EXFOR News (April 2015)

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, JAEA, 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 N.Otsuka (NRDC Coordinator n.otsuka@iaea.org) for inclusion in the EXFOR News distribution list as well as any question on EXFOR.

[1] N.Otuka 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 dΩ_1/dΩ_2/dE'	NUD	Delayed fission neutron multiplicity $\bar{\nu_d}$
D3E	Triple differential dΩ/dE'_1/dE'_2	NUF	Fragment neutrons
D4A	Quadruple diff. dΩ_1/dΩ_2/dE'_1/dE'_2	POL	Polarization
DA	Differential d/dΩ	POD	Differential polarization
DAA	Double differential dΩ_1/dΩ_2	PY	Product yield (other than fission)
DAE	Double differential dΩ/dE'	RI	Resonance integral
DAP	Partial differential d/dΩ	RP	Resonance parameter
DAT	Temperature-dependent Legendre coefficient	RR	Reaction rate
DE	Differential d/dE'	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, d/dΩ
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)

1 Hydrogen 3

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	d,n	^{4}He	DA	1USALAS	4.0+06	7.0+06	Conf	94CRETE,,145	94	M.Drosg	C1145

3 Lithium

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,x	^{7}Be	TT	1USAPUP	8.0+06	2.0+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183
	d,x	^{7}Be	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

10 Neon

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	α,el	^{nat}Ne	DA	1USAWIS	2.4+06	4.0+06	Jour	PR,93,799	54	E.Goldberg+	C0756

10 Neon 18

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	α,p	^{21}Na	CS	1USAANL	1.3+06	2.6+06	Rept	ANL-(05/61),6	05	S.Sinha+	C1839

12 Magnesium

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	d,x	^{22}Na	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

17 Chlorine 37

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,n	^{37}Ar	CS	1USAORL	1.7+06	5.0+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

22 Titanium

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

*	γ,x	^{46}Sc	CS	4RUSMOS		5.5+07	Jour	IZV,78,(11),1420	14	S.S.Belyshev+	M0891
*	γ,x	^{47}Sc	CS	4RUSMOS		5.5+07	Jour	IZV,78,(11),1420	14	S.S.Belyshev+	M0891
*	γ,x	^{47}Sc	INT	4RUSMOS		5.5+07	Jour	IZV,78,(11),1420	14	S.S.Belyshev+	M0891
*	γ,x	^{48}Sc	CS	4RUSMOS		5.5+07	Jour	IZV,78,(11),1420	14	S.S.Belyshev+	M0891
*	γ,x	^{45}Ti	CS	4RUSMOS		5.5+07	Jour	IZV,78,(11),1420	14	S.S.Belyshev+	M0891
	p,x	^{48}V	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183
	d,x	^{48}V	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

22 Titanium 48

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,x+n	inclusive	INT	4RUSMOS		5.5+07	Jour	IZV,78,(11),1420	14	S.S.Belyshev+	M0891

23 Vanadium 51

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,α	^{47}Sc	CS	4ZZZDUB	1.6+07	2.5+07	Jour	IZV,55,(11),2260	91	A.D.Antonov+	M0894
γ,α	^{47}Sc	CS	4ZZZDUB	1.8+07	2.5+07	Jour	YF,51,305	90	A.D.Antonov+	M0892
γ,α	^{47}Sc	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893
γ,α	^{47}Sc	INT	4ZZZDUB		2.5+07	Jour	YF,51,305	90	A.D.Antonov+	M0892

24 Chromium

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072
p,x	^{52}Mn	TT	1USAPUP	8.0+06	8.0+06	Jour	ARI,5,21	59	I.J.Gruverman+	C1183
p,x	^{54}Mn	TT	1USAPUP	2.0+07	2.0+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183
d,x	^{52}Mn	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

24 Chromium 54

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,n	^{54}Mn	CS	1USAORL	2.3+06	5.5+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126
p,x	^{54}Mn	TT	1USAPUP	2.0+07	2.0+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

25 Manganese 55

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,x	^{55}Fe	TT	1USAPUP	2.0+07	2.0+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183
d,x	^{55}Fe	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

26 Iron

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
d,x	^{54}Mn	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183
d,x	^{57}Co	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

28 Nickel

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,x	^{57}Co	TT	1USAPUP	2.0+07	2.0+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

29 Copper

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072
p,x	^{65}Zn	TT	1USAPUP	2.0+07	2.0+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

29 Copper 63

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,n	^{63}Zn	CS	1USAORL	4.3+06	5.8+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

29 Copper 65

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,α	^{61}Co	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893
γ,α	^{61}Co	INT	4ZZZDUB		2.5+07	Jour	YF,51,305	90	A.D.Antonov+	M0892
γ,n	^{64}Cu	CS	4ZZZDUB	1.5+07	2.5+07	Jour	YF,51,305	90	A.D.Antonov+	M0892
γ,n	^{64}Cu	CS	4ZZZDUB	1.5+07	2.5+07	Jour	IZV,55,(11),2260	91	A.D.Antonov+	M0894

30 Zinc

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072
d,x	^{67}Ga	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

31 Gallium 71

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,α	^{67}Cu	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893

32 Germanium

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,x	^{74}As	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183
d,x	^{74}As	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

32 Germanium 76

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,α	^{72}Zn	CS	4ZZZDUB	1.6+07	2.5+07	Jour	IZV,55,(11),2260	91	A.D.Antonov+	M0894
γ,α	^{72}Zn	CS	4ZZZDUB	1.9+07	2.4+07	Jour	YF,51,305	90	A.D.Antonov+	M0892
γ,α	^{72}Zn	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893
γ,α	^{72}Zn	INT	4ZZZDUB		2.5+07	Jour	YF,51,305	90	A.D.Antonov+	M0892

34 Selenium 74

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,n	^{73}Se	CS	4ZZZDUB		1.9+07	Conf	91MINSK,286	91	A.D.Antonov+	M0895

34 Selenium 77

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,n	^{77}Br	CS	1USAORL	2.2+06	5.5+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

34 Selenium 82

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,n	^{81}Se	CS	4ZZZDUB		1.9+07	Conf	91MINSK,286	91	A.D.Antonov+	M0895

37 Rubidium

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

p,x	^{85}Sr	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183
d,x	^{85}Sr	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

37 Rubidium 85

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,n	^{84}Rb	CS	4ZZZDUB		1.9+07	Conf	91MINSK,286	91	A.D.Antonov+	M0895

38 Strontium

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072
	p,x	^{88}Y	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

40 Zirconium

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

40 Zirconium 90

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,n	^{89}Zr	CS	4ZZZDUB		1.9+07	Conf	91MINSK,286	91	A.D.Antonov+	M0895

40 Zirconium 91

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,n	^{90}Zr	CS	4RUSSGU	7.1+06	1.2+07	Conf	94PETRBG,216	94	A.M.Goryachev+	M0898

40 Zirconium 92

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{91}Y	CS	4ZZZDUB		2.4+07	Jour	PPN/L,4,(5),397	07	Tranducthiep+	M0897

40 Zirconium 96

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,α	^{92}Sr	CS	4ZZZDUB	1.7+07	2.5+07	Jour	IZV,55,(11),2260	91	A.D.Antonov+	M0894
	γ,α	^{92}Sr	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893

41 Niobium 93

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,α	^{89}Y	CS	4ZZZDUB	1.4+07	2.5+07	Jour	IZV,55,(11),2260	91	A.D.Antonov+	M0894
	γ,α	^{89}Y	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893
	γ,α	^{89}Y	INT	4ZZZDUB		2.5+07	Jour	YF,51,305	90	A.D.Antonov+	M0892
	n,γ	^{94}Nb	CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

42 Molybdenum

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

42 Molybdenum 92

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,2n	^{90}Mo	?	4RUSMOS		2.9+07	Jour	YF,77,(11),1427	14	B.S.Ishkhanov+	M0887
*	γ,4n	^{88}Mo	?	4RUSMOS		6.8+07	Jour	YF,77,(11),1427	14	B.S.Ishkhanov+	M0887
	γ,α	^{88}Zr	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893
*	γ,n	^{91}Mo	?	4RUSMOS		2.9+07	Jour	YF,77,(11),1427	14	B.S.Ishkhanov+	M0887
*	γ,x	^{89}Nb	?	4RUSMOS		6.8+07	Jour	YF,77,(11),1427	14	B.S.Ishkhanov+	M0887
*	γ,x	^{90}Nb	?	4RUSMOS		2.9+07	Jour	YF,77,(11),1427	14	B.S.Ishkhanov+	M0887

42 Molybdenum 94

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,x	^{92}Nb	?	4RUSMOS		6.8+07	Jour	YF,77,(11),1427	14	B.S.Ishkhanov+	M0887

42 Molybdenum 96

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{95}Nb	?	4RUSMOS		2.9+07	Jour	YF,77,(11),1427	14	B.S.Ishkhanov+	M0887

42 Molybdenum 97

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{96}Nb	?	4RUSMOS		2.9+07	Jour	YF,77,(11),1427	14	B.S.Ishkhanov+	M0887

42 Molybdenum 98

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{97}Nb	?	4RUSMOS		2.0+07	Jour	YF,77,(11),1427	14	B.S.Ishkhanov+	M0887
	n,γ	^{99}Mo	CS	4RUSFEI	2.3+05	2.8+06	Jour	SJA,26,82	69	A.G.Dovbenko+	40001

42 Molybdenum 100

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,x	^{98}Nb	?	4RUSMOS		6.8+07	Jour	YF,77,(11),1427	14	B.S.Ishkhanov+	M0887

45 Rhodium 103

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,n	^{103}Pd	CS	1USAORL	2.3+06	5.7+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

46 Palladium 105

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,n	^{105}Ag	?	1USAORL	2.1+06	5.7+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

46 Palladium 110

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,n	^{110}Ag	CS	1USAORL	1.9+06	5.7+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

47 Silver

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072
	d,x	^{109}Cd	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

47 Silver 109

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,α	^{105}Rh	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890
	p,n	^{109}Cd	CS	1USAORL	2.1+06	5.8+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

48 Cadmium

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072
	d,x	^{111}In	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

48 Cadmium 111

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	p,n	^{111}In	?	1USAORL	2.5+06	5.7+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

48 Cadmium 112

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{111}Ag	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

48 Cadmium 113

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,α	^{109}Pd	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890
*	γ,p	^{112}Ag	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890
	p,n	^{113}In	?	1USAORL	2.5+06	5.7+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

48 Cadmium 114

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{113}Ag	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890
	p,n	^{114}In	?	1USAORL	2.5+06	5.6+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

48 Cadmium 116

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,n	^{115}Cd	CS	4ZZZDUB		1.9+07	Conf	91MINSK,286	91	A.D.Antonov+	M0895
	p,n	^{116}In	CS	1USAORL	1.5+06	5.7+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

49 Indium

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

49 Indium 113

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,n	^{112}In	CS	4ZZZDUB		1.9+07	Conf	91MINSK,286	91	A.D.Antonov+	M0895

49 Indium 115

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,α	^{111}Ag	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893
*	γ,α	^{111}Ag	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890
	p,n	^{115}Sn	CS	1USAORL	1.9+06	5.6+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

50 Tin

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

50 Tin 114

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{113}In	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

50 Tin 116

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{115}In	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

50 Tin 118

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{117}In	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

50 Tin 119

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,α	^{115}Cd	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

51 Antimony

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

51 Antimony 121

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,n	^{120}Sb	CS	4ZZZDUB		1.9+07	Conf	91MINSK,286	91	A.D.Antonov+	M0895

52 Tellurium 125

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,n	^{125}I	?	1USAORL	3.0+06	5.7+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

52 Tellurium 126

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,n	^{126}I	?	1USAORL	2.9+06	5.7+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

52 Tellurium 128

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,n	^{128}I	?	1USAORL	3.0+06	5.7+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

52 Tellurium 130

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,n	^{130}I	CS	1USAORL	1.7+06	5.7+06	Jour	PR,136,B1719	Dec 64	C.H.Johnson+	T0126

57 Lanthanum

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
p,x	^{139}Ce	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183
d,x	^{139}Ce	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

60 Neodymium 143

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,α	^{139}Ce	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893

60 Neodymium 145

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,α	^{141}Ce	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893

60 Neodymium 148

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
γ,α	^{144}Ce	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893

68 Erbium

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ		CS	4UKRIFU	2.5-02	2.5-02	Rept	ICD-5,5	Nov 68	V.P.Vertebnyi+	40061

68 Erbium 166

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

	n,0		RP	4UKRIFU	1.0+01	1.0+02	Rept	ICD-5,5	Nov 68	V.P.Vertebnyi+	40061

68 Erbium 170

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,α	^{166}Dy	CS	4ZZZDUB	1.9+07	2.5+07	Jour	YF,51,305	90	A.D.Antonov+	M0892
	γ,α	^{166}Dy	CS	4ZZZDUB	2.0+07	2.5+07	Jour	IZV,55,(11),2260	91	A.D.Antonov+	M0894
	γ,α	^{166}Dy	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893
	γ,α	^{166}Dy	INT	4ZZZDUB		2.5+07	Jour	YF,51,305	90	A.D.Antonov+	M0892

70 Ytterbium 174

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{173}Tm	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

70 Ytterbium 176

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,α	^{172}Er	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

72 Hafnium 178

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{177}Lu	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

73 Tantalum

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	d,x	^{181}W	TT	1USAPUP	1.5+07	1.5+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

73 Tantalum 181

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,α	^{177}Lu	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893
	γ,α	^{177}Lu	INT	4ZZZDUB		2.5+07	Jour	YF,51,305	90	A.D.Antonov+	M0892
*	γ,α	^{177}Lu	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

74 Tungsten

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

74 Tungsten 183

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,p	^{182}Ta	CS	4ZZZDUB		2.2+07	Jour	PPN/L,4,(5),397	07	Tranducthiep+	M0897

77 Iridium 193

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,α	^{189}Re	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

79 Gold 197

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
*	γ,n	^{196}Au	CS	4ZZZDUB		2.4+07	Jour	PPN/L,3,(4),223	06	Tranducthiep+	M0896
	n,γ	^{198}Au	CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

80 Mercury

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

82 Lead

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	n,γ		CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072
	p,x	^{207}Bi	TT	1USAPUP	2.0+07	2.0+07	Jour	ARI,5,21	59	I.J.Gruverman+	C1183

82 Lead 207

	Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
	γ,α	^{203}Hg	INT	4ZZZDUB		2.3+07	Jour	YF,53,(1),14	91	A.D.Antonov+	M0893

*	γ,α	^{203}Hg	?	4ZZZDUB		2.3+07	Jour	YF,77,1496	14	S.A.Karamian	M0890

83 Bismuth 209

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{210}Bi	CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

90 Thorium 232

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,γ	^{233}Th	CS	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

92 Uranium 235

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,0		RP	4ZZZDUB		1.5+02	Rept	JINR-P3-4992	Apr 70	Yu.V.Ryabov+	40070
n,el		RP	4ZZZDUB		1.5+02	Rept	JINR-P3-4992	Apr 70	Yu.V.Ryabov+	40070

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	4RUSFEI	2.4+04	2.4+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072
n,tot		CS	4RUSFEI	2.3+04	2.3+04	Jour	AE,19,(1),3	65	T.S.Belanova+	40072

94 Plutonium 239

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,0		RP	4ZZZDUB		1.5+02	Rept	JINR-P3-4992	Apr 70	Yu.V.Ryabov+	40070
n,el		RP	4ZZZDUB		1.5+02	Rept	JINR-P3-4992	Apr 70	Yu.V.Ryabov+	40070
n,γ		RP	4ZZZDUB	4.2+01	7.6+01	Rept	JINR-P3-4992	Apr 70	Yu.V.Ryabov+	40070

95 Americium 241

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
n,fis		DA	4RUSFEI	3.3+05	7.2+06	Rept	YFI-8,4	Dec 69	D.L.Shpak+	40010

96 Curium 244

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
0,fis		NU	4ZZZDUB	Spont		Jour	SNP,18,371	74	M.Dakovskii+	40203

98 Californium 246

Reaction	Product	Quant.	Lab.	Energy (eV) Min	Energy (eV) Max	Type	Documentation Ref Vol Page	Date	Author	Data #
0,fis		NU	4ZZZDUB	Spont		Jour	SNP,17,360	73	M.Dakovskii+	40188