

Japan Charged-Particle Nuclear Reaction Data Group (JCPRG)

EXFOR : Recent Compilation (Added in January 2007)

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Retrieval service is available at:

<http://www.jcprg.org/exfor/>

Quantity code

ALF	Alpha	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	Nu
D3A	Triple differential $d\Omega_1/d\Omega_2/dE'$	NUD	Nu delayed
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	Eta	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)

1 Hydrogen 1

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ,el	^1H	POD	4ARMJER	3.0+08	1.0+09	Jour	JP/G,19,139	93	F.V.Adamian+	M0699

1 Hydrogen 2

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ,p	^1Nn	DA	4UKRUFT	1.9+08	5.5+08	Jour	YF,55,(9),2311	92	V.B.Ganenko+	M0383
$n,2n$	^1H	?	1USATNL	1.3+07	1.3+07	Jour	PR/C,73,034001	06	D.E.Gonzalez-Trotter+	14106

3 Lithium 6

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,t	^4He	CS	1USALAS	1.1-01	2.1+03	Jour	NIM/A,564,400	06	D.Rochman+	14108

4 Beryllium 9

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ,n	^8Be	CS	4RUSSGU	1.7+06	2.0+07	Jour	IZV,56,(5),159	92	A.M.Goryachev+	M0509

8 Oxygen 16

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$\gamma,x+n$	inclusive	CS	4RUSSGU	1.5+07	2.5+07	Jour	YF,58,1940	95	S.N.Belyaev+	M0702

8 Oxygen 18

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,el	^{18}O	DA	1USAKTY	8.5+06	8.5+06	Conf	2005NOTRED,,101	05	S.N.Choudry+	14119
$n,inel$	^{18}O	DAP	1USAKTY	8.5+06	8.5+06	Conf	2005NOTRED,,101	05	S.N.Choudry+	14119

17 Chlorine 35

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ, n	^{34}Cl	INT	4RUSMOS		3.2+07	Jour	YF,60,(3),389	97	B.S.Ishkhanov+	M0698
γ, p	^{34}S	INT	4RUSMOS		3.2+07	Jour	YF,60,(3),389	97	B.S.Ishkhanov+	M0698
n, γ	^{36}Cl	CS	1USAORL	Maxwl		Jour	PR/C,65,058801	02	K.H.Guber+	14090

17 Chlorine 37

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ, n	^{36}Cl	INT	4RUSMOS		3.2+07	Jour	YF,60,(3),389	97	B.S.Ishkhanov+	M0698
γ, p	^{36}S	INT	4RUSMOS		3.2+07	Jour	YF,60,(3),389	97	B.S.Ishkhanov+	M0698
n, γ	^{38}Cl	CS	1USAORL	Maxwl		Jour	PR/C,65,058801	02	K.H.Guber+	14090

21 Scandium 45

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ, n	^{44}Sc	INT	4RUSMOS		3.2+07	Jour	YF,58,(7),1180	95	B.S.Ishkhanov+	M0695
γ, p	^{44}Ca	INT	4RUSMOS		3.2+07	Jour	YF,58,(7),1180	95	B.S.Ishkhanov+	M0695

24 Chromium 54

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$n, 0$		RP	1USAORL			Jour	PR/C,74,044614	06	R.F.Carlton+	14114
n, tot		CS	1USAORL	2.3+04	2.9+06	Jour	PR/C,74,044614	06	R.F.Carlton+	14114

26 Iron

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$n, x+n$	inclusive	DAE	1USALAS	9.0+07	1.0+08	Conf	2004SANTA,1,1058	04	S.Kunieda+	14116

26 Iron 56

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, inel	^{56}Fe	CSP	1USALAS	5.0+06	1.5+07	Conf	2004SANTA,1,838	04	R.O.Nelson+	14118
n, inel	^{56}Fe	?	1USALAS	1.4+07	1.4+07	Conf	2004SANTA,1,838	04	R.O.Nelson+	14118

28

Nickel

58

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ, α	^{54}Fe	INT	4RUSMOS		3.2+07	Jour	YF,56,(5),251	93	B.S.Ishkhanov+	M0382
γ, n	^{57}Ni	CSP	4RUSJIA	1.7+07	1.9+07	Jour	YF,61,(9),1541	98	B.S.Ratner	M0694
γ, n	^{57}Ni	INT	4RUSMOS		3.2+07	Jour	YF,56,(5),251	93	B.S.Ishkhanov+	M0382
γ, p	^{57}Co	INT	4RUSMOS		3.2+07	Jour	YF,56,(5),251	93	B.S.Ishkhanov+	M0382

33

Arsenic

75

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, γ	^{76}As	?	1CANMPT	5.5-01		Jour	NIM/A,564,669	06	J.St-Pierre+	14111

37

Rubidium

87

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, γ	^{88}Rb	?	1CANMPT	5.5-01		Jour	NIM/A,564,669	06	J.St-Pierre+	14111

38

Strontium

87

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, γ	^{88}Sr	?	1CANMPT	5.5-01		Jour	NIM/A,564,669	06	J.St-Pierre+	14111

46

Palladium

108

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, γ	^{109}Pd	?	1CANMPT	5.5-01		Jour	NIM/A,564,669	06	J.St-Pierre+	14111

47

Silver

109

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, γ	^{110}Ag	?	1CANMPT	5.5-01		Jour	NIM/A,564,669	06	J.St-Pierre+	14111

48

Cadmium

114

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, γ	^{115}Cd	?	1CANMPT	5.5-01		Jour	NIM/A,564,669	06	J.St-Pierre+	14111

49

Indium

115

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$\gamma, x+n$	inclusive	CS	4RUSSGU	9.0+06	1.9+07	Jour	IZV,62,2223	98	S.N.Belyaev+	M0703
n, γ	^{116}In	?	1CANMPT	5.5-01		Jour	NIM/A,564,669	06	J.St-Pierre+	14111

50

Tin

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, γ	^{113}Sn	CS	1USAORU	2.5-02	2.5-02	Jour	PR/C,73,054312	06	K.S.Krane+	14107
n, γ	^{113}Sn	RI	1USAORU	5.0-01		Jour	PR/C,73,054312	06	K.S.Krane+	14107
n, γ	^{117}Sn	CS	1USAORU	2.5-02	2.5-02	Jour	PR/C,73,054312	06	K.S.Krane+	14107
n, γ	^{117}Sn	RI	1USAORU	5.0-01		Jour	PR/C,73,054312	06	K.S.Krane+	14107
n, γ	^{123}Sn	CS	1USAORU	2.5-02	2.5-02	Jour	PR/C,73,054312	06	K.S.Krane+	14107
n, γ	^{123}Sn	RI	1USAORU	5.0-01		Jour	PR/C,73,054312	06	K.S.Krane+	14107
n, γ	^{125}Sn	CS	1USAORU	2.5-02	2.5-02	Jour	PR/C,73,054312	06	K.S.Krane+	14107
n, γ	^{125}Sn	RI	1USAORU	5.0-01		Jour	PR/C,73,054312	06	K.S.Krane+	14107

50

Tin

116

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n, γ	^{117}Sn	CS	1USAORL	1.8+04	1.4+05	Conf	97TRIST,2,1581	97	P.E.Koehler+	14121
n, tot		CS	1USAORL	2.0+04	2.0+05	Conf	97TRIST,2,1581	97	P.E.Koehler+	14121

50

Tin

118

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ, x	Many	CS	4ARMJSU		4.5+09	Jour	YF,57,(12),2115	94	V.E.Aleksandryan+	M0697

53

Iodine

115

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
$\gamma, x+n$	inclusive	CS	4RUSSGU	9.0+06	1.9+07	Jour	IZV,62,2223	98	S.N.Belyaev+	M0703

53

Iodine

127

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

$\gamma,2n$	^{125}I	CS	4RUSMOS	1.4+07	2.9+07	Rept	MSU-INP-2006-9/808	06	V.V.Varlamov+	M0693
$\gamma,2n$	^{125}I	INT	4RUSMOS		2.8+07	Rept	MSU-INP-2006-9/808	06	V.V.Varlamov+	M0693
$\gamma,3n$	^{124}I	CS	4RUSMOS	2.6+07	3.1+07	Rept	MSU-INP-2006-9/808	06	V.V.Varlamov+	M0693
$\gamma,3n$	^{124}I	INT	4RUSMOS		3.1+07	Rept	MSU-INP-2006-9/808	06	V.V.Varlamov+	M0693
γ,n	^{126}I	CS	4RUSMOS	8.8+06	2.9+07	Rept	MSU-INP-2006-9/808	06	V.V.Varlamov+	M0693
γ,n	^{126}I	INT	4RUSMOS		2.8+07	Rept	MSU-INP-2006-9/808	06	V.V.Varlamov+	M0693
$\gamma,x+n$	inclusive	CS	4RUSMOS	8.8+06	3.0+07	Rept	MSU-INP-2006-9/808	06	V.V.Varlamov+	M0693
$\gamma,x+n$	inclusive	INT	4RUSMOS		3.0+07	Rept	MSU-INP-2006-9/808	06	V.V.Varlamov+	M0693
n,γ	^{128}I	?	1CANMPT	5.5-01		Jour	NIM/A,564,669	06	J.St-Pierre+	14111

53

Iodine

129

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,abs		CS	1USAORL	2.5-02	2.5-02	Jour	NSE,8,112	60	R.C.Block+	12024

55

Cesium

133

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,γ	^{134}Cs	?	1CANMPT	5.5-01		Jour	NIM/A,564,669	06	J.St-Pierre+	14111

56

Barium

130

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
n,γ	^{131}Ba	?	1CANMPT	5.5-01		Jour	NIM/A,564,669	06	J.St-Pierre+	14111

57

Lanthanum

139

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ,n	^{138}La	CS	2JPNAIS	8.9+06	1.2+07	Jour	PR/C,74,025806	06	H.Utsunomiya+	M0696

59

Praesodymium

141

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation Ref Vol Page	Date	Author	Data #
				Min	Max					
γ,n	^{140}Pr	CS	2JPNAIS	9.5+06	1.2+07	Jour	PR/C,74,025806	06	H.Utsunomiya+	M0696
$\gamma,x+n$	inclusive	CS	4RUSSGU	9.0+06	2.5+07	Jour	IZV,59,154	95	S.N.Belyaev+	M0701

60 Neodymium 150

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
n,γ	^{151}Nd	CS	1USARPI	3.0-01	5.0+02	Jour	NSE,153,8		06	D.P.Barry+	14093
n,tot		CS	1USARPI	3.0+00	5.0+02	Jour	NSE,153,8		06	D.P.Barry+	14093

62 Samarium 144

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
γ,n	^{143}Sm	CS	4ZZZDUB		9.4+06	Jour	YF,59,(4),585		96	A.G.Belov+	M0527

62 Samarium 149

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
$n,0$		RP	1USAORL			Conf	58GENEVA,16,150(673)		58	J.A.Harvey+	12012

64 Gadolinium

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
$n,0$		RP	1USARPI			Jour	NSE,154,261		06	G.Leinweber+	14110

64 Gadolinium 148

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
n,γ	^{149}Gd	CS	1USAORU	2.5-02	2.5-02	Jour	PR/C,74,044302		06	M.G.Rios+	14113
n,γ	^{149}Gd	RI	1USAORU		5.0-01	Jour	PR/C,74,044302		06	M.G.Rios+	14113
n,γ	^{149}Gd	SPC	1USAORU	2.5-02	2.5-02	Jour	PR/C,74,044302		06	M.G.Rios+	14113

64 Gadolinium 152

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
$n,0$		RP	1USARPI			Jour	NSE,154,261		06	G.Leinweber+	14110

64 Gadolinium 154

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation		Date	Author	Data #
				Min	Max		Ref	Vol Page			
$n,0$		RP	1USARPI			Jour	NSE,154,261		06	G.Leinweber+	14110

64 Gadolinium 155

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
$n,0$		RP	1USARPI			Jour	NSE,154,261			06	G.Leinweber+	14110

64 Gadolinium 156

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
$n,0$		RP	1USARPI			Jour	NSE,154,261			06	G.Leinweber+	14110

64 Gadolinium 157

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
$n,0$		RP	1USARPI			Jour	NSE,154,261			06	G.Leinweber+	14110

64 Gadolinium 158

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
$n,0$		RP	1USARPI			Jour	NSE,154,261			06	G.Leinweber+	14110
n,γ	^{159}Gd	SPC	1USABNL	1.0+00	2.4+04	Jour	NP/A,729,679			03	C.Granja+	14104

64 Gadolinium 160

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
$n,0$		RP	1USARPI			Jour	NSE,154,261			06	G.Leinweber+	14110

69 Thulium 169

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
n,γ	^{170}Tm	?	1CANMPT	5.5-01		Jour	NIM/A,564,669			06	J.St-Pierre+	14111
n,inel	^{169}Tm	DAP	1USALTI	6.0+05	6.0+05	Conf	2004SANTA,1,1054			04	A.Alimeti+	14115

73

Tantalum

181

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
n,γ	^{182}Ta	?	1CANMPT	5.5-01		Jour	NIM/A,564,669			06	J.St-Pierre+	14111

76

Osmium

189

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
$n,0$		RP	1USAORL			Jour	AAA,171,9			87	R.R.Winters+	14120
n,γ	^{190}Os	CS	1USAORL	Maxwl	5.0+05	Jour	AAA,171,9			87	R.R.Winters+	14120

82

Lead

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
$n,x+n$	inclusive	DAE	1USALAS	2.0+08	3.0+08	Conf	2004SANTA,1,1062			04	T.Watanabe+	14117

82

Lead

208

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
$\gamma,x+n$	inclusive	CS	4RUSSGU	7.2+06	2.6+07	Jour	YF,58,1940			95	S.N.Belyaev+	M0702
$\gamma,x+n$	inclusive	CS	4ZZZDUB	7.4+06	2.2+07	Jour	YF,55,289			92	S.N.Belyaev+	M0700

83

Bismuth

209

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
$\gamma,x+n$	inclusive	CS	4RUSSGU	7.2+06	2.6+07	Jour	YF,58,1940			95	S.N.Belyaev+	M0702

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Thorium

232

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
γ,fis		CS	4RUSFEI		8.9+06	Jour	YF,59,(2),203			96	G.N.Smirenkin+	M0516

92

Uranium

234

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation			Date	Author	Data #
				Min	Max		Ref	Vol	Page			
γ,fis		CS	4RUSFEI		8.9+06	Jour	YF,61,1427			98	A.S.Soldatov+	M0634

