International Activation Cross-Section Data Library for neutron reactions, most important for activation in fusion reactor technology (sublibrary of FENDL). The "ACTV-FUS/INT" file containts ENDF/B-6 formatted evaluated cross-section data for 372 neutron induced reactions for neutron energies up to 20 MeV. The evaluated data were taken from REAC-2, REAC-ECN-5, BOSPOR-86, SINCROSACT, ADL-90, ENDF/B-6, JENDL-3 and BROND libraries. The "ACTV-FUS/INT" library is available on magnetic tape from IAEA Nuclear Data Section, free of charge, upon request.

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(FENDL Activation Sublibrary)

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1. Introduction

At the May 1989 FENDL meeting [1], the Working Group on Neutron Activation Data initiated an intercomparison of activation cross sections important for fusion reactor technology. It was agreed that national nuclear data centers will send to the NDS their contributions, according to a list of reactions selected on the basis of inventory calculations.

A list of 256 important reactions that are significant in producing activation both at short and long cooling times has been compiled by R. Forrest at Harwell Laboratory, UKAEA. The list was distributed to all interested parties and now many activation data files have been received at the NDS from institutes participating in this exercise. Very detailed graphical intercomparisons have been prepared at the NDS, plotting, for each reaction, overlays of the various submitted evaluated data sets and experimental data from EXFOR.

This review and intercomparison activity has the practical goal of creating the activation data sublibrary of FENDL. Selection of the 256 specific evaluations which constitutes the first version of the activation cross-section sublibrary was made at the June 1990 FENDL meeting [2]. This list of evaluations, with a few subsequent modifications, was the basis of the first version of the International Activation Cross-Section Data Library for neutron reactions, most important for activation in fusion reactor technology (as a sublibrary of FENDL). At the next FENDL meeting, planned for 18-22 November 1991 in Vienna, the review and selection process will be renewed, and this will lead to the creation of a second version early in 1992.

2. Sources of Data

Groups that were participating in the intercomparison are listed below, along with their libraries:

REAC-2 (F.M. Mann, Hanford Engineering Development Laboratory) [3].

REAC-ECN-5 (J. Kopecky and H. Gruppelaar, Netherlands Energy Research Foundation) [4].

ENDF/B-VI

All extracted individual reaction cross sections of the ENDF/B-6 general purpose files [5] that are contained in the list of 256 high- priority reactions.

BOSPOR-86 (V. Bychkov et. al., Institute of Physics and Power Engineering) [6,7].

BOSPOR, which means "library of evaluated threshold activation reaction cross sections", was organized in 1980 in Obninsk Nuclear Data Centre. In 1986 the BOSPOR-80 library was revised and its new, extended version BOSPOR-86 was created in ENDF/B-5 File-3 format [8]. Energy range is from threshold to 20 MeV.

SINCROSACT (N. Yamamuro, Data Engineering, Inc.) [9].

These activation data are almost all the cross-sections in ENDF-5 File-10 format for ^{59}Co, $^{64,66-68,70}Zn$, $^{58,60-62,64}Ni$, ^{63}Cu, $^{90-92,94,96}Zr$, ^{93}Nb, $^{92,94-98,100}Mo$, $^{107,109}Ag$, $^{121,123}Sb$, $^{185-187}Re$, ^{197}Au and $^{196,198-200,204}Hg$

Ground state production and isomeric state production cross-sections are given separately. The energy region covered is from threshold to 20 MeV.

ADL-90 (O. Grudzevich et. al. Institute of Physics and Power Engineering + Institute of Atomic Energetics, Obninsk) [10].

The Activation Data Library (ADL-90), for calculation of activation and transmutation in materials used in fusion reactor technology, was created to contribute to the development of FENDL activation sublibrary. This version of library now contains cross-sections for about 5000 (n,p), (n,α), (n,γ), (n,2n) and (n,3n) reaction, for all stable targets.

All data contributed by the participants were kept unchanged, except that the data format was in all cases changed to ENDF-6 [11] at the NDS.

In addition data for a few reactions were taken from JENDL-3 [12] and BROND [13] libraries.

3. Content and Size of the Library

The "ACTV-FUS/INT" file contains cross-section data for 372 neutron induced activation reactions of 150 isotopes for incident neutron energies up to 20 MeV. When it was necessary, the initial data were processed to pointwise evaluated data which includes linearization, reconstruction of resonance data from resonance parameters and summation with the background cross-sections. This processing was done using the preprocessing codes LINEAR and RECENT by D.E. Cullen [14]. The list of reactions presented in the Table 2 on the next pages gives the MAT numbers (accession numbers) as well as brief description of methods, used for data evaluations.

The "ACTV-FUS/INT" library contains 254233 records or 20 Mb of memory.

4. Availability

The "ACTV-FUS/INT" library is available from IAEA NDS on magnetic tape, free of charge, upon request.

5. Evaluation Methods

Techniques applied in the evaluation of the contributed data files have been documented in refs. [3-7, 10, 15]. Self-explanatory brief comments on evaluation methods of activation data are given in Table 2 on their respective places. For instance:

1.000+00 * JENDL-2	the data from JENDL-2 taken directly, no renormalization applied
0.867+00 * THRESH	data from THRESH calculation renormalized at 14.5 MeV (either to experiment or to systematics, as indicated in the second comment line); for example, $XS(eval) = XS(THRESH) * \frac{XS(exp.)}{XS(THRESH)}/14.5\ MeV$
1.8989+00 * BOSPOR Rn-Exp. Qa81	evaluated excitation function from BOSPOR library renormalized at 14.5 MeV to experimental value, measured by Qaim in 1981
5.1156-01 * THRESH output ECN-Petten Rn-Syst. Fo86	data from THRESH calculation at ECN-Petten renormalized at 14.5 to Forrest's systematic
5.0000-01 * JEF-1 Rn-Br=0.5	evaluated data from JEF-1 renormalized at 14.5 to branching ratio $Br=\sigma^m/(\sigma^m+\sigma^g)=0.5$

6. MT Number Identification

The pointwise cross-section data of this library are in ENDF-6 format, MF = 3. But the users of the file should pay attention to the fact that new MT numbers were introduced for the representation of the isomer production data and should check whether their inventory codes handle them. In particular: The MT numbers in the left side column of Table 1 identify the activation of the ground state; this is the total cross-section in case of nuclides with no isomer, or a partial cross-section in case of nuclides with isomer(s). The assigned MT numbers do not distinguish the cases whether the formation of the isomer includes or excludes the decay from a higher isomer.

Table 1. MT numbers

MT		Reaction	MT		Reaction	
4	=	(n,n)	304	=	(n,n)*	1st isomer production
16	=	(n,2n)	316	=	(n,2n)*	1st isomer production
			616	=	(n,2n)#	2nd isomer production
17	=	(n,3n)	317	=	(n,3n)*	1st isomer production
22	=	(n,nα)	322	=	(n,nα)*	1st isomer production
			622	=	(n,nα)#	2nd isomer production
28	=	(n,np)	328	=	(n,np)*	1st isomer production
			628	=	(n,np)#	2nd isomer production
32	=	(n,nd)				
33	=	(n,nt)				
34	=	(n,nHe3)				
102	=	(n,γ)	402	=	(n,γ)*	1st isomer production
			702	=	(n,γ)#	2nd isomer production
103	=	(n,p)	403	=	(n,p)*	1st isomer production
			703	=	(n,p)#	2nd isomer production
104	=	(n,d)	404	=	(n,d)*	1st isomer production
			704	=	(n,d)#	2nd isomer production
105	=	(n,t)				
106	=	(n,He3)				
107	=	(n,α)	407	=	(n,α)*	1st isomer production
			707	=	(n,α)#	2nd isomer production
111	=	(n,2p)				

7. List of Reactions

The list of reactions presented in the Table 2 on the next pages gives the source of data files, MAT numbers and brief description of methods, used for data evaluations.

Table 2. Activation Cross-Sections for Fusion Reactor Technology from "ACTV-FUS/INT" Library

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
1.	B-11(n,d)	REAC-ECN-5	1.6855+00 * THRESH output ECN-Petten Rn-Exp. Mi 68	511
2.	C-13(n,γ)	REAC-ECN-5	1.0000+00 * ACTL	613
3.	C-13(n,α)	REAC-ECN-5	2.5209+00 * THRESH output Rn-Th-Ga64A	613
4.	C-14(n,na)	REAC-ECN-5	1.0000+00 * THRESH output	614
5.	N-14(n,np)	REAC-ECN-5	1.0000+00 * THRESH output comment. uncertain, comp. Ts77=46; reaction has been observed	714
6.	N-14(n,p)	ENDF/B-6		714
7.	N-14(n,d)	REAC-ECN-5	1.0000+00 * THRESH output ENDFB corrected	714
8.	O-16(n,α)	JENDL-3		816
9.	O-17(n,na)	REAC-ECN-5	1.0000+00 * THRESH output ENDFB corrected	817
10.	O-17(n,α)	ENDF/B-6		817
11.	Ne-20(n,α)	REAC-ECN-5	1.6778+00 * THRESH output Rn-Th-Ga64	1020
12.	Na-23(n,α)	BOSPOR-86		1123
13.	Mg-24(n,na)	REAC-ECN-5	3.7473+01 * THRESH output comment. guessed value based upon Si-28	1224
14.	Mg-24(n,p)	REAC-ECN-5	6.5489-01 * ENDF/B-V Rn-Exp. Qa81, Rn-Br=0.69	1224
15.	Mg-24(n,p)*	REAC-ECN-5	2.9423-01 * ENDF/B-V Rn-Br=0.31 (J=1) Syst. Ko87	1224
16.	Mg-26(n,γ)	REAC-ECN-5	1.0000+00 * ACTL evaluation	1226
17.	Al-27(n,2n)	REAC-ECN-5	4.2477-01 * THRESH output ENDFB corrected Rn-Exp. Iw88 G+M1=32.0+-3.5 Mb G=(G+M1)-M1	1327

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
18.	Al-27(n,2n)*	REAC-ECN-5	1.3168-02 * estimate used Al-27(n,2n) Rn-Exp. Qa81 Ml=0.62+-0.05 Mb	1327
19.	Al-27(n,na)	REAC-ECN-5	1.4650+01 * THRESH output Rn-Exp. Kn81. comment. (n,GAS)-(n,α)	1327
20.	Al-27(n,α)	REAC-ECN-5	6.9945-01 * THRESH output ENDFB corrected Rn-Exp. Qa81, Rn-Br=0.69 Syst. Ko87	1327
21.	Al-27(n,α)*	REAC-ECN-5	3.1425-01 * THRESH output ENDFB corrected Rn-Exp. Qa81, Rn-Br=0.31 (J=1) Syst. Ko87	1327
22.	Si-28(n,na)	REAC-ECN-5	9.6085+01 * THRESH output Rn-Exp. He82. comment. (n,Xa)-(n,α) (Exp. FRM KNEFF)	1428
23.	Si-28(n,np)	REAC-ECN-5	1.1429+01 * THRESH output Rn-Evl. He82. comment. uncertain, steep slope	1428
24.	Si-28(n,d)	REAC-ECN-5	8.3846-01 * THRESH output Rn-Evl. He82. comment. partly based upon exp. data(n,do)	1428
25.	Si-30(n,γ)	REAC*2		1430
26.	Si-31(n,γ)	REAC-ECN-5	1.0000+00 * estimate used Si29(n,γ)	1431
27.	P-31(n,γ)	JENDL-3		1531
28.	P-32(n,p)	ADL-90		1532
29.	S-34(n,γ)	REAC-ECN-5	1.0000+00 * ACTL	1634
30.	S-34(n,α)	BOSPOR-86		1634
31.	Cl-35(n,p)	ADL-90		1735
32.	Cl-35(n,α)	ADL-90		1735
33.	Ar-37(n,np)	REAC-ECN-5	2.3459+00 * THRESH output ECN-Petten Rn-Syst. Fo86	1837
34.	Ar-37(n,d)	REAC-ECN-5	4.8241-02 * THRESH output ECN-Petten Rn-Syst. Fo86	1837
35.	Ar-40(n,2n)	REAC-ECN-5	1.5125+00 * THRESH output ACTL corrected Rn-Evl. RCN-2	1840
36.	Ar-40(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	1840
37.	K-39(n,p)	BOSPOR-86		1939
38.	K-39(n,α)	ADL-90		1939

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
39.	K-41(n,p)	BOSPOR-86		1941
40.	Ca-40(n,np)	REAC-ECN-5	1.0000+00 * ECN-Petten, data from JENDL-2	2040
41.	Ca-40(n,γ)	REAC-ECN-5	1.0000+00 * ACTL evaluation	2040
42.	Ca-40(n,d)	REAC-ECN-5	1.0000+00 * THRESH output	2040
43.	Ca-40(n,α)	ADL-90		2040
44.	Ca-40(n,2p)	REAC-ECN-5	1.0000+00 * THRESH output	2040
45.	Ca-42(n,2n)	REAC-ECN-5	1.0000+00 * THRESH output ECN-Petten	2042
46.	Ca-42(n,α)	ADL-90		2042
47.	Ca-43(n,2n)	REAC-ECN-5	1.0000+00 * THRESH output ECN-Petten	2043
48.	Ca-43(n,na)	REAC-ECN-5	2.4909+00 * THRESH output ECN-Petten Rn-Syst. Fo86	2043
49.	Ca-43(n,2p)	REAC-ECN-5	1.0000+00 * THRESH output ECN-Petten	2043
50.	Ca-44(n,2n)	REAC-ECN-5	1.0000+00 * THRESH output ECN-Petten	2044
51.	Ca-44(n,na)	REAC-ECN-5	6.5708-01 * THRESH output ECN-Petten Rn-Syst. Fo86	2044
52.	Ca-44(n,γ)	REAC-ECN-5	1.0000+00 * JENDL-2	2044
53.	Ca-44(n,α)	ADL-90		2044
54.	Ca-45(n,α)	ADL-90		2045
55.	Ca-46(n,na)	REAC-ECN-5	3.0082+00 * THRESH output ECN-Petten Rn-Syst. Fo86	2046
56.	Ca-46(n,γ)	REAC-ECN-5	1.0000+00 * JENDL-2	2046
57.	Ca-48(n,2n)	ADL-90		2048
58.	Sc-45(n,γ)	REAC-ECN-5	6.9000-01 * ENDF/B-V Rn-Br=0.64 Exp. Mu84, above 69.9 keV Br=0.69 Syst. Ko87	2145
59.	Sc-45(n,γ)*	REAC-ECN-5	3.1000-01 * ENDF/B-V Rn-Br=0.36 Exp. Mu84, above 69.9 keV Br=0.31 Syst. Ko87	2145
60.	Sc-45(n,p)	ADL-90		2145
61.	Sc-45(n,α)	ADL-90		2145

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
62.	Sc-46(n,na)	REAC-ECN-5	8.7296-01 * THRESH output ECN-Petten Rn-Syst. Fo86	2146
63.	Ti-45(n,2n)	REAC-ECN-5	1.0000+00 * THRESH output ECN-Petten	2245
64.	Ti-46(n,2n)	BOSPOR-86		2246
65.	Ti-46(n,np)	REAC-ECN-5	1.5019+01 * THRESH output ACTL corrected Rn-Exp. Qa82, Ri83 com. (n,xp)-(n,p), Rn-Br=0.56 Syst. Ko87	2246
66.	Ti-46(n,np)*	REAC-ECN-5	1.1800+01 * THRESH output ACTL corrected Rn-Br=0.44 (J=1.5) Syst. Ko87	2246
67.	Ti-46(n,d)	REAC-ECN-5	5.6434-02 * THRESH output Rn-Exp. Qa82, com.: LLL data, Rn-Br=0.61 Syst. Ko87	2246
68.	Ti-46(n,d)*	REAC-ECN-5	3.6081-02 * THRESH output Rn-Exp. Qa82, com.: LLL data, Rn-Br=0.39 (J=1.5) Syst. Ko87	2246
69.	Ti-46(n,α)	ADL-90		2246
70.	Ti-47(n,2n)	REAC-ECN-5	1.0000+00 * THRESH output ACTL corrected	2247
71.	Ti-47(n,α)	ADL-90		2247
72.	Ti-48(n,α)	ADL-90		2248
73.	Ti-49(n,α)	ADL-90		2249
74.	V-49(n,α)	ADL-90		2349
75.	V-51(n,na)	REAC-ECN-5	1.0000+00 * THRESH output ENDF corrected	2351
76.	V-51(n,α)	ENDF/B-6		2351
77.	Cr-50(n,na)	REAC-ECN-5	1.0000+00 * THRESH output A. Prince corrected	2450
78.	Cr-50(n,np)	REAC-ECN-5	1.6940+00 * THRESH output ACTL corrected Rn-Exp. Qa82. comment. Difference: (n,np+n,d)-(n,d)	2450
79.	Cr-50(n,γ)	ENDF/B-6		2450
80.	Cr-50(n,d)	REAC-ECN-5	8.2192-02 * THRESH output Rn-Exp. Qa82. comment. LLL data	2450
81.	Cr-50(n,α)	ENDF/B-6		2450
82.	Cr-52(n,α)	ENDF/B-6		2452
83.	Cr-54(n,γ)	ENDF/B-6		2454

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
84.	Mn-54(n,2n)	REAC-ECN-5	1.0000+00 * THRESH output ACTL corrected	2554
85.	Mn-55(n,2n)	ENDF/B-6		2555
86.	Mn-55(n,γ)	ENDF/B-6		2555
87.	Fe-54(n,np)	REAC-ECN-5	1.0000+00 * ENDF/B-6 comment. evaluation agrees with exp. data (Gr79, Ba85)	2654
88.	Fe-54(n,d)	REAC-ECN-5	5.9520-02 * THRESH output Rn-Syst. Fo86	2654
89.	Fe-56(n,2n)	ENDF/B-6		2656
90.	Fe-56(n,γ)	ENDF/B-6		2656
91.	Fe-57(n,γ)	ENDF/B-6		2657
92.	Fe-58(n,γ)	ENDF/B-6		2658
93.	Fe-59(n,γ)	REAC-ECN-5	1.0000+00 * estimated used Fe55(n,γ)	2659
94.	Co-58(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	2758
95.	Co-59(n,γ)	REAC-ECN-5	5.3000-01 * ECN-Petten data from JEF-1 Rn-Br=0.451, exp. Mu81, above 85 keV Rn-Br=0.53, Syst. Ko87	2759
96.	Co-59(n,γ)*	REAC-ECN-5	4.7000-01 * ECN-Petten data from JEF-1 Rn-Br=0.549, exp. Mu81, above 85 keV Rn-Br=0.47, Syst. Ko87	2759
97.	Co-60(n,γ)	REAC-ECN-5	1.0000+00 * ACTL evaluation	2760
98.	Co-60(n,p)	ADL-90		2760
99.	Ni-58(n,2n)	ENDF/B-6		2858
100.	Ni-58(n,np)	REAC-ECN-5	1.0000+00 * EFF-2 comment. evaluation agrees with exp. data (Ba85)	2858
101.	Ni-58(n,γ)	ENDF/B-6		2858
102.	Ni-58(n,p)	REAC-ECN-5	4.8684-01 * THRESH output ACTL corrected Rn-Exp. Qa81	2858
103.	Ni-58(n,p)*	REAC-ECN-5	1.2969+00 * THRESH output ACTL corrected Rn-Exp. Qa81	2858
104.	Ni-58(n,d)	REAC-ECN-5	1.0000+00 * ENDF/B-6	2858
105.	Ni-60(n,2n)	REAC-ECN-5	1.0000+00 * THRESH output ENDF/B-V corrected	2860

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
106.	Ni-60(n,np)	REAC-ECN-5	3.8296+00 * THRESH output Rn-Syst. Fo86, com. agreement with Qa82: (n,xp)-(n,p)=213	2560
107.	Ni-60(n,p)	REAC-ECN-5	5.2334-01 * ECN-Petten data from ENDF/B-V Rn-Exp. G+M1=127.1+-13.8 Mb, aver. exp. values. Rn-Br=0.52	2860
108.	Ni-60(n,p)*	REAC-ECN-5	4.7666-01 * ECN-Petten data from ENDF/B-V Rn-Exp. G+M=127.1+-13.8, Rn-Br=0.47(J=2), (Ko87)	2860
109.	Ni-60(n,d)	REAC-ECN-5	1.4635-01 * THRESH output Rn-Syst. Fo86	2860
110.	Ni-61(n,γ)	ENDF/B-6		2861
111.	Ni-62(n,γ)	ENDF/B-6		2862
112.	Ni-62(n,α)	ENDF/B-6		2862
113.	Ni-63(n,α)	ADL-90		2863
114.	Ni-64(n,2n)	ENDF/B-6		2864
115.	Cu-63(n,γ)	REAC-ECN-5	1.0000+00 * ENDF/B-V	2963
116.	Cu-63(n,p)	SINCROSACT		2963
117.	Cu-63(n,α)	REAC-ECN-5	4.1192-01 * ECN-Petten data from ENDF/B-V Rn-Exp. G+M1=42.3+-4.7Mb, aver. exp. values. G=(G+M1)-M1	2963
118.	Cu-63(n,α)*	REAC-ECN-5	6.1908-01 * ECN-Petten data from ENDF/B-V Rn-Exp. M1=25.4+-3.3Mb, (Ka62)	2963
119.	Zn-64(n,2n)	ADL-90		3064
120.	Zn-64(n,na)	REAC-ECN-5	9.2455-01 * THRESH output Rn-Evl. RCN-2	3064
121.	Zn-64(n,np)	REAC-ECN-5	3.4198+00 * THRESH output Rn-Evl. RCN-2	3064
122.	Zn-64(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	3064
123.	Zn-64(n,p)	BOSPOR-86		3064
124.	Zn-64(n,d)	REAC-ECN-5	1.0479-01 * THRESH output Rn-Syst. Fo86	3064
125.	Zn-64(n,2p)	REAC-ECN-5	1.0000+00 * THRESH output	3064
126.	Zn-66(n,2n)	BOSPOR-86		3066

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
127.	Zn-66(n,α)	ADL-90		3066
128.	Zr-92(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	4092
129.	Zr-93(n,α)	REAC-ECN-5	1.0000+00 * THRESH output ACTL corrected	4093
130.	Zr-94(n,2n)	BROND		4094
131.	Zr-94(n,na)	REAC-ECN-5	1.0000+00 * THRESH output ACTL corrected	4094
132.	Zr-94(n,γ)	REAC-ECN-5	9.9998-01 * JEF-1 Rn-Exp. data Mu84 below 42.45 keV	4094
133.	Zr-96(n,2n)	BROND		4096
134.	Nb-92(n,2n)	REAC-ECN-5	1.0000+00 * THRESH output	4192
135.	Nb-92(n,2n)*	REAC-ECN-5	1.0000+00 * THRESH output ACTL corrected	4192
136.	Nb-93(n,2n)	BOSPOR-86		4193
137.	Nb-93(n,2n)*	BOSPOR-86		4193
138.	Nb-93(n,γ)	REAC-ECN-5	3.1000-01 * ECN-Petten, data from ENDF/B-V Rn-Br=0.31 Syst. Ko87	4193
139.	Nb-93(n,γ)*	REAC-ECN-5	6.9000-01 * ECN-Petten, data from ENDF/B-V Rn-Br=0.69 Syst. Ko87(J=3)	4193
140.	Nb-93(n,p)	ADL-90		4193
141.	Nb-95(n,2n)	REAC-ECN-5	2.0000-01 * THRESH output ECN-Petten Rn-Br=0.2 Syst. Ko87	4195
142.	Nb-95(n,2n)*	REAC-ECN-5	8.0000-01 * THRESH output ECN-Petten Rn-Br=0.8 Syst. Ko87 (J=3)	4195
143.	Mo-92(n,2n)	SINCROSACT		4292
144.	Mo-92(n,2n)*	SINCROSACT		4292
145.	Mo-92(n,np)	REAC-ECN-5	9.9376+00 * THRESH output Rn-Exp. H81. com. (n,np)=(x,xp)-(n,p) min. value (n,np) for M.St.	4292
146.	Mo-92(n,np)*	REAC-ECN-5	4.3947+00 * THRESH output ACTL corrected Rn-Exp. Qa81, comment. value given is assumed to be (n,np) only	4292
147.	Mo-92(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4292
148.	Mo-92(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4292

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
149.	Mo-92(n,d)	REAC-ECN-5	4.4308-02 * THRESH output ACTL corrected Rn-Exp. Ha81, Rn-Br=0.53 Syst. Ko87	4292
150.	Mo-92(n,d)*	REAC-ECN-5	4.4012-01 * THRESH output ACTL corrected Rn-Exp. Ha81, Rn-Br=0.47 Syst. Ko87 (J=2)	4292
151.	Mo-94(n,2n)	SINCROSACT		4294
152.	Mo-94(n,2n)*	SINCROSACT		4294
153.	Mo-94(n,p)	SINCROSACT		4294
154.	Mo-94(n,p)*	SINCROSACT		4294
155.	Mo-95(n,np)*	REAC-ECN-5	1.9962+00 * THRESH output com. (n,np)=(n,xp) Ha81-(n,p) Qa81, Br=0.81 Syst. Ko87 (J=3)	4295
156.	Mo-95(n,d)	REAC-ECN-5	1.9195-01 * THRESH output Rn-Exp. Ha81, Rn-Br=0.31 Syst. Ko87 (JG=6]])	4295
157.	Mo-95(n,d)*	REAC-ECN-5	4.2725-01 * THRESH output Rn-Exp. Ha81, Rn-Br=0.69 Syst. Ko87 (J=3)	4295
158.	Mo-98(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1 Rn-Exp. data Mu84 below 5.265 keV	4298
159.	Mo-100(n,2n)	SINCROSACT		4200
160.	Rh-103(n,na)	REAC-ECN-5	4.1072-02 * THRESH output Rn-Syst. Fo86, Rn-Br=0.8 Syst. Ko87	4503
161.	Rh-103(n,na)*	REAC-ECN-5	1.0268-02 * THRESH output Rn-Syst. Fo86, Rn-Br=0.2 Syst. Ko87 (J=0.5)	4503
162.	Rh-103(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4503
163.	Rh-103(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4503
164.	Pd-104(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4604
165.	Pd-104(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4604
166.	Pd-105(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	4605
167.	Pd-106(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4606
168.	Pd-106(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4606

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
169.	Pd-107(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	4607
170.	Pd-108(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4608
171.	Pd-108(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4608
172.	Ag-107(n,2n)	REAC-ECN-5	9.2800-01 * THRESH output ACTL corrected Rn-Exp. Qa81	4707
173.	Ag-107(n,2n)*	SINCROSACT		4707
174.	Ag-107(n,γ)	REAC-ECN-5	6.1975-01 * ECN-Petten, data from ENDF/B-V Rn-Br=0.948 exp. Mu81, above 1000 eV Rn-Br=0.62 Syst. Ko87	4707
175.	Ag-107(n,γ)*	REAC-ECN-5	3.7985-01 * ECN-Petten, data from ENDF/B-V Rn-Br=0.05 Exp. Mu81, above 1000 eV Rn-Br=0.38 Syst. Ko87	4707
176.	Ag-107(n,p)	SINCROSACT		4707
177.	Ag-107(n,p)*	SINCROSACT		4707
178.	Ag-109(n,2n)	SINCROSACT		4709
179.	Ag-109(n,2n)*	SINCROSACT		4709
180.	Ag-109(n,γ)	REAC-ECN-5	6.2000-01 * JEF-1 Rn-Br=0.95 exp. Mu84, above 976.1 eV Br=0.62 Syst. Ko87	4709
181.	Ag-109(n,γ)*	REAC-ECN-5	3.8001-01 * JEF-1 Rn-Br=0.05 exp. Mu84, above 976.1 eV Br=0.38 Syst. Ko87	4709
182.	Cd-110(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4810
183.	Cd-110(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4810
184.	Cd-111(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	4811
185.	Cd-112(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4812
186.	Cd-112(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	4812
187.	Sn-112(n,α)	REAC-ECN-5	1.7395+00 * THRESH output Rn-Syst. Fo86	5012

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
188.	Sn-116(n,α)	REAC-ECN-5	7.2758-01 * THRESH output Rn-Syst. Fo86, Rn-Br=0.56 Syst. Ko87	5016
189.	Sn-116(n,α)*	REAC-ECN-5	5.7167-01 * THRESH output Rn-Syst. Fo86, Rn-Br=0.44 Syst. Ko87 (J=5.5)	5016
190.	Sn-117(n,n)*	REAC-ECN-5	1.0000+00 * Yamamuro comment. Syst. Vo86 gives 218 Mb (Jl=1.5,Jh=5.5)	5017
191.	Sn-117(n,n)	REAC-ECN-5	2.4000-01 * THRESH output ECN-Petten Rn-Superel. 400Mb * Br=Syst. Ko87 (J=0.5)	5067
192.	Sn-119(n,n)*	REAC-ECN-5	1.0000+00 * Yamamuro comment. Syst. Vo86 gives 218 Mb (Jl=1.5, JH=5.5)	5019
193.	Sn-119(n,n)	REAC-ECN-5	2.4000-01 * THRESH output ECN-Petten Rn-Superel. 400 Mb * Br=Syst. Ko87 (J=0.5)	5069
194.	Sn-120(n,γ)	REAC-ECN-5	5.6000-01 * JEF-1 Rn-Br=0.99 Exp. Mu84, above 14.271 keV Br=0.56 Syst. Ko87	5020
195.	Sn-120(n,γ)*	REAC-ECN-5	4.4000-01 * JEF-1 Rn-Br=0.01 exp. Mu84, above 14.271 keV Br=0.44 Syst. Ko87	5020
196.	Sn-122(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	5022
197.	Sn-122(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	5022
198.	Sn-124(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	5024
199.	Sn-124(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	5024
200.	Sn-125(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	5025
201.	Sb-121(n,2n)	REAC-ECN-5	6.9217-01 * THRESH output Rn-Exp. Qa81	5121
202.	Sb-121(n,2n)*	REAC-ECN-5	2.7367-01 * THRESH output Rn-Exp. Qa81	5121
203.	Sb-121(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	5121

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
204.	Sb-121(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	5121
205.	Sb-121(n,p)	REAC-ECN-5	1.0000+00 * Yamamuro	5121
206.	Sb-121(n,p)*	REAC-ECN-5	1.0000+00 * Yamamuro	5121
207.	Sb-123(n,2n)	REAC-ECN-5	4.9062-01 * THRESH output Rn-Exp. Qa81	5123
208.	Sb-123(n,2n)*	REAC-ECN-5	4.4223-01 * THRESH output Rn-Exp. Qa81	5123
209.	Sb-123(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	5123
210.	Sb-123(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	5123
211.	Sb-124(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	5124
212.	Sb-125(n,p)	REAC-ECN-5	9.3933-02 * THRESH output ECN-Petten Rn-Br=0.61 Syst. Ko87, Rn-Syst. Fo86	5125
213.	Sb-125(n,p)*	REAC-ECN-5	6.0056-02 * THRESH output ECN-Petten Rn-Br=0.39 Syst. Ko87 (J=1.5), Rn-Syst. Fo86	5125
214.	Sb-126(n,p)	REAC-ECN-5	7.1984-02 * THRESH output ECN-Petten Rn-Syst. Fo86	5126
215.	Te-122(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	5222
216.	Te-122(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	5222
217.	Cs-136(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	5536
218.	Ba-137(n,p)	ADL-90		5637
219.	La-139(n,h)	REAC-ECN-5	1.8172+00 * THRESH output Rn-Syst. Fo86	5739
220.	La-139(n,α)	REAC-ECN-5	4.7249-01 * THRESH output Rn-Exp. Qa84, Rn-Br=0.5	5739
221.	La-139(n,α)*	REAC-ECN-5	4.7249-01 * THRESH output Rn-Exp. Qa84, Rn-Br=0.5 (J=?)	5739
222.	Ce-140(n,2n)	REAC-ECN-5	5.2065-01 * THRESH output Rn-Exp. Qa81	5840

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
223.	Ce-140(n,2n)*	REAC-ECN-5	5.1493-01 * THRESH output Rn-Exp. Qa81	5840
224.	Ce-140(n,α)	REAC-ECN-5	1.3719+00 * THRESH output Rn-value (n,α) from (n,α) value of Met.St. Br=0.56 Syst. Ko87	5840
225.	Ce-140(n,α)*	REAC-ECN-5	1.0779+00 * THRESH output Rn-Exp. Qa84, Br=0.44 Syst. Ko87 (J=5.5)	5840
226.	Nd-148(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	6048
227.	Nd-150(n,2n)	ADL-90		6050
228.	Nd-150(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	6050
229.	Sm-150(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	6250
230.	Sm-151(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	6251
231.	Sm-152(n,2n)	BOSPOR-86		6252
232.	Sm-152(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	6252
233.	Eu-151(n,2n)	REAC-ECN-5	2.9663-01 * ECN-Petten data from TAT (India) Rn-Exp. G=514+-29.4 Mb, average several measurements	6351
234.	Eu-151(n,2n)*	REAC-ECN-5	7.0337-01 * ECN-Petten data from TAT (India) Rn-Exp. Ml=1219.7+-82.7 Mb, average several measurements.	6351
235.	Eu-151(n,γ)	REAC-ECN-5	6.8030-01 * ECN-Petten, data from ENDF/B-V Rn-Br=0.64 exp. Mu84, above 98 eV Rn-Br=0.68 Syst. Ko87	6351
236.	Eu-151(n,γ)*	REAC-ECN-5	1.9008-01 * ECN-Petten, data from ENDF/B-V Rn-Br=0.36 exp. Mu84, above 98 eV Rn-Br=0.19 Syst. Ko87	6351
237.	Eu-151(n,γ)#	REAC-ECN-5	1.3006-01 * ECN-Petten, data from ENDF/B-V Rn-Br=0.0004 exp. Mu84, above 98 eV Rn-Br=0.13 Syst. Ko87	6351
238.	Eu-152(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	6352
239.	Eu-153(n,2n)	REAC-ECN-5	7.6537-01 * ECN-Petten THRESH output Rn-Exp. G=1546+-138 Mb, average of measurements	6353
240.	Eu-153(n,2n)*	REAC-ECN-5	2.0099-01 * ECN-Petten THRESH output Rn-Exp. Ml=406+-39 Mb, average of measurements.	6353

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
241.	Eu-153(n,2n)#	REAC-ECN-5	3.3663-02 * ECN-Petten THRESH output Rn-Exp. M2=68+-6 Mb, average of measurements.	6353
242.	Eu-153(n,γ)	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	6353
243.	Eu-153(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.5	6353
244.	Eu-154(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	6354
245.	Gd-158(n,γ)	REAC-ECN-5	1.0000+00 * ECN-Petten, data from ENDF/B-4	6458
246.	Gd-160(n,2n)	ADL-90		6460
247.	Tb-159(n,2n)	REAC-ECN-5	7.4138-01 * ECN-Petten THRESH output Rn-Exp. G+M1=1856+-126 Mb, aver. meas., G=(G+M1)-M1	6559
248.	Tb-159(n,2n)*	REAC-ECN-5	2.5862-01 * ECN-Petten THRESH output Rn-Exp. M1=480+-70 Mb, average measurements.	6559
249.	Dy-158(n,p)	REAC-ECN-5	8.2828-01 * THRESH output Rn-Syst. Fo86, Rn-Br=0.81 Syst. Ko87	6658
250.	Dy-158(n,p)*	REAC-ECN-5	1.9429-01 * THRESH output Rn-Syst. Fo86, Rn-Br=0.19 Syst. Ko87 (J=0)	6658
251.	Ho-165(n,2n)	REAC-ECN-5	9.2363-01 * THRESH output ACTL corrected Rn-Exp. Qa81	6765
252.	Ho-165(n,2n)*	REAC-ECN-5	1.1538+00 * THRESH output ACTL corrected Rn-Exp. Qa81	6765
253.	Ho-165(n,γ)	REAC-ECN-5	6.4000-01 * ECN-Petten, data from ENDF/B-V Rn-Br=0.94 exp. Mu84, above 151 eV Rn-Br=0.64 Syst. Ko87	6765
254.	Ho-165(n,γ)*	REAC-ECN-5	3.6001-01 * ECN-Petten, data from ENDF/B-V Rn-Br=0.05 exp. Mu84, above 151 eV Rn-Br=0.36 Syst. Ko87	6765
255.	Ho-166(n,n)*	REAC-ECN-5	2.2000-01 * THRESH output ECN-Petten Rn-Syst. Vo86 (J1=0, Jh=7)	6766
256.	Ho-166(n,n)	REAC-ECN-5	1.9000-01 * THRESH output ECN-Petten Rn-Superel. 400 Mb * Br=Syst. Ko87 (J=0)	6816
257.	Er-164(n,2n)	ADL-90		6864

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
258.	Hf-177(n,γ)	REAC-ECN-5	8.6899-01 * ECN-Petten, data from JENDL-2 Rn-Br=0.99 exp. Mu84, above 1000 eV Rn-Br=0.87 Syst. Ko87	7277
259.	Hf-177(n,γ)*	REAC-ECN-5	1.2999-01 * ECN-Petten, data from JENDL-2 Rn-Br=2E-3 exp. Mu84, above 1000 eV Rn-Br=0.13 Syst. Ko87	7277
260.	Hf-177(n,γ)#	REAC-ECN-5	9.9996-04 * ECN-Petten, data from JENDL-2 Rn-Br=5E-10 exp. Mu84, above 1000 eV Rn-Br=0.001 Syst. Ko87	7277
261.	Hf-178(n,n)	REAC-ECN-5	1.0000+00 * THRESH output ECN-Petten Rn-Superel.(2.Met.St.) 400Mb * Br=Syst. Ko87 (J=0)	7278
262.	Hf-178(n,n)*	REAC-ECN-5	5.2660-02 * ECN-Petten data from JENDL-2 Rn-Syst. SIGM1= 19 Mb, systematics Vonach (Vo86)	7278
263.	Hf-178(n,n)#	REAC-ECN-5	2.4943-04 * ECN-Petten data from JENDL-2 Rn-Syst. SIGM2=0.09 Mb, systematics Vonach (Vo86)	7278
264.	Hf-178(n,2n)	REAC-ECN-5	9.5200-01 * THRESH output Rn-Br=0.952 Syst. Ko87	7278
265.	Hf-178(n,2n)*	REAC-ECN-5	4.8000-02 * THRESH output Rn-Br=0.048 Syst. Ko87 (J=11.5)	7278
266.	Hf-178(n,2n)#	REAC-ECN-5	1.0000-03 * THRESH output Rn-Br=0.001 Syst. Ko87 (J=18.5)	7278
267.	Hf-178(n,γ)	REAC-ECN-5	7.5800-01 * JEF-1 Rn-Br=0.27 exp. Mu84, above 1.5 keV Br=0.758 Syst. Ko87	7278
268.	Hf-178(n,γ)*	REAC-ECN-5	2.4000-01 * JEF-1 Rn-Br=0.62 exp. Mu84, above 1.5 keV Br=0.24 Syst. Ko87	7278
269.	Hf-178(n,γ)#	REAC-ECN-5	2.0000-03 * JEF-1 Rn-Br=0.01 exp. Mu84, above 1.5 keV Br=0.002 Syst. Ko87	7278
270.	Hf-179(n,n)	REAC-ECN-5	6.0000-01 * THRESH output ECN-Petten Rn-Superel. 400Mb * Br=Syst. Ko87 (J=4.5)	7279
271.	Hf-179(n,n)*	REAC-ECN-5	2.4000-01 * THRESH output ECN-Petten Rn-400 Mb * Br=Syst. Ko87 (J=0.5)	7279
272.	Hf-179(n,n)#	REAC-ECN-5	1.1000-01 * THRESH output ECN-Petten	7279

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
273.	Hf-179(n,2n)	REAC-ECN-5	2.8584-01 * ECN-Petten data from ACTL Rn-Syst. G+M1+M2=2106+-160 Mb(B073). G=(G+M1+M2)-M1-M2.	7279
274.	Hf-179(n,2n)*	REAC-ECN-5	7.0795-01 * ECN-Petten data from ACTL Rn-Exp., M1=1491+-116 Mb, experimental value (Sa75).	7279
275.	Hf-179(n,2n)#	REAC-ECN-5	6.0220-03 * ECN-Petten data from ACTL Rn-Syst. G+M1+M2=2106+-160 Mb(B073), Rn-Br=6.22E-3 (Ko87).	7279
276.	Hf-180(n,2n)	REAC-ECN-5	5.5514-01 * JENDL-2 Rn-G+M1+M2=1975+-140 Mb Syst. Bo73 Rn-Br=0.65 Syst. Ko87	7280
277.	Hf-180(n,2n)*	REAC-ECN-5	2.8184-01 * JENDL-2 Rn-Br=0.33 from exp. data (Ru70, So77)	7280
278.	Hf-180(n,2n)#	REAC-ECN-5	1.7081-02 * JENDL-2 Rn-Br=0.02 Syst. Ko87	7280
279.	Hf-180(n,3n)	REAC-ECN-5	8.0001-01 * THRESH output ACTL corrected Rn-Br=0.66 Syst. Ko87	7280
280.	Hf-180(n,3n)*	REAC-ECN-5	8.0001-01 * THRESH output Rn-Br=0.34 Syst. Ko87 (J=8)	7280
281.	Hf-180(n,3n)#	REAC-ECN-5	2. -03 * THRESH output Rn-Br=0.001 Syst. Ko87 (J=16)	7280
282.	Hf-180(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	7280
283.	Ta-179(n,2n)	REAC-ECN-5	5.0000-01 * THRESH output ECN-Petten Rn-Br=0.5	7379
284.	Ta-179(n,2n)*	REAC-ECN-5	5.0000-01 * THRESH output ECN-Petten Rn-Br=0.5 (J=?,EG=EM)	7379
285.	Ta-181(n,2n)	REAC-ECN-5	5.2295+00 * THRESH output ACTL corrected comment. total ACTL minus exp. value for metastable state	7381
286.	Ta-181(n,2n)*	REAC-ECN-5	5.7760-01 * THRESH output ACTL corrected Rn-Exp. Qa81	7381
287.	Ta-181(n,na)	REAC-ECN-5	9.5196-01 * THRESH output ACTL corrected Rn-Br=0.952 Syst. Ko87	7381
288.	Ta-181(n,na)*	REAC-ECN-5	4.7998-02 * estimate used Ta181(n,na) Rn-Br=0.048 Syst. Ko87 (J=11.5)	7381
289.	Ta-181(n,nd)	REAC-ECN-5	1.7693-02 * THRESH output	7381

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
290.	Ta-181(n,nd)*	REAC-ECN-5	4.5600-03 * THRESH output	7381
291.	Ta-181(n,nd)#	REAC-ECN-5	5.4720-04 * THRESH output	7381
292.	Ta-181(n,γ)	REAC-ECN-5	4.7800-01 * JEF-1 Rn-Br=0.99 exp. Mu84, above 330 eV Br=0.478 Syst. Ko87	7381
293.	Ta-181(n,γ)*	REAC-ECN-5	5.0000-01 * JEF-1 Rn-Br=0.005 exp. Mu84, above 330 eV Br=0.50 Syst. Ko87	7381
294.	Ta-181(n,γ)#	REAC-ECN-5	2.2000-02 * JEF-1 Rn-Br=0.005 exp. Mu84, above 330 eV Br=0.022 Syst. Ko87	7381
295.	Ta-181(n,t)	REAC-ECN-5	9.1990-01 * ECN-Petten THRESH output Rn-Syst. R. Forrest, Rn-Br=0.92, Syst. Qa85	7381
296.	Ta-181(n,t)*	REAC-ECN-5	8.0000-02 * ECN-Petten THRESH output Rn-Syst. R. Forrest, Rn-Br=0.08, Syst. Qa85(J=0.5)	7381
297.	Ta-181(n,t)#	REAC-ECN-5	1.0000-03 * ECN-Petten THRESH output Rn-Syst. R. Forrest, Rn-Br=0.001, Syst. Qa85(J=12.5)	7381
298.	Ta-182(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	7382
299.	Ta-182(n,p)	REAC-ECN-5	4.0560-01 * THRESH output ECN-Petten Rn-Syst. Fo86, Rn-Br=0.87 Syst. Ko87	7382
300.	Ta-182(n,p)*	REAC-ECN-5	6.0608-02 * THRESH output ECN-Petten Rn-Syst. Fo86, Rn-Br=0.13 Syst. Ko87 (J=8)	7382
301.	W-180(n,2n)	ADL-90		7480
302.	W-180(n,2n)*	ADL-90 split by ECN		7480
303.	W-182(n,na)	REAC-ECN-5	4.0964-02 * THRESH output Rn-Syst. Fo86, Rn-Br=0.719 Syst. Ko87	7482
304.	W-182(n,na)*	REAC-ECN-5	1.5953-02 * THRESH output Rn-Syst. Fo86, Rn-Br=0.28 Syst. Ko87 (J=8)	7482
305.	W-182(n,na)#	REAC-ECN-5	5.6973-05 * THRESH output Rn-Syst. Fo86, Br=0.001 Syst. Ko87 (J=16)	7482
306.	W-182(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1 Rn-Br=0.5	7482

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
307.	W-182(n,γ)*	REAC-ECN-5	1.0000+00 * JEF-1 Rn-Br=0.5	7482
308.	W-182(n,α)	REAC-ECN-5	7.7639-01 * THRESH output ACTL corrected Rn-Syst. Fo86, minus exp. and Syst. value of met. states	7482
309.	W-182(n,α)*	REAC-ECN-5	1.7236+00 * THRESH output ACTL corrected Rn-Exp. Qa81	7482
310.	W-182(n,α)#	REAC-ECN-5	3.0163-03 * THRESH output ACTL corrected Rn-Syst. Fo86 * Br=0.002 Syst. Ko87 (J=12.5)	7482
311.	W-183(n,γ)	REAC-ECN-5	1.0000+00 * JEF-1	7483
312.	W-184(n,γ)	REAC-ECN-5	5.5999-01 * ECN-Petten, data from ENDF/B-4 Rn-Br=0.999 exp. Mu84, above 2650 eV Rn-Br=0.56 Syst. Ko87	7484
313.	W-184(n,γ)*	REAC-ECN-5	4.4000-01 * ECN-Petten, data from ENDF/B-4 Rn-Br=1E-3 exp. Mu84, above 2650 eV Rn-Br=0.44 Syst. Ko87	7484
314.	W-186(n,na)	REAC-ECN-5	6.0131-02 * THRESH output Rn-Syst. Fo86, Rn-Br=0.72 Syst. Ko87	7486
315.	W-186(n,na)*	REAC-ECN-5	2.3384-02 * THRESH output Rn-Syst. Fo86, Rn-Br=0.28 Syst. Ko87 (J=8)	7486
316.	W-186(n,γ)	REAC-ECN-5	1.0000+00 * ECN-Petten, data from ENDF/B-4	7486
317.	Re-185(n,γ)	REAC-ECN-5	6.7000-01 * ECN-Petten, data from ENDF/B-4 Rn-Br=0.67 Syst. Ko87	7585
318.	Re-185(n,γ)*	REAC-ECN-5	3.3000-01 * ECN-Petten, data from ENDF/B-4 Rn-Br=0.33 Syst. Ko87	7585
319.	Re-187(n,2n)	REAC-ECN-5	7.1191-01 * ECN-Petten data from ACTL Rn-Exp. G=1495+-164 Mb, average measurements	7587
320.	Re-187(n,2n)*	REAC-ECN-5	2.8809-01 * ECN-Petten data from ACTL Rn-Syst. M1=605+-258 Mb = Syst. value YA0 (Ya85) minus value G.	7587
321.	Re-187(n,γ)	REAC-ECN-5	6.2000-01 * JEF-1 Rn-Br= 0.96 exp. Mu84, above 91.8 eV Br=0.62 Syst. Ko87	7587
322.	Re-187(n,γ)*	REAC-ECN-5	3.8000-01 * JEF-1 Rn-Br=0.04 exp. Mu84, above 91.8 eV Br=0.38 Syst. Ko87	7587

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
323.	Os-188(n,γ)	REAC-ECN-5	1.0000+00 * ECN evaluation	7688
324.	Os-188(n,p)	ADL-90		7688
325.	Os-188(n,p)*	ADL-90 split by ECN		7688
326.	Os-189(n,γ)	REAC-ECN-5	9.7800-01 * ECN evaluation Rn-Br=0.978 Syst. Ko87	7689
327.	Os-189(n,γ)*	REAC-ECN-5	2.2000-02 * ECN evaluation Rn-Br=0.022 Syst. Ko87 (J=10)	7689
328.	Os-190(n,γ)	REAC-ECN-5	6.1000-01 * ECN-Petten data from FISPRO-ECN Rn-Br=0.298 exp. Mu84, above 30 eV Rn-Br=0.61 Syst. Ko87	7690
329.	Os-190(n,γ)*	REAC-ECN-5	3.9000-01 * ECN-Petten data from FISPRO-ECN Rn-Br=0.702, exp. Mu84, above 30 eV Rn-Br=0.39 Syst. Ko87	7690
330.	Os-190(n,α)	ADL-90		7690
331.	Os-192(n,2n)	REAC-ECN-5	6.0605-01 * ECN-Petten data from IBJ (Poland) Rn-Exp. G+M1=2216+-112 Mb, aver. val. meas. G=(G+M1)-M1	7692
332.	Os-192(n,2n)*	REAC-ECN-5	3.9395-01 * ECN-Petten data from IBJ (Poland) Rn-Exp. M1=873+-121, average value measurements	7692
333.	Os-192(n,γ)	REAC-ECN-5	1.0000+00 * ECN-Petten data from FISPRO-ECN	7692
334.	Ir-191(n,2n)	ADL-90		7791
335.	Ir-191(n,2n)*	ADL-90 split by ECN		7791
336.	Ir-191(n,na)	REAC-ECN-5	7.0017-02 * THRESH output Rn-Syst. Fo86	7791
337.	Ir-191(n,γ)	REAC-ECN-5	4.2006-01 * ECN-Petten data from FISPRO-ECN Rn-Br=0.324, exp. Mu84, above 10 keV Rn-Br=0.42 Syst. Ko87	7791
338.	Ir-191(n,γ)*	REAC-ECN-5	3.1005-01 * ECN-Petten data from FISPRO-ECN Rn-Br=0.676 exp. Mu84, above 10 keV Rn-Br=0.31 Syst. Ko87	7791
339.	Ir-191(n,γ)#	REAC-ECN-5	2.7005-01 * ECN-Petten data from FISPRO-ECN Rn-Br=1.677E-4 exp. Mu84, above 10 keV Rn-Br=0.27 Syst. Ko87	7791

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
340.	Ir-192(n,n)*	REAC-ECN-5	3.1000-01 * THRESH output ECN-Petten Rn-400 Mb * Br=Syst. Ko87 (J=1), JM2=9 ignored	7792
341.	Ir-192(n,n)	REAC-ECN-5	3.1000-01 * THRESH output ECN-Petten Rn-Superel.(2.met.st.) 400 Mb * Br=Syst. Ko87 (J=1)	7862
342.	Ir-193(n,2n)	REAC-ECN-5	5.9297-01 * ECN-Petten data from IBJ (Poland) Rn-Exp. G+M1=1928+-147 Mb, aver. val. meas. G=(G+M1)-M1	7793
343.	Ir-193(n,2n)*	REAC-ECN-5	3.1007-01 * ECN-Petten data from IBJ (Poland) Rn-Syst. G+M1+M2=2135+-160 Syst. BOEDY (Bo73), Rn-Br=0.31 (Ko87)	7793
344.	Ir-193(n,2n)#	REAC-ECN-5	9.6955-02 * ECN-Petten data from IBJ (Poland) Rn-Syst. M2=(G+M1+M2)-(G+M1)=207+-217 Mb	7793
345.	Pt-192(n,γ)	REAC-ECN-5	6.7000-01 * ECN evaluation Rn-Br=0.67 Syst. Ko87	7892
346.	Pt-192(n,γ)*	REAC-ECN-5	3.3000-01 * ECN evaluation Rn-Br=0.33 Syst. Ko87 (J=6.5)	7892
347.	Pt-194(n,2n)	ADL-90		7894
348.	Pt-194(n,2n)*	ADL-90 split by ECN		7894
349.	Au197(n,2n)	ADL-90		7997
350.	Au197(n,2n)*	ADL-90 split by ECN		7997
351.	Au197(n,2n)#	ADL-90 split by ECN		7997
352.	Au197(n,α)	ADL-90		7997
353.	Au197(n,α)*	ADL-90 split by ECN		7997
354.	Hg-195(n,2n)	REAC-ECN-5	1.0000+00 * THRESH output ECN-Petten	8095
355.	Hg-196(n,2n)	REAC-ECN-5	1.6845-01 * THRESH output Rn-Exp. Qa81	8096
356.	Hg-196(n,2n)*	REAC-ECN-5	7.5038-01 * THRESH output Rn-Exp. Qa81	8096

NO.	REACTION	DATA LIBRARY	EVALUATION METHOD	MAT NUMBER
357.	Tl-203(n,2n)	REAC-ECN-5	8.1092-01 * Bospor Rn-Exp. Qa81	8103
358.	Pb-204(n,n)	REAC-ECN-5	1.1512-01 * JENDL-2 Rn-Exp. V086	8204
359.	Pb-204(n,2n)	REAC-ECN-5	3.6850-01 * JENDL-2 Rn-Br=0.40 from exp. data (Ba86)	8204
360.	Pb-204(n,2n)*	REAC-ECN-5	5.4354-01 * JENDL-2 Rn-Br=0.59 Syst. Ko87	8204
361.	Pb-204(n,2n)#	REAC-ECN-5	9.2125-03 * JENDL-2 Rn-Br=0.01 Syst. Ko87	8204
362.	Pb-204(n,p)	ADL-90		8204
363.	Pb-204(n,t)	REAC-ECN-5	6.7090-01 * THRESH output Rn-Exp. Bo85	8204
364.	Pb-206(n,2n)	ENDF/B-6		8206
365.	Pb-206(n,α)	REAC-ECN-5	1.0000+00 * JENDL-2 comment. evaluation agrees with exp. data (Qa81)	8206
366.	Pb-208(n,γ)	REAC-ECN-5	1.0000+00 * ECN-Petten, data from JENDL-2	8208
367.	Bi-208(n,2n)	REAC-ECN-5	9.1500-01 * THRESH output Rn-Br=0.915 Syst. Ko87	8308
368.	Bi-208(n,2n)*	REAC-ECN-5	8.5000-02 * THRESH output Rn-Br=0.085 Syst. Ko87 (J=10.5)	8308
369.	Bi-209(n,2n)	ENDF/B-6		8309
370.	Bi-209(n,γ)	REAC-ECN-5	7.3000-01 * ECN-Petten, data from CEN (France) Rn-Br=0.71 exp. Mu84, above 2.7E5 eV Rn-Br=0.73 Syst. Ko87	8309
371.	Bi-209(n,γ)*	REAC-ECN-5	2.6999-01 * ECN-Petten, data from CEN (France) Rn-Br=0.28 exp. Mu84, above 2.7E5 eV Rn-Br=0.27 Syst. Ko87	8309
372.	Po-210(n,2n)	REAC-ECN-5	1.0000+00 * THRESH output ECN-Petten	8410

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