

## <sup>79</sup>Se - Comments on evaluation of decay data by M. M. Bé and V. Chisté

This evaluation was completed in January 2006.

### 1. Decay scheme

The  $J^\pi$  value and level energy are from **NDS 70,3** (1993).

### 2. Nuclear Data

- The Q value is from **Audi *et al.*** (2003)
- Published values of the half life are, in years :

Historical values		<i>a</i>	
1949	Parker <i>et al.</i>	$\leq 6.5 \times 10^4$	Report ORNL- 499, p.45
1951	Glendenin	$\geq 7 \times 10^6$	Radiochemical studies : The fission products, C.D. Coryell, N. Sugarman, New-York, McGraw Hill (1951) 596
Revised value			
1993	B. Singh	$\leq 6.5 \times 10^5$	NDS 70,3 p. 452
Measured Values			
1995	Yu Runlan, Guo Jingru <i>et al.</i>	$4.8 (4) \times 10^5$	J. Radioanalytical and Nuclear Chemistry, Articles, 196,1 p. 165
1997	Jiang Songsheng, Guo Jingru <i>et al.</i>	$1.1 (2) \times 10^6$	Nucl. Instr. Methods B123, p 405
2000	Ming He, Shan Jiang <i>et al.</i>	$1.24 (19) \times 10^5$	Nucl. Instr. Methods B172, p 177
2002	Songsheng Jiang, Ming He <i>et al.</i>	$2.95 (38) \times 10^5$	Nucl. Instr. Methods A489, p 195 or Chin. Phys. Lett. 18 (2001) 746
2002	Ming He, Songshen Jiang <i>et al.</i>	$2.80 (36) \times 10^5$	Nucl. Instr. Methods B194, p 393
2006	Bienvenu, <i>et al.</i>	$3.77 (19) \times 10^5$	To be published
Adopted		$3.56 (40) \times 10^5$	

Assessments of the Se-79 half-life were done in the years 49-50 (Parker, Glendenin) and a value of  $6.5 \times 10^4$  a was accepted by the various tables and chart of isotopes.

In 1993, due to inconsistencies in the measured and calculated fission yields of <sup>79</sup>Se for an irradiated fuel from a reactor, the calculations of Parker were reviewed (Singh) and a new value of  $6.5 \times 10^5$  a (i.e. one order of magnitude more) was deduced. Hence, in 1995 a Chinese team carried out the first measurement of this half-life by the means of a radiochemical method, they obtained  $4.8 (4) \times 10^5$  a. However, and since this date, the same team, using the same <sup>79</sup>Se source published various results (see table above), the highest being  $1.1 (2) \times 10^6$  a (1997), and the last  $2.80 (36) \times 10^5$  a (2002).

Only one value (the last) will be used in this evaluation.

In NDS 96,1 (2002) B. Singh adopts the result of 2.96 (38) from the Chinese team.

In 2006, an independent result was published by P. Bienvenu *et al.* confirming the range  $10^5$  a for this half-life. In this study, the concentration of <sup>79</sup>Se was measured using ICP-MS coupled with Electro-Thermal Vaporisation to eliminate potential isobaric interferences and, the activity was measured using LSC after gamma ray spectrometry to check the contribution of residual radioactive contaminants.

In this evaluation, the adopted value is the weighted mean of the last Chinese value (NIM B194) and of the Bienvenu *et al.* value. They are in the same range but not consistent so, the adopted uncertainty is the external uncertainty.

## 2.1 b emission

<sup>79</sup>Se is a pure beta minus emitter which disintegrates directly to the ground state level of <sup>79</sup>Br, no gamma rays are emitted.

The end-point energy is deduced from the Q value. The mean beta energy was calculated for a 1<sup>st</sup> forbidden unique transition.

## References

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