EXFOR News (May 2019)

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 (Naohiko Otsuka 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 et al., Nucl.Data.Sheets **120**(2014)272.

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), NDPCI (India), JAEA (Japan), JCPRG (Japan), KAERI (Korea), CDFE (Russia), CNPD (Russia), UkrNDC (Ukraine)

0 Neutron 1

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,el	n	DA	4ZZZDUB	4.6+08	6.6+08	Jour	ZET,32,440	57	G.A.Leksin	F1381

1 Hydrogen 1

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,el	^{1}H	DA	4ZZZDUB	6.6+08	6.6+08	Jour	ZET,32,440	57	G.A.Leksin	F1381
p,el	^{1}H	POD	4ZZZDUB	6.4+08	6.4+08	Jour	ZET,33,37	58	M.G.Mescheriakov+	F1382

1 Hydrogen 2

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,el	^{2}H	DA	4ZZZDUB	6.6+08	6.6+08	Jour	ZET,32,440	57	G.A.Leksin	F1381

3 Lithium 6

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
^{3}He,el	^{6}Li	DA	4KASKAZ	5.0+07	6.0+07	Jour	YF,44,312	86	V.N.Bragin+	F0777
α,el	^{6}Li	DA	4KASKAZ	5.0+07	5.0+07	Jour	YF,44,312	86	V.N.Bragin+	F0777

3 Lithium 7

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
α,t	^{8}Be	DAP	4RUSKUR	4.0+07	4.0+07	Jour	ZET,39,1468	60	N.A.Vlasov+	F1376
^{14}N,x	^{16}N	CS	4RUSFTI	1.6+07	1.6+07	Jour	ZET,33,1160	57	D.G.Alkhazov+	F1380
^{14}N,x	^{15}O	CS	4RUSFTI	1.6+07	1.6+07	Jour	ZET,33,1160	57	D.G.Alkhazov+	F1380
^{14}N,x	^{18}F	CS	4RUSFTI	1.6+07	1.6+07	Jour	ZET,33,1160	57	D.G.Alkhazov+	F1380
^{14}N,x	^{19}Ne	CS	4RUSFTI	1.6+07	1.6+07	Jour	ZET,33,1160	57	D.G.Alkhazov+	F1380

4 Beryllium 9

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
α,t	^{10}B	DAP	4RUSKUR	4.0+07	4.0+07	Jour	ZET,39,1468	60	N.A.Vlasov+	F1376

5 Boron 11

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,α	^{9}Be	DAP	4RUSSUL	6.6+06	6.6+06	Jour	ZET,46,1473	64	K.A.Gridnev+	F1371

6 Carbon 12

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
t,α	^{11}B	CS	4ZZZDUB	4.2+05	1.1+06	Jour	ZET,44,1450	63	K.Niedzwiedziuk+	F1375
t,α	^{11}B	DAP	4ZZZDUB	2.8+05	1.2+06	Jour	ZET,44,1450	63	K.Niedzwiedziuk+	F1375
α,p	^{15}N	DAP	4RUSMOS	2.1+07	2.6+07	Jour	ZET,48,385	65	I.B.Teplov+	F1372
^{14}N,x	^{25}Al	CS	4RUSFTI	1.6+07	1.6+07	Jour	ZET,33,1160	57	D.G.Alkhazov+	F1380

8 Oxygen 16

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,α	^{14}N	DAP	4RUSSUL	6.6+06	6.6+06	Jour	ZET,46,1473	64	K.A.Gridnev+	F1371

10 Neon 22

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,p	^{23}Ne	DAP	4RUSMOS	4.0+06	4.0+06	Jour	ZET,36,1377	59	V.G.Sukharevskii	F1379

11 Sodium 23

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
α,t	^{24}Mg	DAP	4RUSKUR	4.0+07	4.0+07	Jour	ZET,39,1468	60	N.A.Vlasov+	F1376

13 Aluminium 27

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,el	^{27}Al	DA	4RUSMOS	6.6+06	6.6+06	Jour	ZET,40,972	61	S.S.Vasil'Ev+	F1373
p,inel	^{27}Al	DAP	4RUSMOS	6.6+06	6.6+06	Jour	ZET,40,972	61	S.S.Vasil'Ev+	F1373

18 Argon 36

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,p	^{37}Ar	DAP	4RUSMOS	4.0+06	4.0+06	Jour	ZET,36,1377	59	V.G.Sukharevskii	F1379

26 Iron 56

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,x+t	inclusive	DAE	4RUSKUR	2.0+07	2.0+07	Jour	ZET,38,280	60	N.A.Vlasov+	F1378

28 Nickel 58

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,el	^{58}Ni	DA	4RUSSUL	6.5+06	6.5+06	Jour	ZET,47,855	64	V.P.Bochin+	F1374

28 Nickel 60

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,el	^{60}Ni	DA	4RUSSUL	6.5+06	6.5+06	Jour	ZET,47,855	64	V.P.Bochin+	F1374

28 Nickel 62

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,el	^{62}Ni	DA	4RUSSUL	6.5+06	6.5+06	Jour	ZET,47,855	64	V.P.Bochin+	F1374

28 Nickel 64

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,el	^{64}Ni	DA	4RUSSUL	6.5+06	6.5+06	Jour	ZET,47,855	64	V.P.Bochin+	F1374

30 Zinc 64

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,el	^{64}Zn	DA	4RUSSUL	6.5+06	6.5+06	Jour	ZET,47,855	64	V.P.Bochin+	F1374

30 Zinc 66

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,el	^{66}Zn	DA	4RUSSUL	6.5+06	6.5+06	Jour	ZET,47,855	64	V.P.Bochin+	F1374

30 Zinc 67

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,el	^{67}Zn	DA	4RUSSUL	6.5+06	6.5+06	Jour	ZET,47,855	64	V.P.Bochin+	F1374

30 Zinc 68

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,el	^{68}Zn	DA	4RUSSUL	6.5+06	6.5+06	Jour	ZET,47,855	64	V.P.Bochin+	F1374
d,p	^{69}Zn	CS	4RUSRI	2.4+06	9.0+06	Jour	ZET,35,1355	58	K.I.Zherebtsova+	F1384

30 Zinc 70

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,el	^{70}Zn	DA	4RUSSUL	6.5+06	6.5+06	Jour	ZET,47,855	64	V.P.Bochin+	F1374

31 Gallium 71

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,α	^{69}Zn	CS	4RUSRI	3.4+06	7.9+06	Jour	ZET,35,1355	58	K.I.Zherebtsova+	F1384

34 Selenium 80

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
^{16}O,x	^{93}Mo	CS	4RUSKUR	4.2+07	8.0+07	Jour	ZET,36,1374	58	A.S.Karamyan+	F1370

40 Zirconium 90

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,x+t	inclusive	DAE	4RUSKUR	2.0+07	2.0+07	Jour	ZET,38,280	60	N.A.Vlasov+	F1378

49 Indium 115

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	d,x+t	inclusive	DAE	4RUSKUR	2.0+07	2.0+07	Jour	ZET,38,280	60	N.A.Vlasov+	F1378

79 Gold 197

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	d,x+t	inclusive	DAE	4RUSKUR	2.0+07	2.0+07	Jour	ZET,38,280	60	N.A.Vlasov+	F1378
	^{14}N,x	^{205}Rn	CS	4RUSJIA	7.3+07	1.2+08	Jour	ZET,32,1294	57	S.A.Baraboshkin+	F1383
	^{14}N,x	^{206}Rn	CS	4RUSJIA	6.7+07	1.2+08	Jour	ZET,32,1294	57	S.A.Baraboshkin+	F1383
	^{14}N,x	^{207}Rn	CS	4RUSJIA	7.2+07	1.1+08	Jour	ZET,32,1294	57	S.A.Baraboshkin+	F1383

83 Bismuth 209

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	d,t	^{208}Bi	DAP	4RUSKUR	2.0+07	2.0+07	Jour	ZET,38,280	60	N.A.Vlasov+	F1378
	d,x+t	inclusive	DAE	4RUSKUR	2.0+07	2.0+07	Jour	ZET,38,280	60	N.A.Vlasov+	F1378
	^{14}N,x	^{211}Rn	CS	4RUSKUR	7.6+07	1.0+08	Jour	ZET,36,1933	59	V.A.Karnaukhov	F1387
	^{14}N,x	^{212}Rn	CS	4RUSKUR	7.6+07	1.0+08	Jour	ZET,36,1933	59	V.A.Karnaukhov	F1387

90 Thorium 232

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	p,fis	^{88}Y	CS	4RUSJIA	8.7+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{91}Y	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{88}Zr	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{95}Zr	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{103}Ru	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{106}Ru	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{110}Ag	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{123}Sn	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{124}Sb	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{125}Sb	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{121}Te	CS	4RUSJIA	3.6+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{123}Te	CS	4RUSJIA	3.6+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{127}Te	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{134}Cs	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{137}Cs	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{133}Ba	CS	4RUSJIA	6.7+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{139}Ce	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{141}Ce	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{144}Ce	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
*	p,fis	^{154}Eu	CS	4RUSJIA	2.1+07	1.4+08	Jour	FCY/L,15,234	18	O.N.Libanova+	F1377
	^{12}C,4n	^{240}Cm	CS	4RUSJIA	5.8+07	7.7+07	Jour	ZET,37,973	59	L.I.Guseva+	F1386

^{13}C,5n	^{240}Cm	CS	4RUSJIA	6.6+07	8.0+07	Jour	ZET,37,973	59	L.I.Guseva+	F1386

92 Uranium 238

Reaction	Product	Quant.	Lab.	Energy (eV)		Type	Documentation	Date	Author	Data #
				Min	Max		Ref Vol Page			
^{12}C,x	^{245}Cf	CS	4RUSJIA	6.4+07	7.8+07	Jour	ZET,36,762	59	V.V.Volkov+	F1385
^{12}C,x	^{246}Cf	CS	4RUSJIA	5.7+07	7.8+07	Jour	ZET,36,762	59	V.V.Volkov+	F1385
^{13}C,x	^{245}Cf	CS	4RUSJIA	7.3+07	8.4+07	Jour	ZET,36,762	59	V.V.Volkov+	F1385
^{13}C,x	^{246}Cf	CS	4RUSJIA	6.5+07	8.4+07	Jour	ZET,36,762	59	V.V.Volkov+	F1385