

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia		NDS 121, 561 (2014)	31-Mar-2014

$Q(\beta^-)=63.5$ 5; $S(n)=5185.2$ 13; $S(p)=8379$ 8; $Q(\alpha)=3792$ 20 [2012Wa38](#)

Other Reactions:

$^9\text{Be}(^{238}\text{U},X)$: [2009A132](#) – Measured production cross section for ^{210}Pb $\sigma \approx 1$ μb (estimated from authors' Fig. 4.).

$^{208}\text{Pb}(^{11}\text{Li},^9\text{Li})$: [1992SoZT](#), [1992VaZO](#).

 ^{210}Pb LevelsCross Reference (XREF) Flags

A	^{210}Tl β^- decay (1.30 min)	E	$^{208}\text{Pb}(t,p\gamma)$	I	$^{210}\text{Pb}(t,t')$ $E=20$ MeV
B	^{214}Po α decay	F	$^{208}\text{Pb}(\alpha,^2\text{He})$	J	(HI,xn γ)
C	^{214}Bi $\beta^- \alpha$ decay	G	$^{208}\text{Pb}(^7\text{Li},\alpha p\gamma)$ $E=33$ MeV		
D	$^{208}\text{Pb}(t,p)$, (pol t,p)	H	$^{210}\text{Pb}(p,p')$ $E=20.5$ MeV		

E(level) ^e	J ^{π}	T _{1/2}	XREF	Comments
0.0 [†]	0 ⁺	22.20 y 22	ABCDEFGHIJ	$\% \beta^- = 100$; $\% \alpha = 1.9 \times 10^{-6}$ 4 $\% \alpha$: Weighted average of $\% \alpha = 1.7 \times 10^{-6}$ 3 (1962Ka27) and $\% \alpha = 2.7 \times 10^{-6}$ 6 (1964Wo05). T _{1/2} : weighted average of: 22.4 y 4 (1957Me47), 23.3 y 5 (1959Pa03), 21.4 y 5 (1960Ec01), 22.9 y 7 (1963Im02), 22.0 y 5 (1964Ra12), 22.2 y 10 (1967Vo04), 22.26 y 22 (1969Ho06), and 21.8 y 3 (2002Re18). Evaluator's recommended uncertainty (0.22 y) is from 1969Ho06 . 2008ChZV recommended a value of 22.23 y 12. Others: 1931Cu01 , 1955To14 , 1959Ha20 . Isotope shift: 1987Za02 , 1986An06 , 1995Sh13 .
799.7 [†] 1	2 ⁺	17 ps 5	ABCDE GHIJ	T _{1/2} : from B(E2)(0 ⁺ to 2 ⁺)=0.051 15 (1971El03) in (t,t'). E(level): first 2 ⁺ states in ^{206}Pb , ^{212}Pb occur at 803, 805 keV, respectively. J ^{π} : 799.7 γ E2 to 0 ⁺ .
1097.7 [†] 10	4 ⁺	0.6 ns 1	AB DE GH J	T _{1/2} : from $\beta(298\gamma,799\gamma)(t)$ in ^{210}Tl β^- decay (1964We06). Other value: 0.9 ns 2 $\gamma\gamma(t)$ (1961St20). J ^{π} : L=4 in (t,p).
1195 [†] 4	6 ⁺	49 ns 6	A DE GH J	$\mu = -1.872$ 90 μ : DPAD, corrected for Knight shift (1989Ra17 , 1983De34). T _{1/2} : DPAD in $^{208}\text{Pb}(t,p\gamma)$ (1983De34). Other values: 21 ns 7, $\gamma(t)$ pulsed beam (1980Sj01). J ^{π} : L=6 in (t,p).
1278 [†] 5	8 ⁺	201 ns 17	A DEFG J	$\mu = -2.496$ 64 μ : DPAD, corrected for Knight shift (1989Ra17 , 1983De34). T _{1/2} : DPAD in $^{208}\text{Pb}(t,p\gamma)$ (1983De34). Other values: 156 ns 15, $\gamma(t)$ pulsed beam (1980Sj01); 152 ns 13, $\gamma(t)$ pulsed beam in $^{208}\text{Pb}(^{18}\text{O},^{16}\text{O}'\gamma)$ (1981Bo29). J ^{π} : L=8 in (t,p).
1806 [#] 5	(10 ⁺)		D F J	J ^{π} : L=(10) in (t,p).
1870 [‡] 10	3 ⁻		A D HI	J ^{π} : L=3 in (t,p), (p,p'), (t,t'). B(E3)(0 ⁺ to 3 ⁻)=0.47 11 in (t,t') (1971El03). (t,t') strength of split 3 ⁻ states is close to strength of 3 ⁻ , ^{208}Pb first excited state at 2614 keV.
2003 15			D	
2038 15			D	
2118?			J	

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Adopted Levels, Gammas (continued) ^{210}Pb Levels (continued)

E(level) ^e	J ^π	XREF			Comments
2209 13	(2 ⁺)	A	D	H	J ^π : L=2 in (t,p); γ rays to 2 ⁺ , 4 ⁺ states.
2414 12		A	D		
2454 15			D		
2512 ^a 5	(11 ⁻) ^f		F	J	
2518 ^d 10	(6 ⁺)		D	H	J ^π : L=6 in (t,p).
2701 15	(4 ⁺)		D		J ^π : L=4 in (t,p).
2790 15			D		
2828 ^{‡d} 10	3 ⁻		D	HI	J ^π : L=3 in (p,p'), (t,t'). B(E3)(0 ⁺ to 3 ⁻)=0.25 7 in (t,t') (1971El03). See (p,p') for relative strengths of split 3 ⁻ collective excitations at 1870, 2828 keV.
2861 15			D		
2901 15	(5 ⁻)		D		J ^π : L=(5) in (t,p). E(level): first 5 ⁻ states in ²⁰⁶ Pb, ²⁰⁸ Pb occur at 2782, 3198 keV, respectively.
2986 15			D		
3070 12	(2 ⁺)	A		HI	J ^π : L=(2) in (p,p'); γ rays to 2 ⁺ states.
3120 15			D		
3150 15	(6 ⁺)		D		J ^π : L=(6) in (t,p).
3152 ^b 5	(13 ⁻) ^f		F	J	
3194 10	(4 ⁺)			H	J ^π : L=(4) in (p,p').
3215?				J	
3223 15			D	I	
3281 15			D		
3312 15	(8 ⁺)		D		J ^π : L=8 in (t,p).
3365 15			D		
3420 15			D	F	
3460 32	(4 ⁺)	A	D		J ^π : L=4 in (t,p); γ rays to 3 ⁻ , 4 ⁺ states.
3560 15			D		
3625 19		A	D		
3657 15			D		
3702 15			D		
3755 15			D		
3792 15			D		
3829 15			D		
3880 32		A	D		
4055 15			D		
4080 ^d 10	(2 ⁺)			H	J ^π : L=2 in (p,p').
4105 28		A		I	
4128 ^d 10	(2 ⁺)		D	H	J ^π : L=(2) in (p,p').
4133 ^c 5	(14 ⁺) ^f		F	J	
4185 ^d 10			D	H	
4255 15			D		
4285 ^d 10			D	H	L=(4) in (p,p').
4390 ^{&d} 10	(9 ⁻) ^f		D	F H	XREF: F(4370).
4470 15			D		
4570 15			D		
4586 15			D		
4675 15			D		
4754?				J	
4949 [@] 15	(11 ⁻) ^f		D	F	XREF: F(4890).
5165				J	
5396 ^d 10				H	
5445 ^d 10				H	
5492 ^d 10				H	

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Adopted Levels, Gammas (continued) ^{210}Pb Levels (continued)

E(level) ^e	XREF
5544	J
5557	J
5599	J
5688	J
5741	J
5839	J

[†] Configuration=(ν 2g_{9/2})²; (t,p) strength indicates appreciable configuration mixing except for J ^{π} =6⁺,8⁺ states.

[‡] Configuration=((ν 2g_{9/2}) (ν 1j_{15/2}))3⁻ and Configuration=((208 π B3⁻) (ν 2g_{9/2}0))3 admixed.

Configuration=((ν 2g_{9/2}) (ν 1i_{11/2}))10⁺.

@ Configuration=((ν 1j_{15/2}) (ν 2g_{7/2}))11⁻.

& Configuration=((ν 1j_{15/2}) (ν 3d_{5/2}))9⁻.

^a Configuration=((ν 2g_{9/2}) (ν 1j_{15/2}))11⁻.

^b Configuration=((ν 1i_{11/2}) (ν 1j_{11/2}))13⁻.

^c Configuration=(ν 1j_{15/2})²14⁺.

^d From $^{210}\text{Pb}(\text{p,p}')$.

^e Deduced by evaluator from a least-squares fit to Adopted γ -ray energies, except for levels populated only in $^{208}\text{Pb}(\text{t,p})$, $^{209}\text{Pb}(\text{pol t, p})$, $^{210}\text{Pb}(\text{t,t}')$, $^{210}\text{Pb}(\text{p,p}')$, and $^{208}\text{Pb}(\alpha,^2\text{He})$. $\Delta E=15$ keV in (t,p), estimated in 1981Ha54.

^f From L values and shell model calculations in 1993Vo02 ($\alpha,^2\text{He}$).

 $\gamma(^{210}\text{Pb})$

$E_i(\text{level})$	J_i^π	E_γ @	I_γ	E_f	J_f^π	Mult. @	α &	Comments
799.7	2 ⁺	799.7 [†] 1		0.0	0 ⁺	E2	0.0105	B(E2)(W.u.)=1.4 4
1097.7	4 ⁺	298 [†] 1		799.7	2 ⁺	E2	0.119	B(E2)(W.u.)=4.8 9
1195	6 ⁺	97 [‡] 3	100	1097.7	4 ⁺	[E2]	6.71	B(E2)(W.u.)=2.1 8 E _{γ} : From ^{210}Tl β^- decay.
1278	8 ⁺	83 [‡] 3	100	1195	6 ⁺	[E2]	17.9	B(E2)(W.u.)=0.7 3 E _{γ} : From ^{210}Tl β^- decay.
1806	(10 ⁺)	528.0 [#] 2	100 [#]	1278	8 ⁺			
1870	3 ⁻	1070 10	100	799.7	2 ⁺			
2209	(2 ⁺)	1110 20	100 29	1097.7	4 ⁺			
		1410 20	71 29	799.7	2 ⁺			
2414		1316 13	100	1097.7	4 ⁺			
2512	(11 ⁻)	1233.7 [#] 2	100 [#]	1278	8 ⁺			
3070	(2 ⁺)	860 30	100 29	2209	(2 ⁺)			
		2270 13	43 29	799.7	2 ⁺			
3152	(13 ⁻)	640.4 [#] 2	83 [#]	2512	(11 ⁻)			
		1346.0 [#] 2	100 [#]	1806	(10 ⁺)			
3460	(4 ⁺)	1590 30	25 13	1870	3 ⁻			
		2360 30	100 38	1097.7	4 ⁺			
3625		1210 20	100 24	2414				
		2430 30	53 18	1195	6 ⁺			
3880		2010 30		1870	3 ⁻			
4105		480 20		3625				
4133	(14 ⁺)	981.0 [#] 4	100 [#]	3152	(13 ⁻)			

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Adopted Levels, Gammas (continued)

 $\gamma(^{210}\text{Pb})$ (continued)

† From ^{214}Po α decay.

‡ From $^{208}\text{Pb}(^7\text{Li},\alpha p\gamma)$.

From $(\text{HI},x n\gamma)$, $^{238}\text{U}(^{208}\text{Pb},x n\gamma)$.

@ From ^{210}Tl β^- decay, unless otherwise specified.

& 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.

Adopted Levels, GammasLevel Scheme

Intensities: Relative photon branching from each level

