EXFOR News (February 2022)

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)

1 Hydrogen 1

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	^{8}B,el	^{1}H	?	1USATAM			Jour	PR/C,100,054618	19	J.Hooker+	C2423
*	^{34}S,γ		RP	1CANTMF	2.7+02	5.0+02	Jour	PR/C,103,055801	21	M.Lovely+	C2629

1 Hydrogen 2

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	^{26}Mg,p	^{27}Mg	?	1USANOT	1.6+08	1.6+08	Jour	PR/C,103,064320	21	D.G.Mcneel+	C2641

1 Hydrogen 3

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	^{26}Mg,p	^{28}Mg	?	1USANOT	1.6+08	1.6+08	Jour	PR/C,103,064320	21	D.G.Mcneel+	C2641

2 Helium 3

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	α,γ	^{7}Be	CS	2ITYCAT		2.3+04	Jour	PL/B,807,135606	20	G.G.Kiss+	C2598

3 Lithium 6

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	^{3}He,d	^{7}Be	DAP	2ITYCAT	3.0+06	5.0+06	Jour	PL/B,807,135606	20	G.G.Kiss+	C2598

6 Carbon 13

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	α,n	^{16}O	CSP	1USANOT	1.1+06	6.1+06	Jour	PRL,125,062501	20	M.Febbraro+	C2579
*	α,n	^{16}O	DAP	1USANOT	5.2+06	6.3+06	Jour	PRL,125,062501	20	M.Febbraro+	C2579

7 Nitrogen 15

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	p,α	^{12}C	DAP	1USANOT	8.9+05	3.9+06	Jour	PR/C,103,065801	21	R.J.Deboer+	C2642

9 Fluorine 19

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	p,γ		RP	1CANTMF	3.2+05	3.2+05	Jour	PR/C,103,055805	21	M.Williams+	C2630
*	p,γ	^{20}Ne	RR	1CANTMF			Jour	PR/C,103,055805	21	M.Williams+	C2630

11 Sodium 23

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,α	^{20}F	DAP	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,α	^{20}F	?	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,inel	^{23}Na	DAP	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,inel	^{23}Na	?	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,x	^{22}Ne	DAP	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,x	^{22}Ne	?	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745

12 Magnesium 24

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	^{3}He,p	^{26}Al	DAP	1USAANL	1.0+07	1.0+07	Jour	PL/B,813,136033	21	A.Kankainen+	C2632

13 Aluminium 27

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,el	^{27}Al	CS	1USAANL	2.5-02	2.5-02	Rept	CP-1827,10	44	E.Bragdon	14706
	p,x	^{24}Na	CS	1CANMCG	2.7+07	8.6+07	Thes	MEGHIR	Jun 62	S.Meghir	B0016

17 Chlorine

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,x+γ	inclusive	?	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745

17 Chlorine 35

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,α	^{32}P	CS	4ZZZDUB	3.3+06	5.3+06	Jour	PR/C,104,044620	21	E.Sansarbayar+	41744
*	n,α	^{32}P	CSP	4ZZZDUB	4.8+06	5.3+06	Jour	PR/C,104,044620	21	E.Sansarbayar+	41744
*	n,α	^{32}P	?	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,inel	^{35}Cl	DAP	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,inel	^{35}Cl	?	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,p	^{35}S	?	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,x	^{34}S	DAP	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,x	^{34}S	?	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745

17 Chlorine 37

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	$n,2n$	^{36}Cl	?	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745
*	n,inel	^{37}Cl	?	4ZZZDUB	1.4+07	1.4+07	Jour	IZV,85,1410	21	S.B.Dabylova+	41745

18 Argon 40

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	^{8}B,fus		CS	1USATAM	1.6+07	2.4+07	Jour	PL/B,816,136256	21	J.C.Zamora+	C2633

22 Titanium 50

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	d,p	^{51}Ti	DAP	1USAFSU	1.6+07	1.6+07	Jour	PR/C,103,064309	21	L.A.Riley+	C2638

25 Manganese

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,tot		CS	1USACOL			Jour	PR,75,895	49	I.W.Ruderman+	14707

25 Manganese 55

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,ths	^{55}Mn	TSL	1USACOL			Jour	PR,75,895	49	I.W.Ruderman+	14707

26 Iron

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,el	^{nat}Fe	CS	1USAANL	2.5-02	2.5-02	Rept	CP-1827,10	44	E.Bragdon	14706

28 Nickel

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,el	^{nat}Ni	CS	1USAANL	2.5-02	2.5-02	Rept	CP-1827,10	44	E.Bragdon	14706

29 Copper

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,el	^{nat}Cu	CS	1USAANL	2.5-02	2.5-02	Rept	CP-1827,10	44	E.Bragdon	14706

29 Copper 65

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,x	^{64}Cu	CS	1CANMCG	2.1+07	8.6+07	Thes	MEGHIR	Jun 62	S.Meghir	B0016

41 Niobium 93

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	p,4n	^{90}Mo	CS	1USALAS	5.2+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,n	^{93}Mo	CS	1USALAS	5.2+07	9.1+07	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{73}As	CS	1USALAS	1.8+08	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{74}As	CS	1USALAS	1.8+08	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{72}Se	CS	1USALAS	1.8+08	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{75}Se	CS	1USALAS	1.5+08	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{81}Rb	CS	1USALAS	9.1+07	9.1+07	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{82}Rb	CS	1USALAS	7.9+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{83}Rb	CS	1USALAS	6.0+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{84}Rb	CS	1USALAS	5.4+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{86}Rb	CS	1USALAS	1.8+08	1.8+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{83}Sr	CS	1USALAS	6.3+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{85}Y	CS	1USALAS	7.3+07	9.1+07	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{86}Y	CS	1USALAS	5.7+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{87}Y	CS	1USALAS	5.2+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{88}Y	CS	1USALAS	5.2+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{86}Zr	CS	1USALAS	5.6+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{88}Zr	CS	1USALAS	5.2+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{89}Zr	CS	1USALAS	5.2+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{90}Nb	CS	1USALAS	5.2+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631

*	p,x	^{91}Nb	CS	1USALAS	5.2+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631
*	p,x	^{92}Nb	CS	1USALAS	5.2+07	1.9+08	Jour	PR/C,103,034601	21	M.B.Fox+	C2631

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	SPC	4RUSLIN	2.5-02	2.5-02	Jour	NP/A,248,249	75	V.L.Alexeev+	40299
n,γ	^{134}Cs	?	4RUSLIN	2.5-02	2.5-02	Jour	NP/A,248,249	75	V.L.Alexeev+	40299
n,inel	^{133}Cs	?	4RUSLIN	2.5-02	2.5-02	Jour	NP/A,248,249	75	V.L.Alexeev+	40299
n,x	^{134}Ba	SPC	4RUSLIN	2.5-02	2.5-02	Jour	NP/A,248,249	75	V.L.Alexeev+	40299
n,x	^{134}Ba	?	4RUSLIN	2.5-02	2.5-02	Jour	NP/A,248,249	75	V.L.Alexeev+	40299

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	?	4RUSLIN	2.5-02	2.5-02	Jour	NP/A,248,249	75	V.L.Alexeev+	40299

74 Tungsten 184

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{185}W	CS	2GERKFK	Maxwl		Jour	PR/C,80,025804	09	J.Marganiec+	14248

74 Tungsten 186

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{187}W	CS	2GERKFK	Maxwl		Jour	PR/C,80,025804	09	J.Marganiec+	14248

76 Osmium

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,el	^{nat}Os	CS	1USAANL	2.5-02	2.5-02	Rept	CP-1827,10	44	E.Bragdon	14706

82 Lead

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,el	^{nat}Pb	CS	1USAANL	2.5-02	2.5-02	Rept	CP-1827,10	44	E.Bragdon	14706

82 Lead 208

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	^{8}B,x	^{7}Be	CS	1USANOT	3.0+07	3.0+07	Jour	PR/C,102,031601	20	A.Pakou+	C2581
*	^{8}B,x	^{7}Be	DA	1USANOT	3.0+07	3.0+07	Jour	PR/C,102,031601	20	A.Pakou+	C2581
*	^{10}C,el	^{208}Pb	DA	1USATAM	6.6+07	6.6+07	Jour	PR/C,103,044613	21	R.Linares+	C2627

90 Thorium 232

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	p,3n	^{230}Pa	TT	1USALAS	1.9+07	2.7+07	Jour	ARI,156,108973	20	M.T.Friend+	C2457

92 Uranium 235

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,fis		DEP	4RUSFEI	2.9+00	2.9+00	Jour	YK,,(3),11	21	A.S.Egorov+	41742

92 Uranium 238

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ	^{239}U	CS	1USAANL	Maxwl		Rept	CP-2079	44	H.L.Anderson+	12445

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	4RUSMIF	3.0+06	3.0+06	Jour	SJA,53,576	82	A.G.Golovanov+	41743
	n,sct	^{239}Pu	DAP	1USAANL	5.5+05	1.0+06	Jour	JNE,27,317	73	A.Smith+	10212

102 Nobelium 252

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	0,fis		KE	4ZZZDUB	Spont		Jour	PPN/L,18,449	21	A.V.Isaev+	41741
*	0,fis		NU	4ZZZDUB	Spont		Jour	PPN/L,18,449	21	A.V.Isaev+	41741

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	0,fis		KE	4ZZZDUB	Spont		Jour	PPN/L,18,449	21	A.V.Isaev+	41741
*	0,fis		NU	4ZZZDUB	Spont		Jour	PPN/L,18,449	21	A.V.Isaev+	41741