EXFOR News (April 2021)

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	Length or amplitude	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 2

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation	Date	Author	Data #
				Min	Max		Ref Vol Page			
d,n	^{3}He	DA	1USAWIS	4.8+06	1.3+07	Jour	NP,27,421	61	W.E.Wilson+	A1159
d,n+p	^{2}H	DA	1USAWIS	8.9+06	1.3+07	Jour	NP,27,421	61	W.E.Wilson+	A1159

1 Hydrogen 3

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation	Date	Author	Data #
				Min	Max		Ref Vol Page			
p,n	^{3}He	DA	1USALAS	1.5+06	5.5+06	Priv	PERRY	59	J.E.Perryjr+	A0152
p,n	^{3}He	DA	1USAWIS	4.9+06	1.3+07	Jour	NP,27,421	61	W.E.Wilson+	A1159
p,n+p	^{2}H	DA	1USAWIS	1.2+07	1.2+07	Jour	NP,27,421	61	W.E.Wilson+	A1159

2 Helium 3

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation	Date	Author	Data #
				Min	Max		Ref Vol Page			
d,p	^{4}He	CS	2UK OXF	1.1+05	5.0+05	Jour	PPS/A,70,863	57	D.L.Booth+	O2483
d,p	^{4}He	DA	2SWTETH	1.0+06	1.3+07	Jour	FBS,9,165	90	M.Bittcher+	O2484
d,p	^{4}He	DA	2UK OXF	1.1+05	5.0+05	Jour	PPS/A,70,863	57	D.L.Booth+	O2483
d,p	^{4}He	DA	1USACAL	7.9+04	9.0+05	Jour	PR/C,4,1532	71	M.R.Dwarakanath+	A1066
d,p	^{4}He	POD	2SWTETH	1.0+06	1.3+07	Jour	FBS,9,165	90	M.Bittcher+	O2484

3 Lithium 7

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation	Date	Author	Data #
				Min	Max		Ref Vol Page			
d,n	^{8}Be	CSP	2SPNSPN	1.1+06	1.1+06	Jour	NCS,9,377	58	J.Catala+	O2486
d,n	^{8}Be	DAP	2SPNSPN	1.1+06	1.1+06	Jour	NCS,9,377	58	J.Catala+	O2486

4 Berylium 9

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation	Date	Author	Data #
				Min	Max		Ref Vol Page			
p,α	^{6}Li	DAP	1USAFSU	6.0+06	1.2+07	Jour	NP,49,209	63	H.R.Blieden+	F0167
p,el	^{9}Be	DA	1USAFSU	6.0+06	8.0+06	Jour	NP,49,209	63	H.R.Blieden+	F0167
p,inel	^{9}Be	DAP	2JPNKTO	4.2+06	6.1+06	Jour	JPJ,36,1254	74	M.Yasue	F0135

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	CS	1USALAS	6.5+05	5.3+06	Jour	NDS,119,107	14	T.N.Massey+	14663
*	n,α	^{7}Li	CSP	1USALAS	6.5+05	5.3+06	Jour	NDS,119,107	14	T.N.Massey+	14663
*	n,p	^{10}Be	CS	1USALAS	1.2+06	5.3+06	Jour	NDS,119,107	14	T.N.Massey+	14663

5 Boron 11

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
^{12}C,el	^{11}B	DA	2FR PAR	8.7+07	8.7+07	Jour	NP/A,165,118	71	M.Liu+	O2485
^{14}N,^{10}Be	^{15}O	DAP	2FR PAR	4.1+07	1.1+08	Jour	NP/A,165,118	71	M.Liu+	O2485
^{14}N,^{12}C	^{13}C	DAP	2FR PAR	4.1+07	1.1+08	Jour	NP/A,165,118	71	M.Liu+	O2485
^{14}N,el	^{11}B	DA	2FR PAR	4.1+07	1.1+08	Jour	NP/A,165,118	71	M.Liu+	O2485

6 Carbon 12

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,tot		CS	2JPNJAE	1.1+07	2.5+08	Rept	JAERI-M-6883	77	K.Nishimura+	20302
^{12}C,el	^{12}C	DA	2FR PAR	8.7+07	8.7+07	Jour	NP/A,165,118	71	M.Liu+	O2485

6 Carbon 13

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
^{12}C,el	^{13}C	DA	2FR PAR	8.7+07	8.7+07	Jour	NP/A,165,118	71	M.Liu+	O2485

13 Aluminium 27

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
α,el	^{27}Al	DA	4RUSMOS	3.0+07	3.0+07	Jour	IZV,61,2102	97	A.V.Ignatenko+	F1431
α,t	^{28}Si	DAP	4RUSMOS	3.0+07	3.0+07	Jour	IZV,61,2102	97	A.V.Ignatenko+	F1431
^{20}Ne,x	Many	CS	4ZZZDUB			Jour	ZET,45,904	63	V.V.Bredel'+	F1434
^{20}Ne,x	^{44}Sc	CS	4ZZZDUB			Jour	ZET,45,904	63	V.V.Bredel'+	F1434
^{22}Ne,x	Many	CS	4ZZZDUB			Jour	ZET,45,904	63	V.V.Bredel'+	F1434
^{22}Ne,x	^{44}Sc	CS	4ZZZDUB			Jour	ZET,45,904	63	V.V.Bredel'+	F1434
^{40}Ar,x	^{44}Sc	?	4ZZZDUB	2.7+08	2.7+08	Jour	ZET,46,2017	64	V.A.Fomichev+	F1433

16 Sulphur 32

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

n,α	^{29}Si	CS	2FR ILL	Maxwl		Conf	92KARLSR,,247	92	C.Wagemans+	23735
^{16}O,x	Many	CS	4ZZZDUB			Jour	ZET,45,904	63	V.V.Bredel'+	F1434
^{16}O,x	^{44}Sc	CS	4ZZZDUB			Jour	ZET,45,904	63	V.V.Bredel'+	F1434

16 Sulphur 33

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,α	^{30}Si	CS	2FR ILL	Maxwl		Conf	92KARLSR,,247	92	C.Wagemans+	23735
	$n,\gamma+\alpha$	^{30}Si	CSP	2FR ILL	Maxwl		Conf	92KARLSR,,247	92	C.Wagemans+	23735

18 Argon 40

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,el	^{40}Ar	DA	1USACAL	4.1+05	2.0+06	Jour	PR/C,4,1532	71	M.R.Dwarakanath+	A1066

21 Scandium 44

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	^{22}Ne,x	Many	CS	4ZZZDUB	8.3+07	1.6+08	Jour	ZET,46,2017	64	V.A.Fomichev+	F1433

21 Scandium 45

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	^{16}O,x	^{44}Sc	CS	4ZZZDUB	2.1+07	8.3+07	Jour	ZET,46,2017	64	V.A.Fomichev+	F1433
	^{22}Ne,x	^{44}Sc	CS	4ZZZDUB	6.3+07	1.7+08	Jour	ZET,46,2017	64	V.A.Fomichev+	F1433

26 Iron 54

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,0		RP	2ZZZCER			Jour	NDS,119,117	14	G.Giubrone+	23734
*	n,γ	^{55}Fe	CS	2ZZZCER	Maxwl	1.0+06	Jour	NDS,119,117	14	G.Giubrone+	23734

26 Iron 57

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	n,0		RP	2ZZZCER			Jour	NDS,119,117	14	G.Giubrone+	23734
*	n,γ	^{58}Fe	CS	2ZZZCER	Maxwl	2.5-02	Jour	NDS,119,117	14	G.Giubrone+	23734

28 Nickel 58

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	^{3}He,α	^{57}Ni	DAP	4RUSKUR	3.6+07	3.6+07	Jour	YF,10,911	69	K.P.Artemov+	F1432

28 Nickel 60

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	^{3}He,α	^{59}Ni	DAP	4RUSKUR	3.6+07	3.6+07	Jour	YF,10,911	69	K.P.Artemov+	F1432

28 Nickel 62

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	^{3}He,α	^{61}Ni	DAP	4RUSKUR	3.6+07	3.6+07	Jour	YF,10,911	69	K.P.Artemov+	F1432

28 Nickel 64

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	^{3}He,α	^{63}Ni	DAP	4RUSKUR	3.6+07	3.6+07	Jour	YF,10,911	69	K.P.Artemov+	F1432

36 Krypton 82

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	^{3}He,x	^{82}Sr	CS	4RUSKUR	2.0+07	7.5+07	Jour	AE,126,272	19	V.A.Zagryadskii+	F1435

36 Krypton 83

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	^{3}He,x	^{82}Sr	CS	4RUSKUR	3.3+07	7.5+07	Jour	AE,126,272	19	V.A.Zagryadskii+	F1435

36 Krypton 84

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	^{3}He,x	^{82}Sr	CS	4RUSKUR	4.3+07	7.5+07	Jour	AE,126,272	19	V.A.Zagryadskii+	F1435

57 Lanthanum 139

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,el		RP	2JPNJAE	2.0+04	2.4+05	Rept	JAERI-M-6883	77	K.Nishimura+	20302
n,tot		CS	2JPNJAE	2.0+07	2.4+08	Rept	JAERI-M-6883	77	K.Nishimura+	20302

59 Praesodymium 141

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,el		RP	2JPNJAE	2.0+04	2.4+05	Rept	JAERI-M-6883	77	K.Nishimura+	20302
n,tot		CS	2JPNJAE	2.0+07	2.4+08	Rept	JAERI-M-6883	77	K.Nishimura+	20302

62 Samarium 149

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ		RP	1USALAS	4.4+04	9.1+04	Jour	PR/C,76,025804	07	P.E.Koehler+	14306

83 Bismuth 209

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
^{6}Li,fis		CS	1USAROC	2.7+07	3.4+07	Conf	73ROCH,1,447	73	H.Freiesleben+	A0118
^{7}Li,fis		CS	1USAROC	2.7+07	3.4+07	Conf	73ROCH,1,447	73	H.Freiesleben+	A0118

92 Uranium 233

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,fis		CS	2ZZZGEL	1.0+06	8.5+06	Jour	NP/A,733,3	04	F.Tovesson+	22698
n,fis	Many	FY	1USAMTR	2.5-02	2.5-02	Rept	IDO-14678	66	W.J.Maeck+	13848
n,fis	Many	?	1USAUI	2.5-02	2.5-02	Jour	ANS,35,551	80	B.W.Wehring+	10918
n,fis	^{99}Tc	FY	1USAMTR	2.5-02	2.5-02	Rept	IDO-14678	66	W.J.Maeck+	13848
n,fis	^{106}Ru	FY	1USAMTR	2.5-02	2.5-02	Rept	IDO-14678	66	W.J.Maeck+	13848

92 Uranium 235

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,abs		ALF	1USAMTR	2.5-02	2.5-02	Rept	IDO-14678	66	W.J.Maeck+	13848
n,fis	Many	FY	1USAINL	2.5-02	2.5-02	Rept	ICP-1142	78	W.J.Maeck+	10865
n,fis	Many	FY	1USAINL	2.5-02	2.5-02	Jour	NSE,42,191	70	F.L.Lisman+	13270

n,fis	Many	FY	1USAMTR	2.5-02	2.5-02	Rept	IDO-14678	66	W.J.Maeck+	13848
n,fis		MAS	1USAANL	1.7+05	8.1+06	Jour	PR/C,24,2600	81	L.E.Glendenin+	12729
n,fis	Many	?	1USAINL	Fast		Jour	NSE,42,191	70	F.L.Lisman+	13270
n,fis	^{77}As	FY	1USAANL	2.5-02	2.5-02	Book	RCS,2,566(54)	51	E.P.Steinberg+	13417
n,fis	^{99}Tc	FY	1USAMTR	2.5-02	2.5-02	Rept	IDO-14678	66	W.J.Maeck+	13848
n,fis	^{106}Ru	FY	1USAMTR	2.5-02	2.5-02	Rept	IDO-14678	66	W.J.Maeck+	13848
n,fis	^{141}Ba	FY	1USAANL	2.5-02	2.5-02	Book	RCS,2,1188	51	A.Goldstein+	14639
n,fis	^{141}Ba	?	1USAANL	2.5-02	2.5-02	Book	RCS,2,1188	51	A.Goldstein+	14639
n,fis	^{141}La	FY	1USAANL	2.5-02	2.5-02	Book	RCS,2,1188	51	A.Goldstein+	14639
n,fis	^{145}Ce	?	1USAMIT	2.5-02	2.5-02	Jour	BAP,16,516(BH2)	71	J.L.Fasching+	13437

94 Plutonium 239

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation	Date	Author	Data #
				Min	Max		Ref Vol Page			
n,fis	Many	FY	1USAINL	2.5-02	2.5-02	Jour	NSE,42,191	70	F.L.Lisman+	13270
n,fis	Many	?	1USAINL	2.5-02	2.5-02	Jour	NSE,42,191	70	F.L.Lisman+	13270
n,fis	^{135}Xe	?	1USAINL	2.5-02	2.5-02	Rept	ENICO-1001	79	W.J.Maeck+	10898

94 Plutonium 241

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation	Date	Author	Data #
				Min	Max		Ref Vol Page			
n,fis	Many	?	1USAINL	2.5-02	2.5-02	Jour	NSE,42,191	70	F.L.Lisman+	13270

100 Fermium 254

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation	Date	Author	Data #
				Min	Max		Ref Vol Page			
0,fis	Many	FY	1USASRL	Spont		Jour	PR/C,8,1488	73	R.M.Harbour+	13310