EXFOR News (April 2012)

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. Please send an email to n.otsuka@iaea.org if you would prefer to be advised electronically when EXFOR News is released.

Quantity codes

ALF	α-value ($\sigma_{\rm capt}/\sigma_{\rm fis}$)	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 $\mathrm{d}\Omega_1/\mathrm{d}\Omega_2/\mathrm{d}E'$	NUD	Delayed fission neutron multiplicity $\bar{\nu}_d$
D3E	Triple differential $\mathrm{d}\Omega/\mathrm{d}E'_1/\mathrm{d}E'_2$	NUF	Fragment neutrons
D4A	Quadruple diff. $\mathrm{d}\Omega_1/\mathrm{d}\Omega_2/\mathrm{d}E'_1/\mathrm{d}E'_2$	POL	Polarization
DA	Differential $\mathrm{d}/\mathrm{d}\Omega$	POD	Differential polarization
DAA	Double differential $\mathrm{d}\Omega_1/\mathrm{d}\Omega_2$	PY	Product yield (other than fission)
DAE	Double differential $\mathrm{d}\Omega/\mathrm{d}E'$	RI	Resonance integral
DAP	Partial differential $\mathrm{d}/\mathrm{d}\Omega$	RP	Resonance parameter
DAT	Temperature-dependent Legendre coefficient	RR	Reaction rate
DE	Differential $\mathrm{d}/\mathrm{d}E'$	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 $\bar{\nu}\sigma_{\rm fis}/(\sigma_{\rm capt}+\sigma_{\rm fis})$	TTD	Differential thick target yield, $\mathrm{d}/\mathrm{d}\Omega$
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)

4 Beryllium 9

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,x+n	inclusive	CS	3AULAML	1.5+06	2.7+07	Jour	NP/A,238,189	75	R.J.Hughes+	M0832
γ,x+n	inclusive	INT	3AULAML	1.6+06	2.8+07	Jour	NP/A,238,189	75	R.J.Hughes+	M0832

6 Carbon 12

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,x+n	inclusive	CS	2BLGGHT	1.9+07	3.3+07	Jour	NP/A,198,144	72	R.E.Vandevyver+	M0838

9 Fluorine 19

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,t	^{16}O	DA	1CANSAS	1.8+07	2.3+07	Jour	NP/A,223,409	74	D.M.Skopik+	M0834
γ,t	^{16}O	DAP	1CANSAS	1.8+07	2.3+07	Jour	NP/A,223,409	74	D.M.Skopik+	M0834
γ,t	^{16}O	INT	1CANSAS	1.8+07	2.3+07	Jour	NP/A,223,409	74	D.M.Skopik+	M0834
γ,x+n	inclusive	CS	2BLGGHT	1.0+07	1.9+07	Jour	NP/A,198,144	72	R.E.Vandevyver+	M0838

12 Magnesium 26

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,α	^{22}Ne	DA	2GERJLU	1.6+07	2.2+07	Jour	NP/A,234,365	74	H.Wolf+	M0833
γ,p	^{25}Na	DA	2GERJLU	1.6+07	2.3+07	Jour	NP/A,234,365	74	H.Wolf+	M0833
γ,p	^{25}Na	INT	2GERJLU	1.6+07	2.3+07	Jour	NP/A,234,365	74	H.Wolf+	M0833

14 Silicon

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,abs		CS	3SLNIJS	1.0+07	3.0+07	Jour	NP/A,117,124	68	N.Bezic+	M0840
γ,abs		INT	3SLNIJS	1.0+07	3.0+07	Jour	NP/A,117,124	68	N.Bezic+	M0840

20 Calcium

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,abs		CS	3SLNIJS	7.7+06	3.1+07	Jour	NP/A,117,124	68	N.Bezic+	M0840
γ,abs		INT	3SLNIJS	1.0+07	3.0+07	Jour	NP/A,117,124	68	N.Bezic+	M0840

21 Scandium 45

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,x+n	inclusive	CS	3AULAML	1.1+07	2.5+07	Jour	NP/A,205,139	73	R.H.Sambell+	M0837
γ,x+n	inclusive	INT	3AULAML		2.5+07	Jour	NP/A,205,139	73	R.H.Sambell+	M0837

22 Titanium

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,inel	^{nat}Ti	DA	2GERMPM	1.6+07	2.4+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842
γ,sct	^{nat}Ti	DA	2GERMPM	1.4+07	2.8+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842

23 Vanadium 51

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,inel	^{51}V	DA	2GERMPM	1.6+07	2.5+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842
γ,sct	^{51}V	DA	2GERMPM	1.4+07	2.8+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842

24 Chromium

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,inel	^{nat}Cr	DA	2GERMPM	1.6+07	2.4+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842
γ,sct	^{nat}Cr	DA	2GERMPM	1.4+07	2.8+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842

25 Manganese 55

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,x+n	inclusive	CS	2BLGGHT	1.0+07	2.3+07	Jour	NP/A,223,416	74	R.Carchon+	M0835
γ,x+n	inclusive	INT	2BLGGHT		2.3+07	Jour	NP/A,223,416	74	R.Carchon+	M0835

30 Zinc 64

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,abs		CS	1USAIOW	1.2+07	2.6+07	Jour	NP/A,213,358	73	G.E.Clark+	M0836
γ,p	^{63}Cu	CSP	1USAIOW	1.2+07	2.6+07	Jour	NP/A,213,358	73	G.E.Clark+	M0836
γ,p	^{63}Cu	DAP	1USAIOW	1.2+07	2.5+07	Jour	NP/A,213,358	73	G.E.Clark+	M0836
γ,x+n	inclusive	CS	1USAIOW	1.2+07	2.6+07	Jour	NP/A,213,358	73	G.E.Clark+	M0836

33 Arsenic 75

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,inel	^{75}As	DA	2GERMPM	1.4+07	2.4+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842
γ,sct	^{75}As	DA	2GERMPM	1.3+07	3.1+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842

34 Selenium

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,inel	^{nat}Se	DA	2GERMPM	1.4+07	2.5+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842
γ,sct	^{nat}Se	DA	2GERMPM	1.2+07	3.1+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842

39 Yttrium 89

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,sct	^{89}Y	DA	2GERMPM	1.3+07	3.1+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842

46 Palladium 108

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,abs		CS	3AULAML	8.2+06	2.4+07	Jour	NP/A,139,501	69	T.K.Deague+	M0839
γ,abs		INT	3AULAML	8.0+06	2.4+07	Jour	NP/A,139,501	69	T.K.Deague+	M0839
γ,p	^{107}Rh	CS	3AULAML	8.2+06	2.9+07	Jour	NP/A,139,501	69	T.K.Deague+	M0839
γ,x+n	inclusive	CS	3AULAML	8.2+06	2.4+07	Jour	NP/A,139,501	69	T.K.Deague+	M0839

46 Palladium 110

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,n	^{109}Pd	CS	3AULAML	8.2+06	2.9+07	Jour	NP/A,139,501	69	T.K.Deague+	M0839

48 Cadmium

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,inel	^{nat}Cd	DA	2GERMPM	1.4+07	2.3+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842
γ,sct	^{nat}Cd	DA	2GERMPM	1.1+07	2.8+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842

49 Indium 115

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,inel	^{115}In	DA	2GERMPM	1.4+07	1.9+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842
γ,sct	^{115}In	DA	2GERMPM	1.2+07	2.9+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842

50 Tin

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,inel	^{nat}Sn	DA	2GERMPM	1.4+07	2.4+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842
γ,sct	^{nat}Sn	DA	2GERMPM	1.1+07	2.8+07	Jour	NP/A,147,305	70	H.Arenhoevel+	M0842

82 Lead

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,fis		CS	2ZZZCER	4.4+07	1.0+09	Jour	PR/C,83,044620	Apr 11	D.Tarrio+	23151
n,fis		?	2ZZZCER	4.4+07	1.0+09	Jour	PR/C,83,044620	Apr 11	D.Tarrio+	23151

83 Bismuth 209

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,fis		CS	2ZZZCER	4.4+07	1.0+09	Jour	PR/C,83,044620	Apr 11	D.Tarrio+	23151
n,fis		?	2ZZZCER	4.4+07	1.0+09	Jour	PR/C,83,044620	Apr 11	D.Tarrio+	23151

90 Thorium 232

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,fis	n	?	2JPNTOH	2.0+06	2.0+06	Rept	INDC(NDS)-220,149	89	M.Baba+	22112

92 Uranium 235

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,fis	Many	FY	2FR SAC		1.6+07	Jour	IRE,58,(4),2064	11	F.Carrel+	M0841
n,fis		NUF	2GERKFK	Maxwl		Jour	JNE,26,165	72	H.Werle+	20616
n,fis		?	2ZZZGEL	1.5+06	2.3+06	Jour	ZP,257,108	Dec 72	H.-H.Knitter+	20394
n,fis	n	KE	2SWDAE	5.3+05	5.3+05	Jour	NSE,62,(4),695	Apr 77	P.I.Johansson+	20175
n,fis	n	KE	2GERKFK	Maxwl		Jour	JNE,26,165	72	H.Werle+	20616
n,inel	^{235}U	DE	2ZZZGEL	1.9+06	1.9+06	Jour	ZP,257,108	Dec 72	H.-H.Knitter+	20394

92 Uranium 238

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,fis	Many	FY	2FR SAC		1.9+07	Jour	IRE,58,(4),2064	11	F.Carrel+	M0841
n,fis	n	?	2JPNTOH	2.0+06	2.0+06	Rept	INDC(NDS)-220,149	89	M.Baba+	22112

94 Plutonium 239

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,fis		NUF	2GERKFK	Maxwl		Jour	JNE,26,165	72	H.Werle+	20616
n,fis	n	KE	2ZZZGEL	2.2+05	2.2+05	Jour	AKE,26,76	75	H.Knitter	20576
n,fis	n	KE	2GERKFK	Maxwl		Jour	JNE,26,165	72	H.Werle+	20616
n,fis	n	?	2ZZZGEL	2.2+05	2.2+05	Jour	AKE,26,76	75	H.Knitter	20576

98 Californium 252

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
0,fis		NUF	2GERKFK	Spont		Jour	JNE,26,165	72	H.Werle+	20616
0,fis		NUF	2AUSIRK	Spont		Jour	NSE,106,(3),367	Nov 90	A.Chalupka+	22202
0,fis	n	KE	2ZZZGEL	Spont		Jour	AKE,22,84	Oct 73	H.H.Knitter+	20401
0,fis	n	KE	2GERKFK	Spont		Jour	JNE,26,165	72	H.Werle+	20616
0,fis	n	?	2AUSATI	Spont		Rept	INDC(AUS)-4	Dec 79	F.Bensch+	21465
n,fis	n	KE	2GERKFK	2.5-02	2.5-02	Jour	JNE,26,165	72	H.Werle+	20616