

²⁰⁹Pb - Comments on evaluation of decay data by F. G. Kondev

This evaluation was completed in February 2011, with the same literature cut off date, as a part of ANL commitment to the IAEA-CRP on “Updated Decay Data Library for Actinides”.

1 Decay Scheme

The nuclide ²⁰⁹Pb ($J^\pi = 9/2^+$) disintegrates 100 % by β^- emissions with a single β^- -decay branch to the ground state ($J^\pi = 9/2^-$) of the daughter nuclide ²⁰⁹Bi. The level schemes of ²⁰⁹Pb and ²⁰⁹Bi, including level energies and J^π 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 ²⁰⁹Pb ground state are listed in Table 1. The LRSW value of $T_{1/2} = 3.277$ (15) h was adopted ($\chi^2_v = 1.87$, which is smaller than the critical value of $\chi^2_{v, \text{crit}} = 3.32$ (99 % confidence level)).

Table 1. Experimental data for the half-life of ²⁰⁹Pb.

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 β^- Transitions

The decay of ²⁰⁹Pb proceeds with a single β^- transition directly to the ²⁰⁹Bi ground state. The maximum β^- -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_β and $\log ft$ value in decay of ²⁰⁹Pb.

	Level energy (keV)	J^π	$E_{\beta\text{-max}}$ (keV)	P_β (%)	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)
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1971Pe03 B. I. Persson, I. Plesser, J.W. Sunier. Nucl. Phys. A167(1971)470 (Half-life)
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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)