

## <sup>209</sup>Pb - Comments on evaluation of decay data by F. G. Kondev

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### 1 Decay Scheme

The nuclide <sup>209</sup>Pb ( $J^\pi = 9/2^+$ ) disintegrates 100 % by  $\beta^-$  emissions with a single  $\beta^-$ -decay branch to the ground state ( $J^\pi = 9/2^-$ ) of the daughter nuclide <sup>209</sup>Bi. The level schemes of <sup>209</sup>Pb and <sup>209</sup>Bi, including level energies and  $J^\pi$  values, are based on the ENSDF evaluation of Martin (1991Ma16).

### 2 Nuclear Data

Adopted  $Q(\beta^-)$  value of 644.0 (12) keV is taken from the evaluation of Audi *et al.* (2003Au03).

The experimental half-life data for the <sup>209</sup>Pb ground state are listed in Table 1. The LRSW value of  $T_{1/2} = 3.277$  (15) h was adopted ( $\chi^2_{\nu} = 1.87$ , which is smaller than the critical value of  $\chi^2_{\nu, \text{crit}} = 3.32$  (99 % confidence level)).

Table 1. Experimental data for the half-life of <sup>209</sup>Pb.

Author	$T_{1/2}$ (h)	Used in evaluation
1972Be44	3.253 (14)	Yes
1971Pe03	3.31 (3)	Yes
1959Po64	3.31 (3)	Yes
1942Ma03	3.3 (1)	Yes
1941Fa04	3.32(3)	Yes
1940Kr08	2.75 (5)	No

### 2.1 $\beta^-$ Transitions

The decay of <sup>209</sup>Pb proceeds with a single  $\beta^-$  transition directly to the <sup>209</sup>Bi ground state. The maximum  $\beta^-$ -decay energy recommended in Table 2 was deduced from  $Q(\beta^-) = 644.0$  (12) keV (2003Au03). The  $\log ft$  value was calculated using the LOGFT program from the ENSDF evaluation package, which is based on the work of Gove and Martin (1971Go40).

Table 2. Level energy, quantum number,  $E_{\beta_{0,1} \text{ max}}$ ,  $P_\beta$  and  $\log ft$  value in decay of <sup>209</sup>Pb.

	Level energy (keV)	$J^\pi$	$E_{\beta\text{-max}}$ (keV)	$P_\beta$ (%)	Nature	$\log ft$
$\beta_{0,0}$	0.0	9/2-	644.0 (12)	100	First forbidden non-unique	5.536 (4)

### 3 References

- 1940Kr08 R. S. Krishnan, E. A. Nahum. Proc. Cambridge Phil. Soc. 36(1940)490 (Half-life)  
1941Fa04 K. Fajans, A. F. Voigt. Phys. Rev. 60(1941) 619 (Half-life)  
1942Ma03 W. Maurer, W. Ramm. Z. Phys. 119 (1942)602 (Half-life)  
1959Po64 A. Poularikas, R.W. Fink. Phys. Rev. 115(1959)989 (Half-life)  
1971Go40 N. B. Gove, M. J. Martin. Nucl. Data Tables A10(1971)205 (log ft values)  
1971Pe03 B. I. Persson, I. Plesser, J.W. Sunier. Nucl. Phys. A167(1971)470 (Half-life)  
1972Be44 H. Behrens, M. Kobelt, W. G. Thies, H. Appel. Z. Phys. 252(1972)349 (Half-life)  
1991Ma16 M. J. Martin. Nucl. Data Sheets 63(1991)723 (Nuclear levels)  
2003Au03 G. Audi, A. H. Wapstra, C. Thibault. Nucl. Phys. A729(2003)337 (Q value)