EXFOR News (April 2023)

New experimental data available from Nuclear Reaction Data Centres

EXFOR [1] is a world-wide data library for experimental neutron, charged-particle and photon induced reaction data compiled by the International Network of the Nuclear Reaction Data Centres (NRDC)[a] co-ordinated by the IAEA Nuclear Data Section. Regularly updated web retrieval databases are available at IAEA-NDS as well as NNDC, NEADB, JCPRG and CDFE.

This News lists newly created EXFOR entries as well as revised EXFOR entries where new data subentries are added. Entries from articles pubslished in past 10 years are flagged by asterisks (*). Please send an email to the NRDC Coordinator (n.otsuka@iaea.org) for inclusion in the EXFOR News distribution list as well as any question on EXFOR.

[1] N. Otuka, E. Dupont, V. Semkova, B. Pritychenko et al., Nucl.Data.Sheets **120**(2014)272.

Quantity codes

ALF	α-value ($\sigma_{\rm capt}/\sigma_{\rm fis}$)	KE	Kinetic energy
AMP	Scattering length	INT	Cross section integral over incident energy
CHG	Fragment charge	KER	Kerma factor
CS	Cross section	MAS	Fragment mass
CSP	Partial cross section	MFQ	Differential fission neutron multiplicity
CST	Temperature dependent cross section	MLT	Multiplicity
D3A	Triple differential $\mathrm{d}\Omega_1/\mathrm{d}\Omega_2/\mathrm{d}E'$	NQ	Nuclear quantity
D3E	Triple differential $\mathrm{d}\Omega/\mathrm{d}E'_1/\mathrm{d}E'_2$	NU	Fission neutron multiplicity $\bar{\nu}$
D4A	Quadruple diff. $\mathrm{d}\Omega_1/\mathrm{d}\Omega_2/\mathrm{d}E'_1/\mathrm{d}E'_2$	NUD	Delayed fission neutron multiplicity $\bar{\nu_d}$
DA	Differential $\mathrm{d}/\mathrm{d}\Omega$	POL	Polarization
DAA	Double differential $\mathrm{d}\Omega_1/\mathrm{d}\Omega_2$	POD	Differential polarization
DAE	Double differential $\mathrm{d}\Omega/\mathrm{d}E'$	PY	Product yield (other than fission)
DAP	Partial differential $\mathrm{d}/\mathrm{d}\Omega$	RI	Resonance integral
DAT	Temperature-dependent Legendre coefficient	RP	Resonance parameter
DE	Differential $\mathrm{d}/\mathrm{d}E'$	RR	Reaction rate
DEP	Energy spectrum for specific group	SIF	Self indication
DP	Diff. by linear momentum of outgoing part.	SPC	Gamma spectrum
DT	Diff. by 4-momentum transfer squared	TSL	Thermal scattering
ETA	η-value = $\bar{\nu}\sigma_{\rm fis}/(\sigma_{\rm capt}+\sigma_{\rm fis})$	TT	Thick target yield
EVL	Evaluation	TTD	Differential thick target yield, $\mathrm{d}/\mathrm{d}\Omega$
FY	Fission product yield	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), NDPCI (India), JAEA (Japan), JCPRG (Japan), KAERI (Korea), CDFE (Russia), CNPD (Russia), UkrNDC (Ukraine)

4 Beryllium 7

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,α	^{4}He	CS	2JPNIPC	4.5+04	2.0+06	Jour	AJ,915,L13	21	S.Hayakawa+	23652
*	n,p	^{7}Li	CSP	2JPNIPC	1.7+05	2.4+06	Jour	AJ,915,L13	21	S.Hayakawa+	23652

5 Boron 10

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,α	^{7}Li	DAP	1USALAS	1.6+06	2.0+07	Jour	PR/C,105,054612	22	T.N.Massey+	14663
*	n,d	^{9}Be	DAP	1USALAS	7.0+06	1.7+07	Jour	PR/C,105,054612	22	T.N.Massey+	14663
*	n,p	^{10}Be	DAP	1USALAS	1.2+06	1.0+07	Jour	PR/C,105,054612	22	T.N.Massey+	14663
*	n,t	^{8}Be	DAP	1USALAS	1.8+06	1.8+07	Jour	PR/C,105,054612	22	T.N.Massey+	14663
	p,el	^{10}B	DA	2ITYFIR	8.0+05	3.3+06	Jour	NIM/B,184,309	01	M.Chiari+	O0922

5 Boron 11

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,el	^{11}B	DA	2ITYFIR	8.0+05	3.3+06	Jour	NIM/B,184,309	01	M.Chiari+	O0922

8 Oxygen 16

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,inel	^{16}O	CSP	1USACLA	1.6+07	4.7+07	Jour	PR/C,3,1514	71	S.M.Austin+	O0025

13 Aluminium 27

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,x	^{24}Na	CS	4RUSITE	3.6+07	2.6+09	Rept	ISTC-2002	04	Yu.E.Titarenko+	O1728

14 Silicon

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,x	Many	DE	2JPNTOH	1.5+07	1.5+07	Conf	88MITO,,1053	88	K.Yageta+	23760

26 Iron 56

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,d	^{55}Fe	POD	2NEDENT	2.5+07	2.5+07	Jour	JP/G,15,1735	89	J.H.Polane+	O0038

32 Germanium 74

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	$n,0$		RP	2ZZZCER			Jour	EPJ/A,58,239	22	C.Lederer-Woods+	23651
*	n,γ	^{75}Ge	CS	2ZZZCER	Maxwl	7.0+04	Jour	EPJ/A,58,239	22	C.Lederer-Woods+	23651

37 Rubidium 88

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{89}Rb	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

38 Strontium 88

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{89}Sr	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011
	p,γ	^{89}Y	CS	2GERTHS	1.4+06	4.9+06	Jour	PR/C,67,015801	03	S.Galanopoulos+	O1054

38 Strontium 89

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{90}Sr	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

39 Yttrium 91

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{92}Y	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

40 Zirconium 90

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{91}Zr	CS	2JPNTIT	1.6+04	5.5+05	Conf	2005NOTRED,,373	05	K.Ohgama+	22960

40 Zirconium 91

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{92}Zr	CS	2JPNTIT	1.5+04	5.5+05	Jour	NST,42,333	05	K.Ohgama+	22897
	n,γ	^{92}Zr	MLT	2JPNTIT	4.8+04	5.5+05	Jour	NST,42,333	05	K.Ohgama+	22897
	n,γ	^{92}Zr	PY	2JPNTIT	4.8+04	5.5+05	Jour	NST,42,333	05	K.Ohgama+	22897

40 Zirconium 92

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{93}Zr	CS	2JPNTIT	1.5+04	5.5+05	Jour	NST,42,333	05	K.Ohgama+	22897
	n,γ	^{93}Zr	MLT	2JPNTIT	4.8+04	5.5+05	Jour	NST,42,333	05	K.Ohgama+	22897
	n,γ	^{93}Zr	PY	2JPNTIT	4.8+04	5.5+05	Jour	NST,42,333	05	K.Ohgama+	22897

40 Zirconium 94

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{95}Zr	CS	2JPNTIT	1.5+04	5.5+05	Conf	2005NOTRED,,373	05	K.Ohgama+	22960

41 Niobium 93

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,0		RP	2JPNJAE			Jour	NST,59,318	22	S.Endo+	23605
*	n,γ	^{94}Nb	CS	2JPNJAE	1.0-02	4.5+02	Jour	NST,59,318	22	S.Endo+	23605
*	n,tot		CS	2JPNJAE	1.0-02	4.5+02	Jour	NST,59,318	22	S.Endo+	23605

43 Technetium 99

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,γ	^{100}Tc	CS	2JPNTOK	8.5+04	8.5+04	Jour	NST,58,1318	21	S.Nakamura+	23749

53 Iodine 129

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{130}I	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011
	n,γ	^{130}I	RI	1CANCRC		6.0-01	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

53 Iodine 130

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{131}I	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

55 Cesium 133

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{134}Cs	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

55 Cesium 134

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{135}Cs	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

55 Cesium 135

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{136}Cs	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011
n,γ	^{136}Cs	RI	1CANCRC		6.0-01	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

59 Praesodymium 143

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{144}Pr	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

66 Dysprosium 161

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{162}Dy	CS	2JPNKTO	3.2-03	2.1+05	Conf	2002BRUSS,,613	02	G.N.Kim+	23750

66 Dysprosium 163

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{164}Dy	CS	2JPNKTO	3.2-03	2.1+05	Conf	2002BRUSS,,613	02	G.N.Kim+	23750

91 Protactinium 233

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{234}Pa	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011
	n,γ	^{234}Pa	RI	1CANCRC		6.0-01	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

92 Uranium 233

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,fis	Many	FY	1CANCRC	2.5-02	2.5-02	Book	PR.NUC.EN.,3,(1),261	59	D.Bidinosti+	12010

92 Uranium 235

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,fis		CS	2ZZZCER	2.5-02	2.0+03	Jour	EPJ/A,55,120	19	S.Amaducci+	23453
*	n,fis		INT	2ZZZCER	7.8+00	1.1+01	Jour	EPJ/A,55,120	19	S.Amaducci+	23453

92 Uranium 236

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{237}U	CS	1CANCRC	2.5-02	2.5-02	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011
	n,γ	^{237}U	RI	1CANCRC		6.0-01	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

92 Uranium 238

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,fis		CS	2GERPTB	2.5+06	1.5+07	Jour	EPJ/A,58,227	22	F.Belloni+	23653

93 Neptunium 237

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,γ	^{238}Np	CS	2JPNJAE	1.0-02	4.7+05	Jour	NST,59,110	22	G.Rovira+	23601

94 Plutonium 238

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,fis		RI	1CANCRC		6.0-01	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

94 Plutonium 239

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,fis	Many	FY	1CANCRC	2.5-02	2.5-02	Book	PR.NUC.EN.,3,(1),261	59	D.Bidinosti+	12010

94 Plutonium 240

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,0		RP	2JPNJAE			Jour	NST,58,764	21	S.Kawase+	23741
*	n,fis		CS	2GERPTB	2.5+06	1.5+07	Jour	EPJ/A,58,227	22	F.Belloni+	23653
	n,fis		RI	1CANCRC		6.0-01	Conf	58GENEVA,16,54(203)	58	T.A.Eastwood+	12011

94 Plutonium 242

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,fis		CS	2GERPTB	2.5+06	1.5+07	Jour	EPJ/A,58,227	22	F.Belloni+	23653

95 Americium 243

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,γ	^{244}Am	CS	2JPNJAE	2.2+04	2.5+04	Jour	NST,58,1159	21	Y.Kodama+	23748

96 Curium 244

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,0		RP	2JPNJAE			Jour	NST,58,764	21	S.Kawase+	23741
*	n,γ	^{245}Cm	CS	2JPNJAE	6.1-01	1.0+03	Jour	NST,58,764	21	S.Kawase+	23741

96 Curium 246

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,0		RP	2JPNJAE			Jour	NST,58,764	21	S.Kawase+	23741

*	n,γ	^{247}Cm	CS	2JPNJAE	6.1-01	1.0+03	Jour	NST,58,764	21	S.Kawase+	23741

96 Curium 248

	Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation	Date	Author	Data #
					Min	Max		Ref Vol Page			
*	n,0		RP	2JPNJAE			Jour	NST,58,764	21	S.Kawase+	23741