

EXFOR News (September 2011)

New experimental data available from Nuclear Reaction Data Centres

EXFOR is a world-wide data library for experimental neutron induced, charged-particle induced and photonuclear reaction data compiled by the [International Network of the Nuclear Reaction Data Centres \(NRDC\)](#)^a coordinated by the [IAEA Nuclear Data Section](#). Regularly updated retrieval database is available at [NNDC](#), [NEADB](#), [IAEA-NDS](#), [JAEA](#), [JCPRG](#) and [CDFE](#).

Quantity codes

ALF	α -value ($\sigma_{\text{capt}}/\sigma_{\text{fis}}$)	FY	Fission product yield
AMP	Length or amplitude	INT	Cross section integral over incident energy
CHG	Fragment charge	KE	Kinetic energy
CS	Cross section	KER	Kerma factor
CSN	Differential with respect to number of particles	MLT	Multiplicity
CSP	Partial cross section	NQ	Nuclear quantity
CST	Temperature dependent cross section	NU	Fission neutron multiplicity $\bar{\nu}$
D3A	Triple differential $d\Omega_1/d\Omega_2/dE'$	NUD	Delayed fission neutron multiplicity $\bar{\nu}_d$
D3E	Triple differential $d\Omega/dE'_1/dE'_2$	NUF	Fragment neutrons
D4A	Quadruple diff. $d\Omega_1/d\Omega_2/dE'_1/dE'_2$	POL	Polarization
DA	Differential $d/d\Omega$	POD	Differential polarization
DAA	Double differential $d\Omega_1/d\Omega_2$	PY	Product yield (other than fission)
DAE	Double differential $d\Omega/dE'$	RI	Resonance integral
DAP	Partial differential $d/d\Omega$	RP	Resonance parameter
DAT	Temperature-dependent Legendre coefficient	RR	Reaction rate
DE	Differential d/dE'	SIF	Self indication
DEP	Energy spectrum for specific group	SPC	Gamma spectrum
DP	Diff. by linear momentum of outgoing part.	TSL	Thermal scattering
DT	Diff. by 4-momentum transfer squared	TT	Thick target yield
ETA	η -value $\bar{\nu}\sigma_{\text{fis}}/(\sigma_{\text{capt}} + \sigma_{\text{fis}})$	TTD	Differential thick target yield, $d/d\Omega$
EVL	Evaluation	TTP	Partial thick target yield

Special codes in outgoing particle field

abs	Absorption	fus	Fusion	sct	Scattering	tot	Total
el	Elastic	inel	Inelastic	tcx	Total charge changing		
fis	Fission	non	Nonelastic	ths	Thermal scattering		

Special codes in incident energy field

Fast	Fast reactor spectrum average	Maxw	Maxwellian spectrum average
Fiss	Fission spectrum average	Spont	Spontaneous (for fission)

^a [NNDC](#) (USA), [NEADB](#) (France), [NDS](#) (Austria), [CJD](#) (Russia), [CNDC](#) (China), [ATOMKI](#) (Hungary), [BARC](#) (India), [JAEA](#) (Japan), [JCPRG](#) (Japan), [KAERI](#) (Korea), [CAJaD](#) (Russia), [CDFE](#) (Russia), [CNPD](#) (Russia), [UkrNDC](#) (Ukraine)

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Lithium

7

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$^{18}\text{O}, ^8\text{Be}$	^{17}N	DAP	3POLWWA	1.1+08	1.1+08	Jour	PR/C,83,024606	11	A.T.Rudchik+	D5083
$^{18}\text{O}, ^9\text{Be}$	^{16}N	DAP	3POLWWA	1.1+08	1.1+08	Jour	NP/A,860,(1),8	11	A.T.Rudchik+	D5087

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Carbon

12

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$^{16}\text{O}, \text{el}$	^{12}C	DA	4KASKAS	2.0+07	2.8+07	Jour	NP/A,859,29	11	Sh.Hamada+	A0886

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Carbon

13

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$^{18}\text{O}, \text{el}$	^{13}C	DA	3POLWWA	1.0+08	1.0+08	Jour	NP/A,852,(1),1	11	A.T.Rudchik+	D5084
$^{18}\text{O}, \text{inel}$	^{13}C	DAP	3POLWWA	1.0+08	1.0+08	Jour	NP/A,852,(1),1	11	A.T.Rudchik+	D5084

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Carbon

14

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$^{18}\text{O}, \text{el}$	^{14}C	DA	3POLWWA	1.0+08	1.0+08	Jour	EPJ/A,47,(4),50	11	A.T.Rudchik+	D5085
$^{18}\text{O}, \text{inel}$	^{14}C	DAP	3POLWWA	1.0+08	1.0+08	Jour	EPJ/A,47,(4),50	11	A.T.Rudchik+	D5085

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Oxygen

16

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$^{12}\text{C}, \text{el}$	^{16}O	DA	4KASKAS	2.1+07	2.1+07	Jour	NP/A,859,29	11	Sh.Hamada+	A0886

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Magnesium

24

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
α, inel	^{24}Mg	DAA	4RUSMOS	3.0+07	3.0+07	Jour	IZV,75,588	11	L.I.Galanina+	A0883
α, inel	^{24}Mg	DAP	4RUSMOS	3.0+07	3.0+07	Jour	IZV,75,588	11	L.I.Galanina+	A0883

20 Calcium 40

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,α	³⁷ Ar	DAP	2FR LYO	3.3+06	3.3+06	Jour	CR/B,265,1265	Nov 67	H.Abaschi+	21506

21 Scandium 45

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
d,p	⁴⁶ Sc	CS	3CZRUFJ	8.1+05	1.2+07	Jour	JP/G,38,035106	11	N.K.Skobelev+	A0881
d,t	⁴⁴ Sc	CS	3CZRUFJ	7.3+06	1.2+07	Jour	JP/G,38,035106	11	N.K.Skobelev+	A0881
$^6\text{He},x$	⁴⁶ Sc	CS	4ZZZDUB	4.9+06	2.3+07	Jour	JP/G,38,035106	11	N.K.Skobelev+	A0881

22 Titanium 49

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
p,n	⁴⁹ V	DE	4RUSFEI	8.1+06	1.1+07	Jour	YF,74,355	11	B.V.Zhuravlev+	A0880

23 Vanadium

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
d,x	⁴⁷ Ca	CS	2JPNTOH	3.6+07	4.0+07	Jour	NIM/B,269,1792	11	F.Tarkanyi+	D4246
d,x	⁴⁶ Sc	CS	2JPNTOH	3.6+07	4.0+07	Jour	NIM/B,269,1792	11	F.Tarkanyi+	D4246
d,x	⁴⁷ Sc	CS	2JPNTOH	5.3+06	4.0+07	Jour	NIM/B,269,1792	11	F.Tarkanyi+	D4246
d,x	⁴⁸ Sc	CS	2JPNTOH	5.3+06	4.0+07	Jour	NIM/B,269,1792	11	F.Tarkanyi+	D4246
d,x	⁴⁸ V	CS	2JPNTOH	3.2+07	4.0+07	Jour	NIM/B,269,1792	11	F.Tarkanyi+	D4246
d,x	⁵¹ Cr	CS	2JPNTOH	5.3+06	4.0+07	Jour	NIM/B,269,1792	11	F.Tarkanyi+	D4246

23 Vanadium 47

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
0,0		NQ	4RUSFEI	Spont		Jour	YF,74,355	11	B.V.Zhuravlev+	A0880

23 Vanadium 48

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
0,0		NQ	4RUSFEI	Spont		Jour	YF,74,355	11	B.V.Zhuravlev+	A0880

23 Vanadium 49

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
0,0		NQ	4RUSFEI	Spont		Jour	YF,74,355	11	B.V.Zhuravlev+	A0880

24 Chromium 52

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
<i>n,p</i>	⁵² V	CS	3INDPOO	1.5+07	1.5+07	Jour	KPS,59,(1073)	11	B.Lalremruata+	33034

24 Chromium 53

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
0,0		NQ	4RUSFEI	Spont		Jour	YF,74,355	11	B.V.Zhuravlev+	A0880
<i>n,p</i>	⁵³ V	CS	3INDPOO	1.5+07	1.5+07	Jour	KPS,59,(1073)	11	B.Lalremruata+	33034

24 Chromium 54

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
0,0		NQ	4RUSFEI	Spont		Jour	YF,74,355	11	B.V.Zhuravlev+	A0880

25 Manganese 55

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
<i>p,n</i>	⁵⁵ Fe	TT	2GERJUL	1.5+07	1.5+07	Jour	ARI,68,2393	10	M.Al-Abyad+	D0632
<i>p,x</i>	⁵¹ Cr	TT	2GERJUL	3.0+07	3.0+07	Jour	ARI,68,2393	10	M.Al-Abyad+	D0632
<i>p,x</i>	⁵⁴ Mn	TT	2GERJUL	3.0+07	3.0+07	Jour	ARI,68,2393	10	M.Al-Abyad+	D0632
<i>d,p</i>	⁵⁶ Mn	CS	2JPNTOH	5.4+06	3.8+07	Jour	NIM/B,269,1878	11	F.Ditroi+	D4247
<i>d,x</i>	⁵¹ Cr	CS	2JPNTOH	2.4+07	3.8+07	Jour	NIM/B,269,1878	11	F.Ditroi+	D4247
<i>d,x</i>	⁵² Mn	CS	2JPNTOH	2.4+07	3.8+07	Jour	NIM/B,269,1878	11	F.Ditroi+	D4247
<i>d,x</i>	⁵⁴ Mn	CS	2JPNTOH	7.9+06	3.8+07	Jour	NIM/B,269,1878	11	F.Ditroi+	D4247

27 Cobalt 59

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
<i>n,2n+α</i>	⁵⁴ Mn	CS	2JPNTOH	2.8+07	3.8+07	Rept	JAERI-M-92-027,354	Mar 92	T.S.Soewarsono+	22335
<i>n,γ</i>	⁶⁰ Co	CS	3INDAUW	2.4+04	2.4+04	Jour	JPI,35,8	73	M.Sriramachandramurty+	31712

28 Nickel

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
<i>p,x</i>	⁵⁵ Co	CS	3KORKRM	5.6+06	4.0+07	Jour	NIM/B,269,1140	11	M.U.Khandaker+	D7002
<i>p,x</i>	⁵⁶ Co	CS	3KORKRM	2.3+07	4.0+07	Jour	NIM/B,269,1140	11	M.U.Khandaker+	D7002
<i>p,x</i>	⁵⁷ Co	CS	3KORKRM	7.4+06	4.0+07	Jour	NIM/B,269,1140	11	M.U.Khandaker+	D7002
<i>p,x</i>	⁵⁸ Co	CS	3KORKRM	2.3+07	4.0+07	Jour	NIM/B,269,1140	11	M.U.Khandaker+	D7002
<i>p,x</i>	⁵⁶ Ni	CS	3KORKRM	2.1+07	4.0+07	Jour	NIM/B,269,1140	11	M.U.Khandaker+	D7002
<i>p,x</i>	⁵⁷ Ni	CS	3KORKRM	1.1+07	4.0+07	Jour	NIM/B,269,1140	11	M.U.Khandaker+	D7002

28 Nickel 64

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
³⁶ S,fus		CS	2ITYPAD	5.2+07	8.3+07	Jour	PR/C,82,064609	10	G.Montagnoli+	D0639
³⁶ S,fus		DA	2ITYPAD	9.0+07	9.0+07	Jour	PR/C,82,064609	10	G.Montagnoli+	D0639

29 Copper 63

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
<i>p,n</i>	⁶³ Zn	CS	3RUMBUC	5.1+06	5.2+06	Jour	RJP,55,1006	10	M.Ivascu+	D0646

29 Copper 65

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
<i>p,n</i>	⁶⁵ Zn	CS	3RUMBUC	5.1+06	5.2+06	Jour	RJP,55,1006	10	M.Ivascu+	D0646

30 Zinc 66

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
<i>n,p</i>	⁶⁶ Cu	CS	3INDPOO	1.5+07	1.5+07	Jour	KPS,59,(1073)	11	B.Lalremruata+	33034

30 Zinc 68

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
<i>n,γ</i>	⁶⁹ Zn	CS	3INDAUW	2.4+04	2.4+04	Jour	JPJ,35,8	73	M.Sriramachandramurty+	31712
<i>n,p</i>	⁶⁸ Cu	CS	3INDPOO	1.5+07	1.5+07	Jour	KPS,59,(1073)	11	B.Lalremruata+	33034

				36		Krypton		80			
Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
$\alpha,2n$	^{82}Sr	CS	4RUSKUR	2.1+07	5.2+07	Jour	AE,110,88		11	V.A.Zagryadskii+	A0887

				36		Krypton		82			
Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
$\alpha,4n$	^{82}Sr	CS	4RUSKUR	3.7+07	5.2+07	Jour	AE,110,88		11	V.A.Zagryadskii+	A0887

				36		Krypton		83			
Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
$\alpha,5n$	^{82}Sr	CS	4RUSKUR	4.2+07	5.2+07	Jour	AE,110,88		11	V.A.Zagryadskii+	A0887

				37		Rubidium		87			
Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
n,γ	^{88}Rb	CS	3INDAUW	2.4+04	2.4+04	Jour	JPJ,35,8		73	M.Sriramachandramurty+	31712

				38		Strontium		86			
Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
n,γ	^{87}Sr	CS	3INDAUW	2.4+04	2.4+04	Jour	JPJ,35,8		73	M.Sriramachandramurty+	31712

				42		Molybdenum		97			
Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
n,p	^{97}Nb	CS	3INDPOO	1.5+07	1.5+07	Jour	KPS,59,(1073)		11	B.Lalremruata+	33034

				42		Molybdenum		98			
Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
n,γ	^{99}Mo	CS	3INDAUW	2.4+04	2.4+04	Jour	JPJ,35,8		73	M.Sriramachandramurty+	31712

42 Molybdenum 100

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,γ	^{101}Mo	CS	3INDAUW	2.4+04	2.4+04	Jour	JPJ,35,8	73	M.Sriramachandramurty+	31712

44 Ruthenium 96

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,γ	^{97}Ru	CS	3INDAUW	2.4+04	2.4+04	Jour	JPJ,35,8	73	M.Sriramachandramurty+	31712

44 Ruthenium 102

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,γ	^{103}Ru	CS	3INDAUW	2.4+04	2.4+04	Jour	JPJ,35,8	73	M.Sriramachandramurty+	31712

44 Ruthenium 104

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,γ	^{105}Ru	CS	3INDAUW	2.4+04	2.4+04	Jour	JPJ,35,8	73	M.Sriramachandramurty+	31712

48 Cadmium

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
α,x	^{117}Sn	?	4ZZZDUB	3.5+07	3.5+07	Jour	ARI,69,965	11	O.D.Maslov+	A0888

48 Cadmium 116

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$\alpha,3n$	^{117}Sn	?	4ZZZDUB	3.5+07	3.5+07	Jour	ARI,69,965	11	O.D.Maslov+	A0888

49 Indium 113

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,γ	^{114}In	CS	3INDAUW	2.4+04	2.4+04	Jour	JPJ,35,8	73	M.Sriramachandramurty+	31712

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Indium

115

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,γ	^{116}In	CS	3INDAUW	2.4+04	2.4+04	Jour	JPJ,35,8	73	M.Sriramachandramurty+	31712

50

Tin

116

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,p	^{116}In	CS	3INDPOO	1.5+07	1.5+07	Jour	KPS,59,(1073)	11	B.Lalremruata+	33034

50

Tin

117

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,p	^{117}In	CS	3INDPOO	1.5+07	1.5+07	Jour	KPS,59,(1073)	11	B.Lalremruata+	33034

50

Tin

118

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,p	^{118}In	CS	3INDPOO	1.5+07	1.5+07	Jour	KPS,59,(1073)	11	B.Lalremruata+	33034

50

Tin

120

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,p	^{120}In	CS	3INDPOO	1.5+07	1.5+07	Jour	KPS,59,(1073)	11	B.Lalremruata+	33034
α,el	^{120}Sn	DA	3BZLUSP	2.0+07	3.1+07	Jour	PR/C,82,(4),044606	10	P.Mohr+	D0645
$^6\text{He},x+\alpha$	inclusive	DA	3BZLUSP	1.7+07	2.0+07	Jour	PR/C,82,034602	10	P.N.Defaria+	D0644
$^6\text{He},x+\alpha$	inclusive	DAE	3BZLUSP	1.7+07	2.0+07	Jour	PR/C,82,034602	10	P.N.Defaria+	D0644

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Samarium

147

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
p,γ	^{148}Eu	?	3RUMBUC	5.2+06	8.5+06	Jour	RJP,55,1006	10	M.Ivascu+	D0646
p,n	^{147}Eu	CS	3RUMBUC	5.2+06	8.5+06	Jour	RJP,55,1006	10	M.Ivascu+	D0646

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Samarium

149

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					

p,γ	^{150}Eu	?	3RUMBUC	5.4+06	8.6+06	Jour	RJP,55,1006	10	M.Ivascu+	D0646
p,n	^{149}Eu	CS	3RUMBUC	5.4+06	8.6+06	Jour	RJP,55,1006	10	M.Ivascu+	D0646

68 Erbium

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
p,x	^{167}Tm	CS	2BLGVUB	4.7+06	1.6+07	Jour	NIM/B,269,695	11	A.Hermanne+	D4243
p,x	^{168}Tm	CS	2BLGVUB	4.7+06	1.6+07	Jour	NIM/B,269,695	11	A.Hermanne+	D4243

68 Erbium 170

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
p,n	^{170}Tm	CS	2BLGVUB	4.7+06	1.6+07	Jour	NIM/B,269,695	11	A.Hermanne+	D4243

69 Thulium 169

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
α,γ	^{173}Lu	CS	3HUNDEB	1.3+07	1.7+07	Jour	PL/B,695,419	11	G.G.Kiss+	D4244
α,n	^{172}Lu	CS	3HUNDEB	1.1+07	1.7+07	Jour	PL/B,695,419	11	G.G.Kiss+	D4244

70 Ytterbium 172

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
α,x	^{174}Lu	CS	4ZZZDUB	3.5+07	3.5+07	Jour	NIM/A,646,87	11	S.A.Karamian+	A0882

70 Ytterbium 175

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
α,x	^{177}Lu	CS	4ZZZDUB	3.5+07	3.5+07	Jour	NIM/A,646,87	11	S.A.Karamian+	A0882

70 Ytterbium 176

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$\alpha,2n$	^{178}Hf	CS	4ZZZDUB	3.5+07	3.5+07	Jour	NIM/A,646,87	11	S.A.Karamian+	A0882
α,n	^{179}Hf	CS	4ZZZDUB	3.5+07	3.5+07	Jour	NIM/A,646,87	11	S.A.Karamian+	A0882
α,t	^{177}Lu	CS	4ZZZDUB	3.5+07	3.5+07	Jour	NIM/A,646,87	11	S.A.Karamian+	A0882
α,x	Many	CS	4ZZZDUB	3.5+07	3.5+07	Jour	NIM/A,646,87	11	S.A.Karamian+	A0882

71 Lutetium

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
α,x	Many	CS	4ZZZDUB	3.5+07	3.5+07	Jour	NIM/A,646,87	11	S.A.Karamian+	A0882

71 Lutetium 175

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$\alpha,n+\alpha$	^{174}Lu	CS	4ZZZDUB	3.5+07	3.5+07	Jour	NIM/A,646,87	11	S.A.Karamian+	A0882

71 Lutetium 176

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
α,p	^{179}Hf	CS	4ZZZDUB	3.5+07	3.5+07	Jour	NIM/A,646,87	11	S.A.Karamian+	A0882
α,x	^{178}Hf	CS	4ZZZDUB	3.5+07	3.5+07	Jour	NIM/A,646,87	11	S.A.Karamian+	A0882

79 Gold 197

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$n,2n$	^{196}Au	CS	2JPNTOH	1.8+07	3.8+07	Rept	JAERI-M-92-027,354	Mar 92	T.S.Soewarsono+	22335
$n,4n$	^{194}Au	CS	2JPNTOH	2.8+07	3.8+07	Rept	JAERI-M-92-027,354	Mar 92	T.S.Soewarsono+	22335
$d,2n$	^{197}Hg	CS	2JPNTOH	6.2+06	3.9+07	Jour	NIM/B,269,1389	11	F.Tarkanyi+	D4245
$d,4n$	^{195}Hg	CS	2JPNTOH	2.2+07	3.9+07	Jour	NIM/B,269,1389	11	F.Tarkanyi+	D4245
d,x	^{194}Au	CS	2JPNTOH	3.0+07	3.9+07	Jour	NIM/B,269,1389	11	F.Tarkanyi+	D4245
d,x	^{196}Au	CS	2JPNTOH	2.5+06	3.9+07	Jour	NIM/B,269,1389	11	F.Tarkanyi+	D4245
d,x	^{198}Au	CS	2JPNTOH	3.9+06	3.9+07	Jour	NIM/B,269,1389	11	F.Tarkanyi+	D4245

82 Lead

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
d,fis		CS	4ZZZDUB	1.6+09	4.0+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082

82 Lead 204

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,inel	^{204}Pb	CS	2ITYFRA	2.9+06	1.4+07	Conf	2002PRAHA,	02	M.Pillon	23127

				82		Lead		207			
Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #	
				Min	Max						
n,p	^{207}Tl	CS	2ITYFRA	1.4+07	1.4+07	Conf	2002PRAHA,	02	M.Pillon	23127	

				82		Lead		208			
Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #	
				Min	Max						
$\gamma,4n$	^{204}Pb	CS	3KORPUE		7.0+07	Jour	NIM/B,269,1417	11	H.Naik+	G3105	
$\gamma,5n$	^{203}Pb	CS	3KORPUE		7.0+07	Jour	NIM/B,269,1417	11	H.Naik+	G3105	
$\gamma,6n$	^{202}Pb	CS	3KORPUE		7.0+07	Jour	NIM/B,269,1417	11	H.Naik+	G3105	
n,p	^{208}Tl	CS	2ITYFRA	1.5+07	1.5+07	Conf	2002PRAHA,	02	M.Pillon	23127	
p,n	^{208}Bi	CS	4RUSFEI	8.1+06	9.6+06	Jour	YF,73,1150	10	B.V.Zhuravlev+	A0869	
$p,x+n$	inclusive	CS	4RUSFEI	1.0+07	1.1+07	Jour	YF,73,1150	10	B.V.Zhuravlev+	A0869	
$p,x+n$	inclusive	DAE	4RUSFEI	1.0+07	1.1+07	Jour	YF,73,1150	10	B.V.Zhuravlev+	A0869	
$p,x+n$	inclusive	DE	4RUSFEI	8.1+06	9.6+06	Jour	YF,73,1150	10	B.V.Zhuravlev+	A0869	
d,el	^{208}Pb	DA	4UKRIJD	7.3+06	7.3+06	Jour	YFE,11,(4),400	10	Yu.N.Pavlenko+	D5080	
d,el	^{208}Pb	DAE	4UKRIJD	7.3+06	7.3+06	Jour	YFE,11,(4),400	10	Yu.N.Pavlenko+	D5080	
$d,n+p$	^{208}Pb	DAE	4UKRIJD	7.3+06	7.3+06	Jour	YFE,11,(4),400	10	Yu.N.Pavlenko+	D5080	
$^{58}\text{Fe},\text{fis}$	Many	FY	4ZZZDUB	2.9+08	3.2+08	Jour	PR/C,83,064613	11	I.M.Itkis+	A0885	
$^{58}\text{Fe},\text{fis}$	Many	KE	4ZZZDUB	2.9+08	3.2+08	Jour	PR/C,83,064613	11	I.M.Itkis+	A0885	

				83		Bismuth		209			
Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #	
				Min	Max						
$\gamma,3n$	^{206}Bi	CS	3KORPUE		7.0+07	Jour	NIM/B,269,1417	11	H.Naik+	G3105	
$\gamma,4n$	^{205}Bi	CS	3KORPUE		7.0+07	Jour	NIM/B,269,1417	11	H.Naik+	G3105	
$\gamma,5n$	^{204}Bi	CS	3KORPUE		7.0+07	Jour	NIM/B,269,1417	11	H.Naik+	G3105	
$\gamma,6n$	^{203}Bi	CS	3KORPUE		7.0+07	Jour	NIM/B,269,1417	11	H.Naik+	G3105	
p,n	^{209}Po	CS	4RUSFEI	6.9+06	9.5+06	Jour	YF,73,1150	10	B.V.Zhuravlev+	A0869	
$p,x+n$	inclusive	CS	4RUSFEI	1.0+07	1.1+07	Jour	YF,73,1150	10	B.V.Zhuravlev+	A0869	
$p,x+n$	inclusive	DAE	4RUSFEI	1.0+07	1.1+07	Jour	YF,73,1150	10	B.V.Zhuravlev+	A0869	
$p,x+n$	inclusive	DE	4RUSFEI	6.9+06	1.1+07	Jour	YF,73,1150	10	B.V.Zhuravlev+	A0869	
$d,10n+p$	^{200}Bi	CS	4ZZZDUB	1.6+09	1.6+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
$d,4n$	^{207}Po	CS	4ZZZDUB	1.6+09	4.0+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
$d,5n$	^{206}Po	CS	4ZZZDUB	1.6+09	4.0+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
$d,6n$	^{205}Po	CS	4ZZZDUB	1.6+09	1.6+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
$d,7n$	^{204}Po	CS	4ZZZDUB	1.6+09	4.0+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
$d,8n$	^{203}Po	CS	4ZZZDUB	1.6+09	1.6+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
d,fis		CS	4ZZZDUB	1.6+09	4.0+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
d,x	^{200}Bi	CS	4ZZZDUB	1.6+09	1.6+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
d,x	^{201}Bi	CS	4ZZZDUB	1.6+09	1.6+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
d,x	^{203}Bi	CS	4ZZZDUB	1.6+09	4.0+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
d,x	^{204}Bi	CS	4ZZZDUB	1.6+09	4.0+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
d,x	^{205}Bi	CS	4ZZZDUB	1.6+09	4.0+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	
d,x	^{206}Bi	CS	4ZZZDUB	1.6+09	4.0+09	Conf	2010KYIV,,250	10	V.V.Sotnikov+	D5082	

90 Thorium 228

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, fis		CS	2UK HAR	1.6+06	1.6+06	Rept	AERE-R-10842	Oct 83	G.D.James+	21877

90 Thorium 232

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$\gamma, 0$		RP	2GERIFS	2.0+06	2.3+06	Jour	NP/A,476,39	88	R.D.Heil+	G0028
γ, fis		CS	3INDMNG		9.2+06	Jour	ANE,38,757	11	H.G.Rajprakash+	G0503
γ, fis		DA	3INDMNG		9.2+06	Jour	ANE,38,757	11	H.G.Rajprakash+	G0503
γ, fis	Many	FY	3INDTRM		1.0+07	Jour	NP/A,853,1	11	H.Naik+	G0501
γ, sct		RP	2GERIFS		4.1+06	Jour	NP/A,476,39	88	R.D.Heil+	G0028
γ, sct	^{232}Th	?	2GERIFS		4.1+06	Jour	NP/A,476,39	88	R.D.Heil+	G0028
$n, 2n$	^{231}Th	CS	3INDTRM	9.8+06	9.8+06	Jour	EPJ/A,47,51	11	H.Naik+	33033
n, γ	^{233}Th	CS	3INDTRM	3.7+06	9.8+06	Jour	EPJ/A,47,51	11	H.Naik+	33033

92 Uranium 233

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, fis		CS	2ZZZCER	5.0+05	2.0+07	Jour	EPJ/A,47,2	11	F.Belloni+	23128
n, fis		?	2ZZZCER	5.0+05	2.0+07	Jour	EPJ/A,47,2	11	F.Belloni+	23128

92 Uranium 235

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$\gamma, 0$		RP	2GERIFS	1.8+06	1.8+06	Jour	PR/C,52,468	95	A.Zilges+	G0026
γ, sct		RP	2GERIFS		2.5+06	Jour	PR/C,52,468	95	A.Zilges+	G0026
γ, sct	^{235}U	?	2GERIFS		2.5+06	Jour	PR/C,52,468	95	A.Zilges+	G0026
n, fis	Many	DA	3INDTRM	4.0+06	4.0+06	Jour	PR/C,137,B511	65	S.S.Kapoor+	33032
n, fis	Many	FY	3INDTRM	4.0+06	4.0+06	Jour	PR/C,137,B511	65	S.S.Kapoor+	33032
n, fis		KE	3INDTRM	4.0+06	4.0+06	Jour	PR/C,137,B511	65	S.S.Kapoor+	33032
n, fis	Many	KE	3INDTRM	4.0+06	4.0+06	Jour	PR/C,137,B511	65	S.S.Kapoor+	33032
n, fis	Many	NU	3INDTRM	2.5-02	2.5-02	Jour	PRM,40,(4),299	93	M.S.Samant+	33035

92 Uranium 236

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$\gamma, 0$		RP	2GERIFS	1.8+06	3.1+06	Jour	PR/C,42,771	90	J.Margraf+	G0027
γ, sct		RP	2GERIFS		3.9+06	Jour	PR/C,42,771	90	J.Margraf+	G0027
γ, sct	^{236}U	?	2GERIFS		3.9+06	Jour	PR/C,42,771	90	J.Margraf+	G0027

92 Uranium 238

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$\gamma,0$		RP	2GERIFS	2.2+06	2.5+06	Jour	NP/A,476,39	88	R.D.Heil+	G0028
γ, fis	Many	FY	3INDTRM		1.0+07	Jour	NP/A,853,1	11	H.Naik+	G0501
γ, sct		RP	2GERIFS		4.1+06	Jour	NP/A,476,39	88	R.D.Heil+	G0028
γ, sct	^{238}U	?	2GERIFS		4.1+06	Jour	NP/A,476,39	88	R.D.Heil+	G0028
d, fis	Many	FY	4UKRIJD	3.7+07	3.7+07	Conf	2010KYIV,,239	10	Yu.V.Kibkalo+	D5081
$^{36}\text{S}, \text{fis}$	Many	FY	4ZZZDUB	1.7+08	2.0+08	Jour	PR/C,83,064613	11	I.M.Itkis+	A0885
$^{36}\text{S}, \text{fis}$	Many	KE	4ZZZDUB	1.7+08	2.0+08	Jour	PR/C,83,064613	11	I.M.Itkis+	A0885

93 Neptunium 237

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ, fis		CS	3INDMNG		9.0+06	Jour	RM,46,413	11	H.G.Rajaprakash+	G0502
γ, fis		DA	3INDMNG		9.0+06	Jour	RM,46,413	11	H.G.Rajaprakash+	G0502

94 Plutonium 240

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ, fis	Many	FY	3INDTRM		1.0+07	Jour	NP/A,853,1	11	H.Naik+	G0501

94 Plutonium 241

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, fis	^{132}Sb	FY	3INDTRM	2.5-02	2.5-02	Jour	RCA,,55,173	91	B.S.Tomar+	33029
n, fis	^{132}Sb	?	3INDTRM	2.5-02	2.5-02	Jour	RCA,,55,173	91	B.S.Tomar+	33029

96 Curium 248

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$^{26}\text{Mg}, \text{fis}$	Many	FY	4ZZZDUB	1.3+08	1.6+08	Jour	PR/C,83,064613	11	I.M.Itkis+	A0885
$^{26}\text{Mg}, \text{fis}$	Many	KE	4ZZZDUB	1.3+08	1.6+08	Jour	PR/C,83,064613	11	I.M.Itkis+	A0885

97 Berkelium 249

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$^{48}\text{Ca}, 3n$	$^{294}\ast$	CS	4ZZZDUB	2.5+08	2.5+08	Jour	PR/C,83,054315	11	Yu.Ts.Oganessian+	A0884

$^{48}\text{Ca}, 4n$ $^{293}\text{*}$ CS 4ZZZDUB 2.5+08 2.5+08 Jour [PR/C,83,054315](#) 11 Yu.Ts.Oganessian+ [A0884](#)

98 Californium 249

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$^{22}\text{Ne}, \text{fis}$	Many	FY	4ZZZDUB	1.0+08	1.3+08	Jour	PR/C,83,064613	11	I.M.Itkis+	A0885
$^{22}\text{Ne}, \text{fis}$	Many	KE	4ZZZDUB	1.0+08	1.3+08	Jour	PR/C,83,064613	11	I.M.Itkis+	A0885

98 Californium 252

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
0, fis		?	3HUNII	Spont		Jour	NSE,165,117	10	N.Kornilov+	31692