$^{208}Pb(^{18}O,2n\gamma)$ 1986Sc12

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Sukhjeet Singh	ENSDF	08-Mar-2022

1986Sc12: E(^{18}O)=78,79 MeV; target=140 μg/cm^2 placed between thin carbon foils. Measured $\gamma\gamma$(recoil)- and (ce)γ(recoil)-coin, $\gamma(\theta)$ at 145° and 90°.
Additional information 1.
The level scheme is constructed on the basis of coincidence data, energy sums and systematics.

^{224}Th Levels

E(level)[†]	J$^\pi$[‡]	Comments
0[#]	0$^+$	
98.8[#] *5*	2$^+$	
251.0?[@] *3*	1$^-$	E(level),J$^\pi$: from Adopted Levels. 1986Sc12 list 246 keV *5*, but this level is probably not populated in this reaction.
284.5[#] *7*	4$^+$	
305.7[@] *7*	3$^-$	
464.9[@] *9*	5$^-$	
534.9[#] *9*	6$^+$	
699.6[@] *10*	7$^-$	
834.0[#] *10*	8$^+$	
996.9[@] *11*	9$^-$	
1172.8[#] *12*	10$^+$	
1346.2?[@] *13*	11$^-$	

[†] From least-squares fit to Eγ data, assuming 0.5 keV uncertainty for each Eγ.
[‡] From 1986Sc12 based on band structures.
[#] Band(A): K^π=0$^+$ g.s. band.
[@] Band(B): K^π=0$^-$ band.

$\gamma(^{224}Th)$

E$_\gamma$[†]	I$_\gamma$[‡]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[#]	α[&]	I$_{(\gamma+ce)}$[†]	Comments
70.1	15	534.9	6$^+$	464.9	5$^-$	[E1]	0.300	19	ce(L)/(γ+ce)=0.1743 *21*; ce(M)/(γ+ce)=0.0426 *6* ce(N)/(γ+ce)=0.01117 *16*; ce(O)/(γ+ce)=0.00251 *4*; ce(P)/(γ+ce)=0.000429 *7*; ce(Q)/(γ+ce)=2.19×10^{-5} *4* α(L)=0.227 *4*; α(M)=0.0554 *8* α(N)=0.01452 *21*; α(O)=0.00326 *5*; α(P)=0.000558 *8*; α(Q)=2.85×10^{-5} *4*
98.8	10	98.8	2$^+$	0	0$^+$	E2[@]	11.92	135	ce(L)/(γ+ce)=0.675 *7*; ce(M)/(γ+ce)=0.185 *4* ce(N)/(γ+ce)=0.0497 *10*; ce(O)/(γ+ce)=0.01107 *21*; ce(P)/(γ+ce)=0.00184 *4*; ce(Q)/(γ+ce)=7.99×10^{-6} *16* α(L)=8.72 *13*; α(M)=2.40 *4* α(N)=0.642 *9*; α(O)=0.1431 *20*; α(P)=0.0237 *4*; α(Q)=0.0001032 *15*
134.5	16	834.0	8$^+$	699.6	7$^-$	(E1)	0.243	20	ce(K)/(γ+ce)=0.1518 *19*; ce(L)/(γ+ce)=0.0329 *5*; ce(M)/(γ+ce)=0.00796 *12*

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^{208}Pb(^{18}O,2nγ) 1986Sc12 (continued)

$\gamma(^{224}Th)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[&]	$I_{(\gamma+ce)}$[†]	Comments
									ce(N)/(γ+ce)=0.00210 *3*; ce(O)/(γ+ce)=0.000480 *7*; ce(P)/(γ+ce)=8.64×10^{-5} *13*; ce(Q)/(γ+ce)=5.45×10^{-6} *8* α(K)=0.189 *3*; α(L)=0.0409 *6*; α(M)=0.00990 *14* α(N)=0.00261 *4*; α(O)=0.000597 *9*; α(P)=0.0001073 *15*; α(Q)=6.78×10^{-6} *10*
162.9	10	996.9	9$^-$	834.0	8$^+$	[E1]	0.1536	12	ce(K)/(γ+ce)=0.1045 *14*; ce(L)/(γ+ce)=0.0217 *3*; ce(M)/(γ+ce)=0.00523 *8* ce(N)/(γ+ce)=0.001381 *20*; ce(O)/(γ+ce)=0.000317 *5*; ce(P)/(γ+ce)=5.77×10^{-5} *9*; ce(Q)/(γ+ce)=3.84×10^{-6} *6* α(K)=0.1205 *17*; α(L)=0.0250 *4*; α(M)=0.00604 *9* α(N)=0.001593 *23*; α(O)=0.000366 *6*; α(P)=6.65×10^{-5} *10*; α(Q)=4.43×10^{-6} *7*
164.8	26	699.6	7$^-$	534.9	6$^+$	(E1)	0.1494	30	ce(K)/(γ+ce)=0.1020 *13*; ce(L)/(γ+ce)=0.0211 *3*; ce(M)/(γ+ce)=0.00510 *8* ce(N)/(γ+ce)=0.001345 *19*; ce(O)/(γ+ce)=0.000309 *5*; ce(P)/(γ+ce)=5.62×10^{-5} *8*; ce(Q)/(γ+ce)=3.76×10^{-6} *6* α(K)=0.1173 *17*; α(L)=0.0243 *4*; α(M)=0.00586 *9* α(N)=0.001546 *22*; α(O)=0.000356 *5*; α(P)=6.46×10^{-5} *9*; α(Q)=4.32×10^{-6} *6*
173.4[a]	3.5	1346.2?	11$^-$	1172.8	10$^+$	(E1)	0.1323	4	ce(K)/(γ+ce)=0.0919 *12*; ce(L)/(γ+ce)=0.0188 *3*; ce(M)/(γ+ce)=0.00455 *7* ce(N)/(γ+ce)=0.001200 *17*; ce(O)/(γ+ce)=0.000276 *4*; ce(P)/(γ+ce)=5.03×10^{-5} *7*; ce(Q)/(γ+ce)=3.41×10^{-6} *5* α(K)=0.1041 *15*; α(L)=0.0213 *3*; α(M)=0.00515 *8* α(N)=0.001359 *19*; α(O)=0.000313 *5*; α(P)=5.70×10^{-5} *8*; α(Q)=3.86×10^{-6} *6*
175.9	5	1172.8	10$^+$	996.9	9$^-$	(E1)	0.1279	6	ce(K)/(γ+ce)=0.0893 *12*; ce(L)/(γ+ce)=0.0182 *3*; ce(M)/(γ+ce)=0.00440 *7* ce(N)/(γ+ce)=0.001162 *17*; ce(O)/(γ+ce)=0.000267 *4*; ce(P)/(γ+ce)=4.88×10^{-5} *7*; ce(Q)/(γ+ce)=3.31×10^{-6} *5* α(K)=0.1007 *14*; α(L)=0.0206 *3*; α(M)=0.00496 *7* α(N)=0.001310 *19*; α(O)=0.000302 *5*; α(P)=5.50×10^{-5} *8*; α(Q)=3.74×10^{-6} *6*
180.4	28	464.9	5$^-$	284.5	4$^+$	(E1)	0.1204	31	ce(K)/(γ+ce)=0.0847 *11*; ce(L)/(γ+ce)=0.01723 *24*; ce(M)/(γ+ce)=0.00415 *6* ce(N)/(γ+ce)=0.001097 *16*; ce(O)/(γ+ce)=0.000253 *4*; ce(P)/(γ+ce)=4.62×10^{-5} *7*; ce(Q)/(γ+ce)=3.16×10^{-6} *5* α(K)=0.0949 *14*; α(L)=0.0193 *3*; α(M)=0.00466 *7*

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^{208}Pb(^{18}O,2nγ) 1986Sc12 (continued)

γ(^{224}Th) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[&]	$I_{(\gamma+ce)}$[†]	Comments
									ce(Q)/(γ+ce)=3.16×10^{-6} *5* α(K)=0.0949 *14*; α(L)=0.0193 *3*; α(M)=0.00466 *7* α(N)=0.001229 *18*; α(O)=0.000283 *4*; α(P)=5.17×10^{-5} *8*; α(Q)=3.54×10^{-6} *5*
185.7	54	284.5	4$^+$	98.8	2$^+$	E2[@]	0.868	100	ce(K)/(γ+ce)=0.0962 *14*; ce(L)/(γ+ce)=0.270 *4*; ce(M)/(γ+ce)=0.0737 *11* ce(N)/(γ+ce)=0.0197 *3*; ce(O)/(γ+ce)=0.00442 *7*; ce(P)/(γ+ce)=0.000745 *12*; ce(Q)/(γ+ce)=7.97×10^{-6} *13* α(K)=0.180 *3*; α(L)=0.504 *7*; α(M)=0.1377 *20* α(N)=0.0369 *6*; α(O)=0.00827 *12*; α(P)=0.001392 *20*; α(Q)=1.488×10^{-5} *21*
206.9	23	305.7	3$^-$	98.8	2$^+$	(E1)	0.0871	25	ce(K)/(γ+ce)=0.0635 *9*; ce(L)/(γ+ce)=0.01261 *18*; ce(M)/(γ+ce)=0.00303 *5* ce(N)/(γ+ce)=0.000802 *12*; ce(O)/(γ+ce)=0.000185 *3*; ce(P)/(γ+ce)=3.40×10^{-5} *5*; ce(Q)/(γ+ce)=2.41×10^{-6} *4* α(K)=0.0690 *10*; α(L)=0.01370 *20*; α(M)=0.00330 *5* α(N)=0.000872 *13*; α(O)=0.000201 *3*; α(P)=3.70×10^{-5} *6*; α(Q)=2.62×10^{-6} *4*
250.4	18	534.9	6$^+$	284.5	4$^+$	(E2)	0.300	23	ce(K)/(γ+ce)=0.0800 *11*; ce(L)/(γ+ce)=0.1107 *15*; ce(M)/(γ+ce)=0.0300 *5* ce(N)/(γ+ce)=0.00803 *12*; ce(O)/(γ+ce)=0.00181 *3*; ce(P)/(γ+ce)=0.000308 *5*; ce(Q)/(γ+ce)=5.37×10^{-6} *8* α(K)=0.1040 *15*; α(L)=0.1440 *21*; α(M)=0.0389 *6* α(N)=0.01043 *15*; α(O)=0.00235 *4*; α(P)=0.000401 *6*; α(Q)=6.98×10^{-6} *10*
297.3[a]	3.4	996.9	9$^-$	699.6	7$^-$	[E2]	0.1734	4	ce(K)/(γ+ce)=0.0632 *9*; ce(L)/(γ+ce)=0.0622 *9*; ce(M)/(γ+ce)=0.01669 *24* ce(N)/(γ+ce)=0.00447 *7*; ce(O)/(γ+ce)=0.001009 *15*; ce(P)/(γ+ce)=0.0001738 *25*; ce(Q)/(γ+ce)=3.96×10^{-6} *6* α(K)=0.0742 *11*; α(L)=0.0730 *11*; α(M)=0.0196 *3* α(N)=0.00524 *8*; α(O)=0.001185 *17*; α(P)=0.000204 *3*; α(Q)=4.64×10^{-6} *7*
298.9	10	834.0	8$^+$	534.9	6$^+$	[E2]	0.1706	12	ce(K)/(γ+ce)=0.0627 *9*; ce(L)/(γ+ce)=0.0610 *9*; ce(M)/(γ+ce)=0.01638 *23* ce(N)/(γ+ce)=0.00439 *7*; ce(O)/(γ+ce)=0.000991 *14*; ce(P)/(γ+ce)=0.0001707 *25*; ce(Q)/(γ+ce)=3.92×10^{-6} *6* α(K)=0.0734 *11*; α(L)=0.0715 *10*; α(M)=0.0192 *3* α(N)=0.00514 *8*; α(O)=0.001160 *17*; α(P)=0.000200 *3*; α(Q)=4.59×10^{-6} *7*
339[a]		1172.8	10$^+$	834.0	8$^+$	[E2]	0.1175		α(K)=0.0572 *8*; α(L)=0.0444 *7*; α(M)=0.01183 *17* α(N)=0.00317 *5*; α(O)=0.000718 *10*; α(P)=0.0001246 *18*; α(Q)=3.44×10^{-6} *5*

[†] From level scheme figure 3 in 1986Sc12.
[‡] Deduced by evaluators from Iγ+ce and conversion coefficients.

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^{208}Pb(^{18}O,2nγ) 1986Sc12 (continued)

$\gamma(^{224}Th)$ (continued)

From Iγ(145°)/Iγ(90°) ratios displayed in figure 2 of 1986Sc12, and interpreted as stretched quadrupoles and stretched dipoles, unless otherwise noted. Based on band structures stretched quadrupoles are assumed as E2 and stretched dipoles as E1.

@ Intensities of L1, and L2+L3 peaks displayed in spectral figure 1 of 1986Sc12 are consistent with E2.

& Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

a Placement of transition in the level scheme is uncertain.

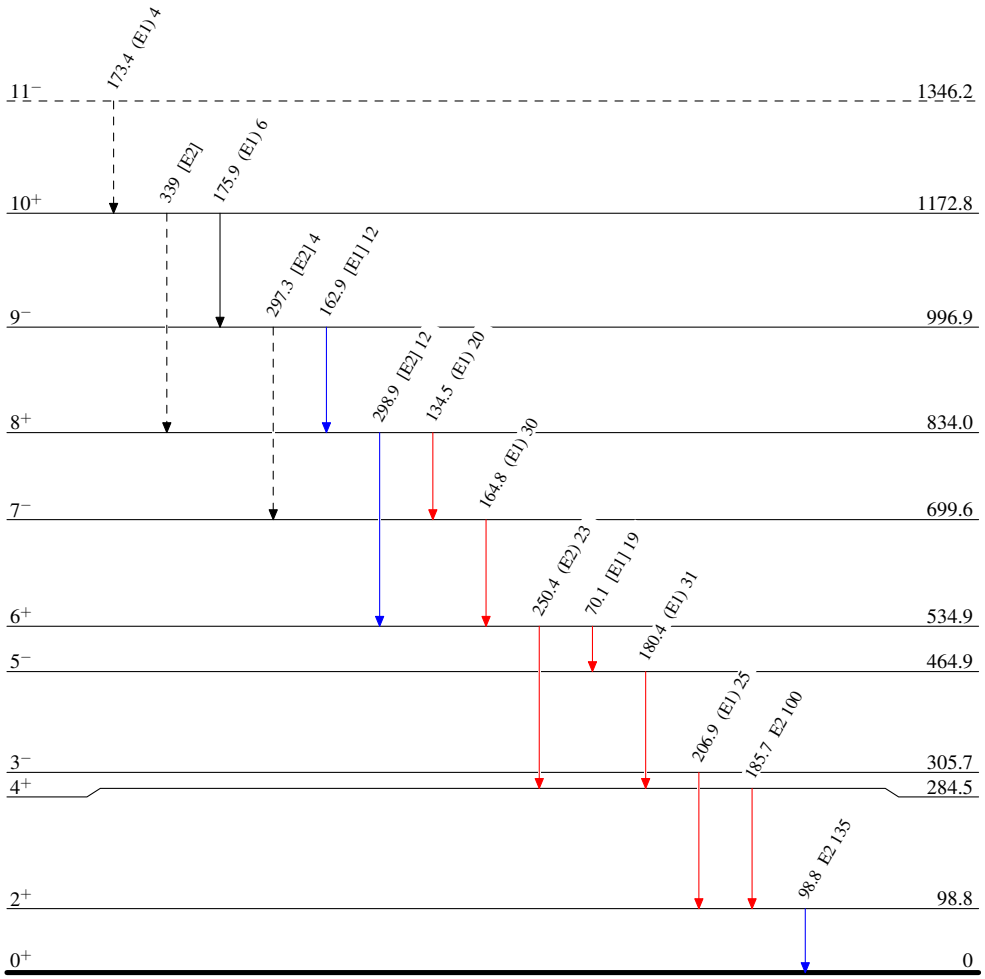
^{208}Pb(^{18}O,2nγ) 1986Sc12

Level Scheme

Intensities: Relative $I_{(\gamma+ce)}$

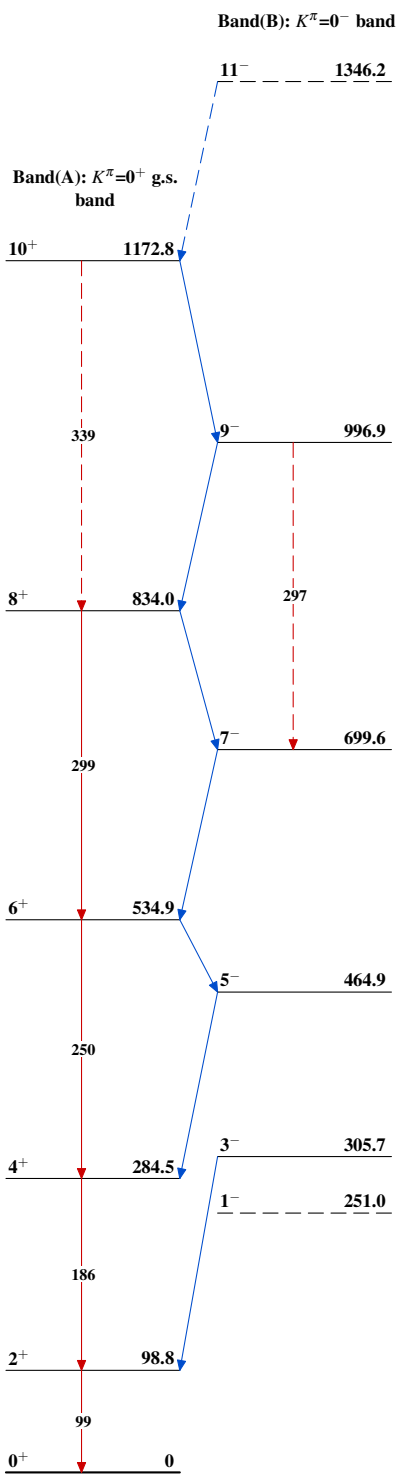
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



$^{224}_{90}Th_{134}$

$^{208}Pb(^{18}O,2n\gamma)$ 1986Sc12



$^{224}_{90}Th_{134}$