Energy levels [98Ti06]. **$^{20}_{11}$Na**

E^* [keV]	J^π	I_t arb.u	Γ_{cm} [keV]	$E_\circ$ [keV]	$T_{1/2}$ or Γ_{cm}	Ref.
0.0	2^+				448(2) ms	
596(8)	3^+					
802(7)	4^+					
984.3(1)	1^+					
1346(8)	2^-					
1837(7)	2^-					
1992(8)	3^-					
2057(12)	3^+					
2645(6)	$\langle 1^+ \rangle$	72				95Go16
2849(6)	3^+					
2983(7)	≥ 3	72				95Go16
2996(2)	1^+	84	19.8	797	19.8(2) keV	95Go16 94Co12
3067(2)	$\langle 0^+ \rangle$					
3086(2)	0^+	60	35.9	887	35.9(2) keV	95Go16 94Co12
3315(9)		40				95Go16
3642(16)	$\langle 2\text{–}4 \rangle^-$					
3871(9)	1^+					
4123(16)	1^+					
4150(60)	$\langle 4,2^- \rangle$					
4560(60)	$\langle 2 \rangle$					
≈4800	1^+					
5170(60)						
≈5600	1^+					
6266(30)	1^+					
6534(13)	0^+					
		95Go16	94Co12	94Co12		Ref.

Additional data on this isotope can be found in [94Co12, 92Sm03, 92Ku07, 90La05, 90Cl06].
Yield of tritium I_t in the (τ,t) reaction was estimated from distribution (in units counts per channel) shown in [95Go16]; similar distribution was obtained in [92Sm03] where resonance parameters for the $^{19}Ne(p,\gamma)^{20}Na$ reaction were presented and their astrophysical applications are discussed.

Energy levels and branching ratios [04Fi10, 90En08, 98En04]. **$^{21}_{11}$Na**

E^* [keV]	$2J^\pi$	$2T$	L	$(2J+1)C^2S$ (d,n)	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage				
							E_f^*:	0.0	332	1716	2424	2798
							$2J_f^\pi$:	3^+	5^+	7^+	1^+	1^-
0.0	3^+				22.49(4) s							
331.9(1)	5^+		2	3.76	7.08(8) ps	93Te05		100				
1716.1(3)	7^+				37(8) fs			7(2)	93(2)			
2423.8(4)	1^+		0	1.93	1.7(4) fs	93Te05		100				
2797.9(5)	1^-		1	0.26	13(4) fs	93Te05		33(4)	11(4)		56(4)	
2829.1(7)	9^+								37(5)	63(5)		

(continued) **$^{21}_{11}$Na**

E^* [keV]	$2J^\pi$	$2T$	L	$(2J{+}1)C^2S$ (d,n)	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage				
						E_f^*:	0.0	332	1716	2424	2798
						$2J_f^\pi$:	3^+	5^+	7^+	1^+	1^-
3544.3(4)	5^+		2	0.16	15.5(14) eV	93Te05	92(1)	2.0(6)	6(1)		
3678.9(4)	3^-		1	0.20	193(13) eV	93Te05		60(3)		17(2)	23(2)
3862.2(5)	5^-				2.6(3) eV		31(6)	69(6)			
4169.6(7)	3^-		1	0.85	180(15) keV	93Te05		60(3)		40(3)	
4294.3(6)	5^+		2	1.29	3.93(10) keV	93Te05	34(2)	65(2)	1.0(3)		
4419(2)	$\langle 11\rangle^+$										
4467.9(7)	3^+		2	1.44	21(3) keV	93Te05	53(8)	47(8)			
4984(8)	1^-				200 keV						
5020(9)	$\langle 3\text{–}7\rangle^+$		[3]	3.23		93Te05					
5380(9)	$\langle 3\text{–}7\rangle^+$										
5457(1)	1^+				110 keV						
5770(20)	$\langle 3\text{–}7\rangle^+$				≈20 keV						
5815(1)	7^-				≈0.4 keV						
5828(1)	3^-				25 keV						
5884(20)	$\langle 3\text{–}7\rangle^+$										
5979(15)	$\langle 3\text{–}7\rangle^+$										
6070(20)	$\langle 5,7\rangle^-$				5 keV						
6170(30)	$\langle 3\text{–}7\rangle^+$										
6341(20)	$\langle 3\text{–}7\rangle^+$										
6468(20)	3^+		2	0.71	145(15) keV	93Te05					
6879(15)	3^-				22(7) keV						
6910	$\langle 3^+\rangle$		2	0.44		93Te05					
6992(15)	7^-				35(9) keV						
7253(15)	1^+				220(20) keV						
7571(15)	3^-				116(12) keV						
7575(15)	1^-				128(20) keV						
7609(15)	3^+				112(20) keV						
7930(15)	5^-				28(11) keV						
7946(15)	7^-				25(9) keV						
7960(15)	1^-				58(7) keV						
8097(15)	3^-				25(9) keV						
8135(15)	5^+				32(9) keV						
8303(13)	$\langle 3\text{–}7\rangle^+$										
8388(15)	1^+				21(8) keV						
8397(15)	3^-				30(13) keV						
8464(15)	3^+				25(9) keV						
8554(15)	1^+				100(8) keV						
8562(15)	3^+				<20 keV						
8595(15)	5^+				138(15) keV						
8624(15)	1^-				92(10) keV						
8715(15)	3^+				360(25) keV						
8738(15)	3^-				110(18) keV						
8742(15)	1^+				98(25) keV						
8827(15)	5^+				138(16) keV						
8960(15)	1^+				25(6) keV						

(continued) **$^{21}_{11}$Na**

E^*	$2J^\pi$	$2T$	L	$(2J{+}1)C^2S$	$T_{1/2}$ or	Ref.	Branching ratios in percentage				
							E_f^*: 0.0	332	1716	2424	2798
[keV]				(d,n)	Γ_{cm}		$2J_f^\pi$: 3^+	5^+	7^+	1^+	1^-
8976(2)	5^+	3			650(50) eV						
8981(15)	5^+				23(16) keV						
9051(15)	7^-				36(11) keV						
9155(15)	3^+				34(13) keV						
9217(2)	1^+	3			2800(350) eV						
9280(30)	⟨3–7⟩										
9348(15)	1^+				23(9) keV						
9563(15)	7^-				63(15) keV						
9725(25)	3^+				256(20) keV						
9775(15)	1^-				56(11) keV						
9779(15)	7^-				41(9) keV						
9808(15)	3^-				80(16) keV						
10050(40)											
11000(30)											
				93Te05		Ref.					

Additional data on this isotope can be found in [03Th04, 03Th01, 01Gr14, 93Te05].
Data for the (d,p) reaction from [68Bu12] are given in [93Te05] for comparison of nucleon transfer spectroscopic factors, obtained sums of $(2J{+}1)S$ for different states are 0.20 (for $1p_{3/2}$), 0.26 (for $1p_{1/2}$), 5.21 (for $1d_{5/2}$), are 1.93 (for $2s_{1/2}$), 2.59 (for $1d_{3/2}$), 3.23 (for $1f_{7/2}$) and 0.85 (for $2p_{3/2}$).

Energy levels and branching ratios [90En08, 98En04]. **$^{22}_{11}$Na**

E^*	J^π	T	L	$S_p'^+$	S_n^-	L	$(2J{+}1)C^2S$	L	S_N	σ (^{12}C,α)	$T_{1/2}$ or	Ref.
[keV]				eval	eval	(τ,d)	(τ,d)	(τ,α)	(τ,α)	μb/sr	Γ_{cm}	
0.0	3^+		2	0.47(12)	0.97(24)	2	1.66	2	0.51	111	2.6019(4) yr	77En02
583.03(9)	1^+		2	0.66(17)	0.39(10)	2	0.98	2	0.21	29	244(6) ns	77En02
657.00(14)	0^+	1				2	<0.2	2	<0.18	2	19.3(10) ps	71Ga14
890.89(17)	4^+			0.78(20)	0.94(17)	2	3.75	2	0.48	170	9.8(2) ps	77En02
1528.06(15)	5^+									198	3.40(14) ps	72Ha81
1936.9(2)	1^+					0+2	2.50			44	13(4) fs	72Ha81
1951.8(3)	2^+	1						2	<1.5	incl	8(2) fs	71Ga14
1983.8(2)	3^+					2	0.93	2	0.25	99	1.58(9) ps	71Ga14
2211.5(3)	1^-		1	0.03(2)	0.52(13)	1	0.04	1	0.23	14	14.6(3) ps	77En02
2571.5(3)	2^-		1	0.02(2)	0.41(11)	1	0.04	1	0.18	78	5.3(3) ps	77En02
2968.7(5)	3^+		2	0.23(6)	<0.05	2	0.79			182	32(4) fs	77En02
3059.6(5)	2^+		0	0.12(3)	small	0+2	0.96			57	22(5) fs	77En02
			+2	0.38(10)	0.07(2)							77En02
3519.2(4)	3^-		1	<0.01	<0.02	⟨1⟩	<0.01	1	<0.01	109	464(83) fs	77En02
3706.6(6)	6^+									68	69(10) fs	72Ha81
3943.5(8)	1^+		0	0.10(3)	0.07(2)	0+2	0.49			27	<0.7 fs	77En02
			+2	0.33(9)	small							77En02

(continued) **$^{22}_{11}$Na**

E^* [keV]	J^π	T	L	S'^+_p eval	S^-_n eval	L (τ,d)	$(2J+1)C^2S$ (τ,d)	L (τ,α)	S_N (τ,α)	σ (^{12}C,α) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.
4071.3(5)	4^+	1				2	0.18	2	0.44	14	<0.7 fs	71Ga14
4296.1(4)	$\langle 0^- \rangle$									11	3.5(+83-14) ps	72Ha81
4319.0(5)	1^+					$\langle 2 \rangle$	0.04			68	17(8) fs	72Ha81
4360.0(4)	2^+					0	1.66			15	4.9(14) fs	72Ha81
4468.3(5)	4^-									138	104(42) fs	72Ha81
4523.8(4)	7^+									431	76(26) fs	72Ha81
4582.8(17)	2^-					$\langle 0 \rangle$	0.06	1	0.29	35	<69 ps	71Ga14
4621.7(18)	1									incl	<69 ps	
4710.0(4)	5^+									307	38(14) fs	72Ha81
4771(2)	3^+					2	0.47			128	5.9(14) ps	72Ha81
5062.4(4)	2^+									67	<14 fs	72Ha81
5100.6(13)	4^+									148	38(12) fs	72Ha81
5131(7)										incl	<69 ps	
5174(2)	2^+	1				0+2	0.49			35	<1 fs	72Ha81
5318(5)	$\langle 1,3 \rangle^+$					2	0.26				<0.7 fs	72Ha81
5442(5)	$\langle 2,3 \rangle^-$					1	0.13	1	0.07			71Ga14
5603(5)	$\langle 1,2 \rangle^+$					0+2	0.10				<3.1 fs	72Ha81
5700(2)	$\langle 0^+–4^+ \rangle$											
5725(2)	$\langle 0–4 \rangle$											
5739(2)	$\langle 0,1 \rangle^+$											
5832(6)												
5863(6)	$\langle 1,2 \rangle^+$											
5920(6)												
5959(2)	2^-	1						1	1.5		2.9(8) fs	71Ga14
5988(2)	$\langle 2,3^+ \rangle$											
5995(2)	$\langle 0–3^+ \rangle$	$\langle 1 \rangle$				0+2	2.0					71Ga22
6090(5)	$\langle 1,2 \rangle^+$	$\langle 1 \rangle$				2	0.69					71Ga22
6189(5)	$\langle 1,2 \rangle^+$	$\langle 1 \rangle$				2	3.1					71Ga22
6242(5)												
6329(5)	$\langle 0–3 \rangle^-$	$\langle 1 \rangle$				1	0.53					71Ga22
6433(5)												
6523(6)												
6551(5)	$\langle 1,2 \rangle^+$	$\langle 1 \rangle$				0+2	0.53					71Ga22
6580(6)												
6636(8)												
6668(5)												
6714(5)								1	0.15			71Ga14
6756(6)												
6834(7)	$\langle 0,1 \rangle^+$	$\langle 1 \rangle$										
6860.3	$\langle 1–3^- \rangle$										<12 eV	
6957(6)		$\langle 1 \rangle$										
6981		$\langle 1 \rangle$										
6997.7	$3^+–5^+$										<5 eV	
6998.6	3^+										<3 eV	
7016.6	3										<11 eV	

(continued) **$^{22}_{11}$Na**

E^* [keV]	J^π	T	L	$S_p'^+$ eval	S_n^- eval	L (τ,d)	$(2J+1)C^2S$ (τ,d)	L (τ,α)	S_N (τ,α)	σ (^{12}C,α) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.
7049												
7076(2)	$\langle 1^-,2\rangle$										<100 eV	
7151(4)	$\langle 3,4\rangle^+$										<500 eV	
7219(3)	$\langle 1^+,2\rangle$	0									<400 eV	
7239(2)	$\langle 2^+–4^+\rangle$										<300 eV	
7277(3)	$\langle 1^-,2^+\rangle$										<500 eV	
7278(3)	$\langle 4^+–6^+\rangle$										<1.5 keV	
7359(3)	$\langle 3^+,4^-\rangle$										<1.0 keV	
7371(3)	2										<500 eV	
7377(2)	$\langle 2,3\rangle^+$										<500 eV	
7400(3)	$\langle 1,2\rangle^+$										<1.5 keV	
7408(2)	1^+	1									3.2(6) keV	
7422(3)	2										2.5(5) keV	
7471(2)	2^+	1									4.0(4) keV	
7514(2)	3^+	0										
7546(2)	$\langle 1–3^+\rangle$	$\langle 1\rangle$									<600 eV	
7573(2)	$\langle 3^+–5^+\rangle$										<500 eV	
7599(3)	2^-										1.9(10) keV	
7604(3)	$\langle 1,2\rangle^+$										<600 eV	
7635(3)	$\langle 2^+,3\rangle$	0									<500 eV	
7682(3)	$\langle 2^+–4^+\rangle$										<500 eV	
7777(2)	$\langle 1–3\rangle^-$	$\langle 1\rangle$									2.8(7) keV	
7800(2)	$\langle 1,2\rangle^+$	0									2.4(7) keV	
7820(2)	$\langle 1,2^+\rangle$	0									<500 eV	
7883(2)											<2.6 keV	
7888(2)	$\langle 3,4\rangle^+$	$\langle 1\rangle$									<500 eV	
7918(3)	1^-	1									17(4) keV	
7943(6)												
7964(3)	$\langle 1–3^+\rangle$	$\langle 1\rangle$									<500 eV	
7976(3)	1^-	$\langle 1\rangle$									10(3) keV	
8017(4)	$4^+,5^+$										<1.0 keV	
8039(3)	$\langle 2,3\rangle$										<500 eV	
8100(4)	$\langle 1,2\rangle^+$										3.8(7) keV	
8106(3)	$\langle 3^+,4\rangle$	1									<1.5 keV	
8113(2)	3^-										3.1(8) keV	
8128(8)												
8164(2)	3^-	1									22.5(25) keV	
8196(4)	$\langle 2,3\rangle^+$										<600 eV	
8210(2)	2^+	0									5.1(15) keV	
8221(4)	$\langle 4–6^+\rangle$											
8232(2)	2^+	1									11(2) keV	
8286(2)	$\langle 1–3\rangle^-$										4.5(1) keV	
8327(2)	$\langle 1,2\rangle^-$										2.7(8) keV	
8370(2)												
8403(5)												

(continued) **$^{22}_{11}$Na**

E^* [keV]	J^π	T	L	S'^{+}_{p} eval	S^{-}_{n} eval	L (τ,d)	$(2J{+}1)C^2S$ (τ,d)	L (τ,α)	S_{N} (τ,α)	σ (^{12}C,α) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.
8434(2)	2^-										5.4(15) keV	
8439												
8495(2)	2^+	1									44(4) keV	
8536(2)	$\langle 1{-}3\rangle^-$										13(2) keV	
8561(3)												
8566(3)	$\langle 0{-}4\rangle^+$											
8572(3)												
8600(2)	$\langle 1{-}3\rangle^-$										11.2(20) keV	
8611(2)												
8635(3)	3^-										11.0(20) keV	
8674(2)	2^+	1									5.3(15) keV	
8724(4)												
8740(5)												
8791(5)												
8846(5)												
8874(5)												
8950(10)												
9008(10)												
9051(10)												
9122(10)												
9150(10)												
9195(10)												
9240(10)												
9312(10)												
9360(10)												
9438(10)												
9527(10)												
9582(10)												
9647(10)												
9682(10)												
9756(10)												
9794(10)												
9859(10)												
9908(10)												
9957(10)												
10009(10)												
10051(10)												
10118(10)												
10167(10)												
10217(20)												78Ha29
10346(20)												78Ha29
10422(20)												78Ha29
10563(20)												78Ha29
10640(20)												78Ha29
10834(20)												78Ha29

(continued) **$^{22}_{11}$Na**

E^* [keV]	J^π	T	L	$S_p'^+$ eval	S_n^- eval	L (τ,d)	$(2J+1)C^2S$ (τ,d)	L (τ,α)	S_N (τ,α)	σ (^{12}C,α) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.
10977(20)												78Ha29
11152(20)												78Ha29
11254(20)												78Ha29
11361(20)												78Ha29
11460(20)												78Ha29
11493(20)												78Ha29
11570(30)												78Ha29
11625(20)												78Ha29
11768(30)												78Ha29
11823(20)												78Ha29
11927(25)												78Ha29
12054(20)												78Ha29
12118(30)												78Ha29
12208(20)												78Ha29
12252(25)												78Ha29
12296(25)												78Ha29
12363(20)												78Ha29
12408(20)												78Ha29
12530(20)												78Ha29
12564(25)												78Ha29
12620(20)												78Ha29
12713(20)												78Ha29
12763(20)												78Ha29
12798(30)												78Ha29
12866(20)												78Ha29
12967(20)												78Ha29
13157(20)												78Ha29
13292(20)												78Ha29
13326(20)												78Ha29
13364(25)												78Ha29
13419(20)												78Ha29
13474(20)												78Ha29
13547(20)												78Ha29
13705(40)												78Ha29
14070(40)												78Ha29
14160(40)												78Ha29
14330(40)												78Ha29
14430(40)												78Ha29
14535(40)												78Ha29
14600(40)												78Ha29
14720(40)												78Ha29
14860(40)												78Ha29
15000(40)												78Ha29
15125(40)												78Ha29
15170(40)												78Ha29

(continued) **$^{22}_{11}$Na**

E^*	J^π	T	L	$S_p'^+$	S_n^-	L	$(2J+1)C^2S$	L	S_N	σ (^{12}C,α)	$T_{1/2}$ or	Ref.
[keV]				eval	eval	(τ,d)	(τ,d)	(τ,α)	(τ,α)	μb/sr	Γ_{cm}	
15300(40)												78Ha29
15395(40)												78Ha29
15580(40)												78Ha29
15650(40)												78Ha29
15840(40)												78Ha29
15980(40)												78Ha29
16190(40)												78Ha29
16325(40)												78Ha29
16430(40)												78Ha29
16560(40)												78Ha29
16650(40)												78Ha29
16770(40)												78Ha29
16880(40)												78Ha29
16950(40)												78Ha29
17070(40)												78Ha29
17180(40)												78Ha29
17370(40)												78Ha29
17510(40)												78Ha29
17700(40)												78Ha29
17860(40)												78Ha29
				77En02	77En02		71Ga22		71Ga14	72Ha81		Ref.

Additional data on this isotope can be found in [03Ha20, 89Ve01, 76Ma23, 71Ga04].

184 levels with the energy up to E^*=17860 keV were studied by the ^{12}C(^{14}N, α)^{22}Na reaction [78Ha29].

Energy levels and branching ratios [90En08, 98En04]. Part 2 **$^{22}_{11}$Na**

E^*	J^π		Branching ratios in percentage								
		E_f^*:	0.0	583.0	657.0	890.9	1528.1	1936.9	1951.8	1983.8	2211.5
[keV]		J_f^π:	3^+	1^+	0^+	4^+	5^+	1^+	2^+	3^+	1^-
583.03(9)	1^+		100								
657.00(14)	0^+			100							
890.89(17)	4^+		100								
1528.06(15)	5^+		93.7(4)			6.3(4)					
1936.9(2)	1^+				100						
1951.8(3)	2^+		<0.7	100	0.29(4)	<0.4	<0.5				
1983.8(2)	3^+		1.80(20)	96.9(3)		1.30(20)					
2211.5(3)	1^-		2.0(4)		98.0(4)						
2571.5(3)	2^-		76(2)	21(2)	1.6(3)						1.1(5)
2968.7(5)	3^+								100		
3059.6(5)	2^+			15(1)					85(1)		
3519.2(4)	3^-		14(3)			7(2)			50(3)		23.1(10)

(continued) **$^{22}_{11}$Na**

E^*	J^π	Branching ratios in percentage								
	E_f^*:	0.0	583.0	657.0	890.9	1528.1	1936.9	1951.8	1983.8	2211.5
[keV]	J_f^π:	3^+	1^+	0^+	4^+	5^+	1^+	2^+	3^+	1^-
3706.6(6)	6^+				68(3)	32(3)				
3943.5(8)	1^+			93(1)				7(1)		
4071.3(5)	4^+					13(5)			87(5)	
4296.1(4)	$\langle 0^- \rangle$						60(10)			
4319.0(5)	1^+			100						
4360.0(4)	2^+	18(3)	6(3)					76(5)		
4468.3(5)	4^-				11(3)	14(3)			9(3)	
4523.8(4)	7^+					100				
4582.8(17)	2^-	30(10)						70(10)		
4621.7(18)	1			40(12)				60(12)		
4710.0(4)	5^+								52(2)	
4771(2)	3^+							100		
5062.4(4)	2^+							100		
5100.6(13)	4^+	18(2)			15(5)	12(2)				
5174(2)	2^+		83(5)						17(5)	
5318(5)	$\langle 1,3 \rangle^+$							100		
5603(5)	$\langle 1,2 \rangle^+$							100		
5700(2)	$\langle 0^+–4^+ \rangle$							100		
5959(2)	2^-	60(2)	26(2)							
5995(2)	$\langle 0–3^+ \rangle$		100							
6090(5)	$\langle 1,2 \rangle^+$		100							
8221(4)	$\langle 4–6^+ \rangle$				51(8)	33(7)				

Energy levels and branching ratios [90En08, 98En04]. Part 3 **$^{22}_{11}$Na**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	2571.5	2968.7	3059.6	3706.6	4071.3	4360.0	4523.8	4710.0	5832	7049
[keV]	J_f^π:	2^-	3^+	2^+	6^+	4^+	2^+	$7^+,\langle 5^+ \rangle$	5^+		
3519.2(4)	3^-	5.7(4)									
4296.1(4)	$\langle 0^- \rangle$	40(10)									
4468.3(5)	4^-	66(4)									
4710.0(4)	5^+		5.0(10)			43(3)					
5100.6(13)	4^+			18(2)		37(3)					
5959(2)	2^-			8(1)			6(1)				
8221(4)	$\langle 4–6^+ \rangle$				16(5)						
8572(3)					70(6)			30(3)			
8611(2)									49(5)		51(6)
8724(4)										100	

Energy levels and branching ratios [90En08, 98En04].

$^{23}_{11}$Na

E^* [keV]	$2J^\pi$	$2T$	L (d,n)	S' (d,n)	L (τ,d)	S' (τ,d)	S' (τ,d)	S'^{+}_{p} eval	S^{-}_{p} eval	C^2S (d,τ)	C^2S (p,d)	σ (^{6}Li,d) μb/sr	S_α *rel.*	$T_{1/2}$ or Γ_{cm}	Ref.
0	3^+		$\langle 2\rangle$	$\langle 0.33\rangle$	2	0.32		0.12	0.49	0.24	0.36		1.0	Stable	71Po11
439.99(1)	5^+		2	2.91	2	2.10		0.52	5.4	3.78	2.83		0.40	1.25 ps	93Te05
2076.0(1)	7^+					≤0.22							1.98	26 fs	71Po11
2390.7(1)	1^+		0	0.50	0	0.50	1.1	0.60	0.45	0.30	0.10		4.0	550 fs	93Te05
2639.9(1)	1^-				1	0.04	0.04	0.03	4.4	2.64	1.70		0.66	67 fs	93Te05
2703.5(1)	9^+					≤0.4								96 fs	71Po11
2982.1(1)	3^+		2	1.68	2	1.28	1.3	0.49	0.32	0.17			0.85	3.0 fs	93Te05
3677.6(1)	3^-		1	0.15	1	0.08	0.1	0.03	1.2	0.93	0.85			24 fs	93Te05
3848.1(1)	5^-				$\langle 3\rangle$	0.03	0.06	0.01	small					89 fs	71Po11
3914.2(1)	5^+		2	0.39	2	0.27	0.45	0.09	0.03	0.02			$\langle 1.1\rangle$	8.3 fs	93Te05
4429.6(2)	1^+				$\langle 0\rangle$	0.006	0.002	<0.01	0.14	0.12	0.05		0.54	210 as	71Po11
4774.6(1)	7^+					≤0.2							1.44	<1.4 fs	71Po11
5378.6(2)	5^+				2	0.07	0.07			0.49	0.27		0.34	175 as	67Du08
5534(2)	11^+												$\langle 1.8\rangle$	9 fs	79Ch04
5741.8(3)	5^+		2	0.47	2	0.21								345 as	93Te05
5766.0(2)	3^+									0.04				415 as	71Kr04
5778(5)															
5926.8(3)	7^+													13 fs	
5964.4(5)	3^-									0.60	1.02			<11 fs	68Ko11
6042.2(1)	7^-													6.2 fs	
6115(2)	5^+–11^+													38 fs	
6194.6(2)	5^-													<70 fs	
6236(2)	$\langle 9,13\rangle^+$													15 fs	
6308.0(1)	1^+		0	0.27	0	0.27	0.75			0.04		9.7			93Te05
6354.5(3)	9^-											37		26 fs	95Fo03
6577.8(2)	$\langle 5,9\rangle^+$					≤0.002						14		<11 fs	71Po11
6617.9(7)	$\langle 5,7\rangle^+$											incl		<0.7 fs	
6735.5(2)	3^+				2	0.030	0.04					15		520 as	71Po11
6819.6(3)	5^-											8		<8 fs	95Fo03
6867.7(2)	$\langle 3,5\rangle^+$				2	0.032								<6 fs	71Po11
6920.6(2)	3^-		1	0.53	1	0.30				0.37		103			93Te05
6947.4(2)	$3^{\langle+\rangle}$				$\langle 2\rangle$	0.18								<30 fs	71Po11
7070.8(2)	$\langle 3$–$7^+\rangle$														
7081.9(3)	3^-		1	0.31	1	0.17	0.6			0.08		44		250 as	93Te05
7122(2)	$\langle 1$–$7^+\rangle$														
7133.2(7)	$\langle 3,5\rangle^+$				2	0.065						22		230 as	71Po11
7154(7)															
7185(3)												5.5			95Fo03
7267(2)												17		18 fs	95Fo03
7277.1(3)	$\langle 5^-,7\rangle$					0.058						incl		9 fs	71Po11
7390(2)	$\langle 1$–$7^+\rangle$					0.034						25			71Po11
7412.4(3)	$\langle 5$–$9^+\rangle$													<35 fs	
7451.5(9)	$\langle 5,7\rangle^-$		3	1.62	2	0.58						123		<3 fs	93Te05
7487.8(2)	$\langle 1,3\rangle^-$				1	0.15						incl		<3 fs	71Po11
7566.2(3)	5^+					≤0.01						16			71Po11

(continued) **$^{23}_{11}$Na**

E^* [keV]	$2J^\pi$	$2T$	L	S' (d,n)	L (τ,d)	S' (τ,d)	S' (τ,d)	S'^{+}_{p} eval	S^{-}_{p} eval	C^2S (d,τ)	C^2S (p,d)	σ (^{6}Li,d) μb/sr	S_α *rel.*	$T_{1/2}$ or Γ_{cm}	Ref.
7686(2)						≤0.01						20			71Po11
7724.4(2)	⟨1–5⟩											25			95Fo03
7750.5(2)	⟨5,7$^+$⟩					0.084									71Po11
7834.1(2)	⟨5$^+$,7⟩											19		<3 fs	95Fo03
7872.8(2)	⟨3,5$^+$⟩													<3 fs	
7876.2(9)	5											7.89		<12 fs	95Fo03
7891.2(3)	5$^+$	3	2	0.87	2	0.46	0.6							155 as	93Te05
7965(2)															
7980												7.98		<30 fs	95Fo03
7991(2)	⟨1–7$^+$⟩														
8061(3)															
8106(7)															
8128(6)															
8155(5)															
8178(6)															
8226(5)															
8261.0(5)					⟨1⟩	0.011									71Po11
8302.0(2)	⟨5,7⟩$^-$		3	0.44	3	0.49								<60 fs	93Te05
8329(3)															
8360.0(9)	⟨3$^+$–7$^+$⟩					0.16						17			71Po11
8417.4(2)	3$^+$		2	0.52	⟨2⟩	0.18								<21 fs	93Te05
8475.7(5)	⟨3,5⟩$^+$					0.077						83			71Po11
8505(3)															
8560(3)															
8611.1(9)															
8631.0(9)	3,5$^+$,7$^+$														
8646(2)	⟨1–7$^+$⟩											65			95Fo03
8663.8(7)	1$^+$	3	0	1.16	0	0.54	0.63							120 as	93Te05
8721(2)	⟨1–7$^+$⟩														
8799(3)															
8822(3)	⟨9,11⟩$^-$				0	0.05*						13			71Po11
8829.5(7)	1$^+$													210 as	
8862															
8894															
8945(3)	7$^-$				⟨3⟩	0.030						27		20 fs	71Po11
8972(3)															
9000															
9041(2)														10 fs	
9072(3)															
9103(3)												28			95Fo03
9113(3)															
9147(5)	⟨1–7$^+$⟩														
9171(3)															
9211.3(8)	3$^-$									0.18		40			95Fo03
9252.6(8)	1$^+$				0	0.032									71Po11

(continued) **$^{23}_{11}$Na**

E^* [keV]	$2J^\pi$	$2T$	L (d,n)	S' (d,n)	L (τ,d)	S' (τ,d)	S' (τ,d)	S'^{+}_{p} eval	S^{-}_{p} eval	C^2S (d,τ)	C^2S (p,d)	σ (^{6}Li,d) μb/sr	S_α *rel.*	$T_{1/2}$ or Γ_{cm}	Ref.
9287(3)															
9322(3)															
9396.3(3)	7^-														
9401.1(4)															
9404.7(3)	1				1	0.039				<0.1				65 eV	71Po11
9425.8(4)	$\langle 1–5^+\rangle$											59			95Fo03
9476(3)															
9487.7(7)	3														
9545(3)															
9586(3)															
9608.1(2)	3^+				2	0.11								6 eV	71Po11
9627(2)															
9651.8(5)	$\langle 3,5\rangle^+$														
9656(1)	1^+													105 eV	
9674(1)	$\langle 3^+,5\rangle$														
9682.6(3)	3^+														
9701(1)	3^+		2	0.32	2	0.27						33		29 eV	93Te05
9732.3(2)	7														
9742(3)															
9755.3(5)	3^+														
9780															
9802(2)														10 fs	
9815.5(4)	5^+														
9835.2(10)	3^+				2	0.20								47 eV	71Po11
9849.7(5)	1^+													150 eV	
9876(3)															
9890.6(6)	3														
9916.7(6)	$\langle 3^+,5,7\rangle$														
9943(3)															
9962(3)															
9988(3)															
10003(1)	1^-													475 eV	
10016(1)	5^+		2	0.19	2	0.18						43		69 eV	71Po11
10040(3)												incl			
10048.8(6)															
10070.4(6)	$\langle 5,7\rangle$														
10075.6(5)	5														
10085(1)	1^+		$\langle 1\rangle$	0.35										1.3 keV	93Te05
10114.5(5)	1^+													4.2 keV	
10125.5(5)	5														
10164.2(5)															
10169.3(2)	5^+													65 eV	
10191(3)															
10214(3)															
10221(3)															

(continued) **$^{23}_{11}$Na**

E^* [keV]	$2J^\pi$	$2T$	L	S' (d,n)	L (τ,d)	S' (τ,d)	S' (τ,d)	$S_p'^+$ eval	S_p^- eval	C^2S (d,τ)	C^2S (p,d)	σ (^{6}Li,d) μb/sr	S_α *rel.*	$T_{1/2}$ or Γ_{cm}	Ref.
10231.2(3)	5^+													4 eV	
10243(1)	1^+													2.5 keV	
10253(3)												41			95Fo03
10281.1(6)	3^+														
10304(3)															
10317.6(6)	3^-													2.0 keV	
10338.3(7)	1^-													190 eV	
10345.7(7)	5^+													8 eV	
10353.4(7)	3^+													210 eV	
10409(3)															
10440(1)	5^+													25 eV	
10448(1)	$\langle 5^+,7\rangle$														
10478.4(7)	3^+											126		470 eV	
10501.4(7)	3^-													920 eV	
10507.4(7)	1^+													560 eV	
10518.6(7)	5^+													100 eV	
10533.6(7)	$\langle 3^+,5\rangle$														
10548.8(9)	5^+													540 eV	
10574.1(8)	3^-													1.1 keV	
10592(3)															
10616.4(8)	$\langle 3,5\rangle^+$													425 eV	
10667(3)															
10675(4)	3^-													23 keV	
10680(3)															
10704(2)	3^-													400 eV	
10940			2	0.42								39			93Te05
11290			2	0.71								78			93Te05
11540			3	0.49								86			93Te05
11600												58			95Fo03
11760			3	0.40											93Te05
11880			3	0.24											93Te05
12230												110			95Fo03
12557(2)	$\langle 5,7\rangle^+$													116 eV	
12920												66			95Fo03
13110												68			95Fo03
13250												156			95Fo03
14370			3												
19586(2)	$\langle 5^+\rangle$													1.9 keV	

(continued) **$^{23}_{11}$Na**

E^*	$2J^\pi$	$2T$	L	S'	L	S'	S'	S'^{+}_{p}	S^{-}_{p}	C^2S	C^2S	σ (^{6}Li,d)	S_α	$T_{1/2}$ or	Ref.
[keV]				(d,n)	(τ,d)	(τ,d)	(τ,d)	eval	eval	(d,τ)	(p,d)	μb/sr	*rel.*	Γ_{cm}	
				93Te05		71Po11	67Du08					95Fo03			Ref.
								77En02	77En02	71Kr04	68Ko11		79Ch04		Ref.

Additional data on this isotope can be found in [02Fu17, 93Te05, 91Ho09, 79Ch04].
Abundance: 100 %.
* Proton is unbound above 8792 keV; S' for unbound states are uncertain within 30% [71Po11]. For states with $E^*\leq$4.43 MeV values S'^{+}_{p} and S^{-}_{p} were evaluated in [77En02].
S' for proton transfer (d,n) and (τ,d) reactions are given at left; data from [71Po11] were used in [93Te05] for comparison of proton transfer spectroscopic factors; additionally sums of $(2J+1)S$ for different groups of states were obtained: 0.15 for $1p_{3/2}$, 4.83 for $1d_{5/2}$, 1.93 for $2s_{1/2}$, 3.98 for $1d_{3/2}$, 3.19 for $1f_{7/2}$ and 1.19 for $2p_{3/2}$.
Two examples of data from proton pickup reactions (d,τ) [71Kr04] and neutron pickup reaction (p,d) [68Ko11] are shown just after the column with S^{-}_{p}. Data from α-particle transfer reaction [95Fo03, 79Ch04] are given in the last columns.
Data for this isotope are considered in vol. LB I/18A.

Energy levels and branching ratios [90En08, 98En04]. Part 2 **$^{23}_{11}$Na**

E^*	$2J^\pi$	L	Ref.		Branching ratios in percentage			
				E^*_f:	0	440	2076	2391
[keV]		(^{6}Li,d)		$2J^\pi_f$:	3^+	5^+	7^+	1^+
0	3^+		71Po11					
439.99(1)	5^+		93Te05		100			
2076.0(1)	7^+		71Po11		8.9(1)	91.1(1)		
2390.7(1)	1^+		93Te05		65.7(4)	34.3(4)		
2639.9(1)	1^-		93Te05		100	<0.6	<0.6	
2703.5(1)	9^+		71Po11		<1	64.9(8)	35.1(8)	
2982.1(1)	3^+		93Te05		58.6(2)	41.1(2)	<0.04	0.3(1)
3677.6(1)	3^-		93Te05		<0.3	78.6(6)	<2.0	1.3(1)
3848.1(1)	5^-		71Po11		22.9(6)	9.5(9)	61.1(7)	<0.3
3914.2(1)	5^+		93Te05		79.5(3)	8.1(1)	9.0(2)	1.1(1)
4429.6(2)	1^+		71Po11		94(2)			6(2)
4774.6(1)	7^+		71Po11		<1	67(1)	29(1)	<4.0
5378.6(2)	5^+		67Du08		15(1)	57(1)	21(1)	
5534(2)	11^+		79Ch04				21(2)	
5741.8(3)	5^+		93Te05		75(1)	25(1)	<4.0	<5.0
5766.0(2)	3^+		71Kr04		51(3)	43(3)	<2.0	<2.0
5778(5)								
5926.8(3)	7^+				54(1)	24.0(9)	14(1)	<0.5
5964.4(5)	3^-		68Ko11		10(4)	10(4)	<5	10(5)
6042.2(1)	7^-				<3	36(2)	<2.0	<2.0
6115(2)	5^+–11^+						17(4)	
6194.6(2)	5^-				11(5)		<7	<7

(continued) **$^{23}_{11}$Na**

E^*	$2J^\pi$	L	Ref.	Branching ratios in percentage			
			E_f^*:	0	440	2076	2391
[keV]		(^{6}Li,d)	$2J_f^\pi$:	3^+	5^+	7^+	1^+
6236(2)	$\langle 9,13\rangle^+$						
6308.0(1)	1^+	0	93Te05	<3	<8	<2	100
6354.5(3)	9^-		95Fo03			13(3)	
6577.8(2)	$\langle 5,9\rangle^+$		71Po11		25(4)	43(5)	<8
6617.9(7)	$\langle 5,7\rangle^+$			3.8(5)	91(1)	1.1(2)	<0.40
6735.5(2)	3^+	2(60)	71Po11		48(6)	34(6)	
6819.6(3)	5^-	3	95Fo03				
6867.7(2)	$\langle 3,5\rangle^+$		71Po11	18(3)	82(3)		
6920.6(2)	3^-	1	93Te05	70(2)	30(2)		
6947.4(2)	$3^{\langle +\rangle}$		71Po11	17(3)	19(3)	<5	15(2)
7070.8(2)	$\langle 3\text{–}7^+\rangle$			91(2)			
7081.9(3)	3^-	1(25)	93Te05	55(2)	25(3)		
7122(2)	$\langle 1\text{–}7^+\rangle$			100			
7133.2(7)	$\langle 3,5\rangle^+$	2(50)	71Po11	44(2)	30(2)	13(3)	<5
7154(7)							
7185(3)		n.s.	95Fo03				
7267(2)		3(6)	95Fo03				
7277.1(3)	$\langle 5^-,7\rangle$		71Po11			60(5)	
7390(2)	$\langle 1\text{–}7^+\rangle$	[4]	71Po11				
7412.4(3)	$\langle 5\text{–}9^+\rangle$				45(5)	31(5)	
7451.5(9)	$\langle 5,7\rangle^-$	1+2	93Te05		92(2)		
7487.8(2)	$\langle 1,3\rangle^-$		71Po11				35(6)
7566.2(3)	5^+	2	71Po11	67	33		
7686(2)		n.s.	71Po11				
7724.4(2)	$\langle 1\text{–}5\rangle$	[0]	95Fo03	75(5)			
7750.5(2)	$\langle 5,7^+\rangle$		71Po11		50(2)		
7834.1(2)	$\langle 5^+,7\rangle$	[5]	95Fo03		58(9)		
7872.8(2)	$\langle 3,5^+\rangle$				52(7)		19(5)
7876.2(9)	5	[1]	95Fo03	48(3)			
7891.2(3)	5^+		93Te05	67(2)	33(2)		
7965(2)					53(10)	47(9)	
7980		2+5	95Fo03				
7991(2)	$\langle 1\text{–}7^+\rangle$			100			
8061(3)					50(20)		
8106(7)							
8128(6)							
8155(5)							
8178(6)							
8226(5)							
8261.0(5)			71Po11				
8302.0(2)	$\langle 5,7\rangle^-$		93Te05		100		
8329(3)							
8360.0(9)	$\langle 3^+\text{–}7^+\rangle$	[2]	71Po11	53(3)	32(3)	15(2)	
8417.4(2)	3^+		93Te05	23(12)			55(8)
8475.7(5)	$\langle 3,5\rangle^+$	4	71Po11		100		

(continued) **$^{23}_{11}$Na**

E^*	$2J^\pi$	L	Ref.	Branching ratios in percentage			
			E_f^*:	0	440	2076	2391
[keV]		(^{6}Li,d)	$2J_f^\pi$:	3^+	5^+	7^+	1^+
8505(3)							
8560(3)							
8611.1(9)							
8631.0(9)	$3,5^+,7^+$			100			
8646(2)	$\langle 1–7^+\rangle$	[4]	95Fo03	100			
8663.8(7)	1^+		93Te05	84(3)			5(3)
8721(2)	$\langle 1–7^+\rangle$			100			
8799(3)							
8822(3)	$\langle 9,11\rangle^-$	5	71Po11				
8829.5(7)	1^+			36(10)			64(10)
8862							
8894							
8945(3)	7^-	$\langle 4(10)\rangle$	71Po11				
8972(3)							
9000							
9041(2)							
9072(3)							
9103(3)		2	95Fo03				
9113(3)							
9147(5)	$\langle 1–7^+\rangle$				100		
9171(3)							
9211.3(8)	3^-	$\langle 4\rangle$	95Fo03				
9252.6(8)	1^+		71Po11				
9287(3)							
9322(3)							
9396.3(3)	7^-						
9401.1(4)							
9404.7(3)	1		71Po11				
9425.8(4)	$\langle 1–5^+\rangle$	$2\langle +5\rangle$	95Fo03				
9476(3)							
9487.7(7)	3						
9545(3)							
9586(3)							
9608.1(2)	3^+		71Po11				
9627(2)							
9651.8(5)	$\langle 3,5\rangle^+$						
9656(1)	1^+						
9674(1)	$\langle 3^+,5\rangle$						
9682.6(3)	3^+						
9701(1)	3^+	3	93Te05				
9732.3(2)	7						
9742(3)							
9755.3(5)	3^+						
9780							
9802(2)							

(continued) **$^{23}_{11}$Na**

E^* [keV]	$2J^\pi$	L (^{6}Li,d)	Ref.	E_f^*: $2J_f^\pi$:	Branching ratios in percentage 0 3^+	440 5^+	2076 7^+	2391 1^+
9815.5(4)	5^+							
9835.2(10)	3^+		71Po11					
9849.7(5)	1^+							
9876(3)								
9890.6(6)	3							
9916.7(6)	$\langle 3^+,5,7\rangle$							
9943(3)								
9962(3)								
9988(3)								
10003(1)	1^-							
10016(1)	5^+	[3]	71Po11					
10040(3)								
10048.8(6)								
10070.4(6)	$\langle 5,7\rangle$							
10075.6(5)	5							
10085(1)	1^+		93Te05					
10114.5(5)	1^+							
10125.5(5)	5							
10164.2(5)								
10169.3(2)	5^+							
10191(3)								
10214(3)								
10221(3)								
10231.2(3)	5^+							
10243(1)	1^+							
10253(3)		6	95Fo03					
10281.1(6)	3^+							
10304(3)								
10317.6(6)	3^-							
10338.3(7)	1^-							
10345.7(7)	5^+							
10353.4(7)	3^+							
10409(3)								
10440(1)	5^+							
10448(1)	$\langle 5^+,7\rangle$							
10478.4(7)	3^+	2						
10501.4(7)	3^-							
10507.4(7)	1^+							
10518.6(7)	5^+							
10533.6(7)	$\langle 3^+,5\rangle$							
10548.8(9)	5^+							
10574.1(8)	3^-							
10592(3)								
10616.4(8)	$\langle 3,5\rangle^+$							
10667(3)								

(continued) **$^{23}_{11}$Na**

E^*	$2J^\pi$	L	Ref.		Branching ratios in percentage			
				E_f^*:	0	440	2076	2391
[keV]		(^{6}Li,d)		$2J_f^\pi$:	3^+	5^+	7^+	1^+
10675(4)	3^-							
10680(3)								
10704(2)	3^-							
10940		3,4	93Te05					
11290		[4]	93Te05					
11540		$\langle 0 \rangle$	93Te05					
11600		$\langle 6 \rangle$	95Fo03					
11760			93Te05					
11880			93Te05					
12230		2	95Fo03					
12557(2)	$\langle 5,7 \rangle^+$							
12920		2,3	95Fo03					
13110		$\langle 4 \rangle$	95Fo03					
13250		3	95Fo03					
14370								
19586(2)	$\langle 5^+ \rangle$							
			Ref.					
			Ref.					

Energy levels and branching ratios [90En08, 98En04]. Part 3 **$^{23}_{11}$Na**

E^*	$2J^\pi$					Branching ratios in percentage						
		E_f^*:	2640	2703	2982	3678	3848	3914	4430	4775	5534	6115
[keV]		$2J_f^\pi$:	1^-	9^+	3^+	3^-	5^-	5^+	1^+	7^+	11^+	
3677.6(1)	3^-		19.6(5)	<0.09	0.5(1)							
3848.1(1)	5^-		4.5(1)	<0.3	2.0(2)	<0.20						
3914.2(1)	5^+		<0.1	<0.7	2.3(2)							
4774.6(1)	7^+		<2.0	4(1)	<2.0	<1.0	<1.0					
5378.6(2)	5^+		<2.0	<3.0	7.1(6)	<2.0	<3.0					
5534(2)	11^+			79(2)								
5741.8(3)	5^+		<4.0	<5.0	<4.0	<3.0	<5.0					
5766.0(2)	3^+		4.4(9)	<6.0	<2.0	<2.0	1.5(7)					
5926.8(3)	7^+				<0.5	<2.0	<3.0	6.7(3)		1.90(10)		
5964.4(5)	3^-		50(10)			15(5)			5(2)			
6042.2(1)	7^-		<9	<4.0	<2.0	12(3)	49(2)	2.8(5)				
6115(2)	5^+–11^+			83(4)								
6194.6(2)	5^-		23(5)			34(7)	32(5)					
6236(2)	$\langle 9,13 \rangle^+$			88(3)							12(3)	
6354.5(3)	9^-			18(3)			66(4)				2.5(6)	
6577.8(2)	$\langle 5,9 \rangle^+$		<7	18(4)	<7	<8	<8	14(3)				
6617.9(7)	$\langle 5,7 \rangle^+$		<3.0		<1.0	<0.8	<0.9	1.1(2)		2.8(1)		
6735.5(2)	3^+					18(5)						

(continued) **$^{23}_{11}$Na**

E^*	$2J^\pi$	Branching ratios in percentage									
	E_f^*:	2640	2703	2982	3678	3848	3914	4430	4775	5534	6115
[keV]	$2J_f^\pi$:	1^-	9^+	3^+	3^-	5^-	5^+	1^+	7^+	11^+	
6819.6(3)	5^-				40(7)	60(7)					
6947.4(2)	$3^{\langle+\rangle}$	8(2)	<5	31(2)	<5	<5	9(2)				
7070.8(2)	$\langle 3\text{–}7^+\rangle$						9.0(20)				
7081.9(3)	3^-	20(2)									
7133.2(7)	$\langle 3,5\rangle^+$			13(2)	<7						
7267(2)			53(4)								36(3)
7277.1(3)	$\langle 5^-,7\rangle$					40(5)					
7390(2)	$\langle 1\text{–}7^+\rangle$		100								
7412.4(3)	$\langle 5\text{–}9^+\rangle$						24(6)				
7451.5(9)	$\langle 5,7\rangle^-$	<6.2	<7.2	<6.2	<6.2	7.7(12)					
7487.8(2)	$\langle 1,3\rangle^-$	20(5)			45(7)						
7724.4(2)	$\langle 1\text{–}5\rangle$			25(5)							
7750.5(2)	$\langle 5,7^+\rangle$			50(2)							
7834.1(2)	$\langle 5^+,7\rangle$		22(7)				20(6)				
7872.8(2)	$\langle 3,5^+\rangle$			29(7)							
7876.2(9)	5				27(5)	25(4)					
7980			100								
8061(3)			50(20)								
8417.4(2)	3^+			23(8)							
8663.8(7)	1^+	7(3)		4(3)							
8945(3)	7^-		100								
9041(2)										21(2)	
9802(2)										20(2)	

Energy levels and branching ratios [90En08, 98En04]. Part 4 **$^{23}_{11}$Na**

E^*	$2J^\pi$	Branching ratios in percentage	
	E_f^*:	6236	7267
[keV]	$2J_f^\pi$:	$\langle 9,13\rangle^+$	
7267(2)		11(2)	
9041(2)		60(3)	19(2)
9802(2)		51(2)	29(2)

Energy levels and branching ratios [04To03, 90En08, 98En04]. **$^{24}_{11}$Na**

E^*	J^π	T	σ (d,p)	Br	ℓ_n	S_n^+	ℓ_n	S_N	S_p^-	ℓ_p	C^2S	C^2S	$T_{1/2}$ or	Ref.
[keV]			μb/sr	%		eval	(d,p)	(d,p)	eval	(d,τ)	(d,τ)	(d,τ)	Γ_{cm}	
0	4^+		1.56	0.003	2	0.3(1)	2	0.69	2.1(5)	2	0.88	1.37	14.959(1) h	77En02
472.207(9)	1^+		1.15	1.69	0	⟨0.02⟩	0	⟨0.01⟩		0		0.16	20.20(7) ms	77En02
					2	0.55(12)	2	0.39		2	0.13	0.41		77En02
563.20(1)	2^+		0.87	18.5	0	0.08(2)	0	0.10		2	0.42		36(6) ps	77En02
					2	⟨0.2⟩	2	⟨0.30⟩						77En02
1341.43(2)	2^+		0.79	4.0			2	⟨0.37⟩		2	0.48	0.58	60(20) fs	04To03
							0	0.62						
1344.59(2)	$3^{\langle+\rangle}$		0.46	0.41									26(6) fs	04To03
1346.62(2)	1^+		incl	0.15									4.4(3) ps	04To03
1511.8(2)	5^+,⟨3^+⟩		0.021							2	0.34	0.53	27(5) fs	98En04
1846.02(2)	2^+		1.06	0.53			0	0.20		2	<0.01	0.07	180(25) fs	04To03
							2	⟨0.39⟩						
1885.53(2)	3^+		0.81	0.42			2	0.29		2	0.14		26(5) fs	04To03
2513.36(3)	3^+		0.56	0.49			2	⟨0.08⟩		2	0.13		10(3) fs	04To03
2563.2(3)	4^+		0.30				2	0.068		2	0.14	0.17	<17 fs	98En04
										0		0.08		
2903.89(3)	3^+		0.09*	0.71						2	<0.3	0.08	35(6) fs	04To03
2977.75(2)	2^+		1.44	13.3			2	0.42		2	<0.06		<17 fs	04To03
3216.6(2)	4^+		0.035							2	0.054	0.08	15(6) fs	98En04
3371.74(2)	2^-		2.32	11.4									13(3) fs	04To03
3413.22(2)	1^+		1.11	0.94			0	0.22		2	0.010		<14 fs	04To03
							2	⟨0.24⟩						
3589.32(3)	1^+		0.21	1.5			0	0.027					<6 fs	04To03
							2	⟨0.09⟩						
3628.24(9)	3^+		1.47	0.23			2	0.27		2	<0.04	0.11	<14 fs	04To03
3655.95(4)	2^+		0.59	0.22			2	0.13		2	<0.04	incl	<14 fs	04To03
3681.80(4)	0^+		0.022	0.70									<14 fs	04To03
3737.6(2)	2^+–4^+		0.23											04To03
3744.97(3)	3^-		2.61	1.0									<17 fs	04To03
3884.9(3)	⟨1–3⟩$^-$		0.012*											04To03
3933.59(5)	1–4		0.56	2.0									<17 fs	04To03
3943.2(3)	2^+,3^+		0.49	0.067									<14 fs	04To03
3977.25(3)	1^-		0.14	2.6									<14 fs	04To03
4048.8(1)	0^-		0.012	0.070									70(30) fs	04To03
4142.6(2)	3^+–6^+		0.011										<20 fs	98En04
4187.3(1)	2^+		2.29										<14 fs	98En04
4196.11(9)	1^-,2^-		0.25	0.43									<10 fs	04To03
4207.07(2)	1^-,2^-		1.26	11.4									23(6) fs	04To03
4220(3)														98En04
4441.63(2)	2^-		0.12	14.1									<35 fs	04To03
4459(8)														98En04
4526.9(2)	3^-		0.25											04To03
4559.1(2)	1^-–3^-		0.18											04To03
4561.94(4)	1^+–3^+			1.2									<10 fs	04To03
4621.3(2)	2^-		0.081	0.10									<10 fs	04To03

(continued) **$^{24}_{11}$Na**

E^* [keV]	J^π	T	σ (d,p) μb/sr	Br %	ℓ_n	S_n^+ eval	ℓ_n (d,p)	S_N (d,p)	S_p^- eval	ℓ_p (d,τ)	C^2S (d,τ)	C^2S (d,τ)	$T_{1/2}$ or Γ_{cm}	Ref.
4693.0(3)	3^-		0.14	0.063									<25 fs	04To03
4750.98(2)	2^-		0.70	5.3										04To03
4772(7)														98En04
4889.3(2)	$\langle 4^- \rangle$		0.012	0.66									<50 fs	98En04
4908.3(2)	2^+–6^+		0.007											04To03
4939.50(5)	2^-		0.24											04To03
4973.8(1)	1^-–3^-		0.15											04To03
5027.3(5)	>–2		0.007										<20 fs	98En04
5045.01(3)	1^-–2^-		0.11	1.2									<30 fs	04To03
5059.63(5)	2^-		0.46	0.8									<50 fs	04To03
5117.22(3)	1^+–2^+		0.44	0.46										04To03
5160(8)														98En04
5180.6(1)	1^-–3^-		2.26											04To03
5192.2(2)	3^-		0.31	0.059									<7 fs	04To03
5245.4(1)	3^-		0.19										<50 fs	04To03
5308.1(2)	1^-–3^-		0.00*											04To03
5338.99(4)	2^-		0.19*	0.58									<14 fs	04To03
5397.6(3)	$\langle 1,3 \rangle^-$		0.037*											98En04
5408.3(2)	1^+,2^+		0.033											04To03
5432(8)	X^+													98En04
5454.57(5)	1,2		0.01*	0.47										04To03
5478.94(5)	1^-		0.14*	0.34									<50 fs	04To03
5571.6(2)	2^+–4^+		0.093											04To03
5629.3(7)	2^-		0.031										<14 fs	98En04
5674.5(3)	1^+,2^+		0.042											04To03
5737.2(2)	1^-–3^-		0.12											04To03
5772.5(4)	1^-–3^-		0.11											98En04
5789.4(9)	3^+–6^+		0.030*											04To03
5809.41(4)	1^-,2^-		0.038	0.98										04To03
5850.7(2)	1^-–3^-		0.67											04To03
5862.9(2)														98En04
5896.7(9)	3^+–6^+		0.092											04To03
5918.22(5)	2^+,$\langle 1^+ \rangle$		0.14*	0.28										04To03
5953.2(1)														98En04
5966(1)	0^+	2											<7 fs	98En04
6072.67(3)	2^+,$\langle 3^+ \rangle$		0.21	0.76										04To03
6088.2(5)	$\langle 1^-$–$5^- \rangle$		0.10*											04To03
6176.2(3)	$\langle 1^-$,$2^- \rangle$		0.039*											04To03
6183.1(7)	$\langle 1^-$–$5^- \rangle$		0.092											04To03
6199.1(2)	$\langle 3^+$–$6^+ \rangle$		0.11											04To03
6223.5(6)			0.014*											98En04
6247.46(4)	2^-		0.089	0.84									<10 fs	04To03
6251.22(5)	0^+–3^+			0.23										04To03
6256.9(3)	1^-,2^-		0.15											04To03
6305.9(5)	2^+–4^+		0.19											04To03

(continued) **$^{24}_{11}$Na**

E^* [keV]	J^π	T	σ (d,p) μb/sr	Br %	ℓ_n	S_n^+ eval	ℓ_n (d,p)	S_N (d,p)	S_p^- eval	ℓ_p (d,τ)	C^2S (d,τ)	C^2S (d,τ)	$T_{1/2}$ or Γ_{cm}	Ref.
6578(4)													<14 fs	98En04
6962.2(1)	1^+												411(13) eV	98En04
6959.44(2)	1^+,2^+												doublt	
6993.4(1)	3^-												1.3(2) eV	98En04
7010.3(1)													1.2(2) keV	98En04
7068.5(2)														
7072.0(2)														
7085.8(2)	0^-													
7096.6(2)														
7141.6(3)														
7151.3(3)	1												5.5(5) keV	98En04
7163.1(3)	0^-												16(4) keV	98En04
7186.2(4)														
7187.0(4)	2^-												5.5(10) keV	98En04
7192.3(4)	0^-												1.8(3) keV	98En04
7245.6(3)	2^+												2.0(8) keV	98En04
7246.1(5)	1^-												0.30(10) keV	98En04
7251.8(5)														
7324.4(6)														
7327.6(6)	1^-												2.6 keV	98En04
7337(1)	1^-												26(3) keV	98En04
7372.7(6)	0^-												7.8(7) keV	98En04
7386.3(6)	2^+												9(3) keV	98En04
7425.5(7)														98En04
7433.7(7)														98En04
7446.1(8)														98En04
7473.9(8)	1^+												35(4) keV	98En04
7499.8(8)													0.8 keV	98En04
7511.3(9)														98En04
7519														98En04
7532.3(9)	1^-												26(3) keV	98En04
7533	1^-													98En04
7627.4													60(6) keV	98En04
7655.5	3^-												45(5) keV	98En04
7708(2)													44(4) keV	98En04
7832(2)													40(4) keV	98En04
7903(2)													27(3) keV	98En04

(continued) **$^{24}_{11}$Na**

E^*	J^π	T	σ (d,p)	Br	ℓ_n	S_n^+	ℓ_n	S_N	S_p^-	ℓ_p	C^2S	C^2S	$T_{1/2}$ or	Ref.
[keV]			μb/sr	%		eval	(d,p)	(d,p)	eval	(d,τ)	(d,τ)	(d,τ)	Γ_{cm}	
			04To03					98Ve01			98Ve01	71Kr04		Ref.
				04To03		77En02		63Da06	77En02					Ref.

Additional data on this isotope can be found in [04To03, 02Ra15, 98Ve01].

* For this state measurements of the (d,p)-reaction [04To03] were performed at different angles.

Experimental data on the transfer reaction $d\sigma/d\Omega$ and branching ratios from the thermal neutron capture were used in [04To03] for the construction of the energy level scheme.

Evaluated parameters S_n^+ and S_p^- from [77En02] are given in the central part of the Table. The columns between them containe estimates of spectroscopic factor $S_{dp}=S_n^+$ [98Ve01] based on data in [63Da06].

Values C^2S for the (d,τ) reaction given in the last but one column are obtained with the assumption of a 1d3/2 transition according to shell-model [98Ve01]; the next column contains analogous data from [71Kr04].

Energy levels and branching ratios [04To03, 90En08, 98En04]. Part 2 **$^{24}_{11}$Na**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	0	472	563	1341	1345	1347	1512.4	1846	1886	2513
[keV]	J_f^π:	4^+	1^+	2^+	2^+	3^+	1^+	5^+,$\langle 3^+\rangle$	2^+	3^+	3^+
472.207(9)	1^+	100									
563.20(1)	2^+	3.4	96.6								
1341.43(2)	2^+		94.7	5.3							
1344.59(2)	$3^{\langle+\rangle}$	55.9		44.1							
1346.62(2)	1^+		99.2	0.8							
1511.8(2)	5^+,$\langle 3^+\rangle$	100									
1846.02(2)	2^+		25.0	16.7	4.7	9.4	44.2				
1885.53(2)	3^+	37.9		62.1							
2513.36(3)	3^+	4.6		93.9	1.5						
2563.2(3)	4^+	33(2)				52(2)		15(2)			
2903.89(3)	3^+	11.6	7.7	1.7	46.9	28.4			2.4	1.3	
2977.75(2)	2^+	0.8	21.7	33.5	32.6	7.8	$\leq$1.2		$\leq$0.2	2.2	
3216.6(2)	4^+					100					
3371.74(2)	2^-		0.3	21.9	27.9	5.2	43.1			1.6	
3413.22(2)	1^+		27.0	12.6	45.7		10.5		4.2		
3589.32(3)	1^+		46.3	37.2	4.2		8.1		4.2		
3628.24(9)	3^+	32.8			47.8	19.4					
3655.95(4)	2^+		13.4	57.2	7.2				8.1	11.4	$\leq$2.7
3681.80(4)	0^+		97.1				2.9				
3744.97(3)	3^-	2.0		14.0	16.2	14.4			46.2	4.1	2.2
3933.59(5)	1–4			60.7	19.6	12.7			7.0		
3943.2(3)	2^+,3^+	100									
3977.25(3)	1^-		47.2	29.1			20.3		1.4		
4048.8(1)	0^-		68.3				31.7				

(continued)

$^{24}_{11}$Na

E^*	J^π		Branching ratios in percentage									
		E_f^*:	0	472	563	1341	1345	1347	1512.4	1846	1886	2513
[keV]		J_f^π:	4^+	1^+	2^+	2^+	3^+	1^+	$5^+,\langle 3^+\rangle$	2^+	3^+	3^+
4142.6(2)	3^+–6^+		50(10)									
4187.3(1)	2^+		5(2)					26(6)			69(6)	
4196.11(9)	$1^-,2^-$			61.3	≤19.8					14.2		
4207.07(2)	$1^-,2^-$			0.6	11.4	19.0		30.5		14.0		
4220(3)			10(5)						90(5)			
4441.63(2)	2^-			3.1	31.7	19.4	25.8	4.0		7.0	0.5	6.9
4561.94(4)	1^+–3^+			36.9						49.9		8.8
4621.3(2)	2^-				79.1							
4693.0(3)	3^-		99.4									
4750.98(2)	2^-			0.4	27.9	8.2				19.6	9.7	2.7
4889.3(2)	$\langle 4^-\rangle$		100									
4939.50(5)	2^-			53.0	20.1	13.2	10.5					
5027.3(5)	>–2		40		60							
5045.01(3)	1^-–2^-			8.4	16.9	38.7		17.6		18.3		
5059.63(5)	2^-		4.0	21.7	56.2						5.0	4.7
5117.22(3)	1^+–2^+			14.8	21.6			22.2		26.5	6.2	
5192.2(2)	3^-				100							
5245.4(1)	3^-		100									
5338.99(4)	2^-				30.5	54.9				14.6		
5397.6(3)	$\langle 1,3\rangle^-$					83(4)						
5454.57(5)	1,2			14.6	70.9			7.3				
5478.94(5)	1^-			16.4	23.0	52.4		8.2				
5629.3(7)	2^-			70		30						
5772.5(4)	1^-–3^-					100						
5809.41(4)	$1^-,2^-$			1.7				20.0				
5862.9(2)						43(9)						
5918.22(5)	$2^+,\langle 1^+\rangle$			50.9				43.9				
5953.2(1)										8(1)		
5966(1)	0^+			76(4)				14(3)				
6072.67(3)	$2^+,\langle 3^+\rangle$			18.1		53.4	3.6	13.7		5.4		
6176.2(3)	$\langle 1^-,2^-\rangle$			100								
6223.5(6)					5(1)			5(1)		85(3)		
6247.46(4)	2^-			33.3	1.7			19.2			2.5	
6251.22(5)	0^+–3^+					19.7		56.6			23.7	
6256.9(3)	$1^-,2^-$			25.9								
6578(4)				17	40							

Energy levels and branching ratios [04To03, 90En08, 98En04]. Part 3 **$^{24}_{11}$Na**

E^*	J^π		Branching ratios in percentage									
		E_f^*:	2562.8	2904	2978	3372	3413	3589	3628	3656	3682	3745
[keV]		J_f^π:	4^+,$\langle 2^+\rangle$	3^+	2^+	2^-	1^+	1^+	3^+	2^+	0^+	3^-
3977.25(3)	1^-				0.8	1.2						
4142.6(2)	3^+–6^+		50(10)									
4196.11(9)	1^-,2^-				4.7							
4207.07(2)	1^-,2^-				2.5	18.3	3.3			0.4		
4441.63(2)	2^-						0.5	0.5	0.09	≤0.3		0.3
4561.94(4)	1^+–3^+				4.4				20.9			
4621.3(2)	2^-								20.9			
4693.0(3)	3^-				0.6							
4750.98(2)	2^-			1.7	3.5	≤0.6	11.8			2.3		8.6
4939.50(5)	2^-						≤3.2					
5045.01(3)	1^-–2^-						16(2)	3(2)				
5059.63(5)	2^-											8.3
5117.22(3)	1^+–2^+				≤8.6							
5397.6(3)	$\langle 1,3\rangle^-$									17(4)		
5809.41(4)	1^-,2^-							4.1				
5862.9(2)												57(9)
5953.2(1)											19(3)	
5966(1)	0^+							10(2)				
6072.67(3)	2^+,$\langle 3^+\rangle$			5.8								
6223.5(6)					4(1)							
6247.46(4)	2^-			36.4		2.7		4.1		32(2)		
6578(4)						43						

Energy levels and branching ratios [04To03, 90En08, 98En04]. Part 4 **$^{24}_{11}$Na**

E^*	J^π		Branching ratios in percentage										
		E_f^*:	3934	3943	3977	4049	4187	4196	4442	4562	4621	4693	5060
[keV]		J_f^π:	1–4	2^+,3^+	1^-	0^-	2^+	1^-,2^-	2^-	X^+	2^-	3^-	2^-
4750.98(2)	2^-				1.9	0.9							
5454.57(5)	1,2				4.4				2.7				
5809.41(4)	1^-,2^-				22.5					31.7			
5918.22(5)	2^+,$\langle 1^+\rangle$											5.2	
5953.2(1)			22(6)	51(5)									
6247.46(4)	2^-						6(2)						
6256.9(3)	1^-,2^-				74.1								

Energy levels and branching ratios [90En08, 98En04].

$^{25}_{11}$Na

E^* [keV]	$2J^\pi$	S_p^- eval	S_N (d,τ)	S_N (t,α)	$T_{1/2}$ or Γ_{cm}	Ref.	E_f^*: $2J_f^\pi$:	Branching ratios in percentage 0 5^+	89.5 3^+	1069 1^+	2202 3^+	2417 $\langle 7,3\rangle$
0	5^+	3.7(7)	3.9*	2.83	59.1(6) s	77En02						
89.53(10)	3^+				5.1(3) ns			100				
1069.32(19)	1^+	0.46(8)	0.38	0.12	1.32(14) ps	77En02		10(1)	90(1)			
2202(1)	3^+		0.27	0.20	25(4) fs	84Ki11		53(2)	20(2)	27(2)		
2417(3)	$\langle 7,3\rangle$		0.41		140(100) fs	84Ki11		100				
2788(3)	3^+,7^+				175(35) fs			100				
2914(3)	5^+			0.19	10(4) fs				100			
3353(3)	3–7^+				16(5) fs			90(3)	10(3)			
3455(5)					150(20) fs							x
3687(2)	1^+–5^+				18(8) fs			80(4)	20(4)			
3928(5)					<30 fs			x				
3950(3)					<85 fs			x	x	x		
3995(4)	1^-		2.84		31(7) fs	84Ki11			x	x	x	
4136(5)					16(6) fs			x				
4289(3)	1^+		0.05			84Ki11				x		
4340(7)												
4450(10)												
4710(10)												
4800(10)												
4962(10)												
5146(10)												
5190(9)	3^-		1.24			84Ki11						
5223(10)												
5347(10)												
5378(10)												
5465(10)												
5484(12)												
5690(10)	3^-		0.26			84Ki11						
5713(12)												
5746(12)												
5876(12)												
6005(22)	$\langle 1,3\rangle^-$		0.09			84Ki11						
6079(15)												
6154(15)												
6549(19)	3^-		0.21			84Ki11						
6753(21)	1^-,3^-											
6863(20)												
6936(20)												
6985(20)												
7603(17)	3^-		0.40			84Ki11						
7780(25)												
8052(26)	$\langle 1,3\rangle^-$		0.18			84Ki11						
8400(25)												
		77En02	84Ki11	87Pe09		Ref.						

* $3/2^+$ states contributes only 8% to the strength of the unresolved doublet [84Ki11].

Energy levels and branching ratios [90En08, 98En04]. **$^{26}_{11}$Na**

E^*	J^π	$T_{1/2}$ or	Branching ratios in percentage		
			E_f^*:	0	82.5
[keV]		Γ_{cm}	J_f^π:	3^+	1^+
0	3^+	1.077(5) s			
82.5(5)	1^+	9 μs		100	
233.6(2)	1^+			x	x
420(15)					
1996(30)					
2048(15)					
2186(15)					
2290(15)					
2456(15)					
2697(15)					
2815(15)					
2933(15)					
3123(15)					
3232(15)					
3310(15)					
3400(15)					
3618(15)					
3814(15)					
3966(15)					
4083(15)					
4190(15)					
4440(15)					
4702(15)					
4940(30)					
5080(60)					

Energy levels [90En08, 98En04]. **$^{27}_{11}$Na**

E^*	$2J^\pi$	$T_{1/2}$ or	Ref.
[keV]		Γ_{cm}	
0.0	5^+	301(6) ms	
62	3^+		02Co11
1725	$\langle 1^- \rangle$		02Co11
1815	$\langle 1^+ \rangle$		02Co11
2191	$\langle 7^+ \rangle$		02Co11
2224	$\langle 9^+ \rangle$		02Co11
2729*	$\langle 5^+ \rangle$		02Co11
3017*	$\langle 3^+ \rangle$		02Co11
3657	$\langle 9^+ \rangle$		02Co11
3837	$\langle 5^+ \rangle$		02Co11
4235	$\langle 7^+ \rangle$		02Co11

(continued) **$^{27}_{11}$Na**

E^* [keV]	$2J^\pi$	$T_{1/2}$ or Γ_{cm}	Ref.
4716	$\langle 3^+ \rangle$		02Co11
5190	$\langle 13^+ \rangle$		02Co11
5408	$\langle 11^+ \rangle$		02Co11
5704	$\langle 11^+ \rangle$		02Co11
5948	$\langle 9^+ \rangle$		02Co11
6158*	$\langle 9^+ \rangle$		02Co11
6741	$\langle 7^+ – 11^+ \rangle$		02Co11
9186	$\langle 17^+ \rangle$		02Co11

Additional data on this isotope can be found in [02Ta10, 01Co05].
* Excitation energy may be 62 keV higher [02Co11].