^{58}Co - Comments on evaluation of decay data
by M.M. Bé

Complete references can be found in the "Table de Radionucléides" volume, only additional references are given here.
This evaluation was completed in November 1993 with minor editing in October 1998 and in March 2002.

Nuclear Data

- Q value is from Audi 1995.
- spin and parity are from NDS 60 (1990) 189
- The half-life value is the weighted mean of : 70,750 (70) [Hoppes 1982], 70,916 (15) [Houtermans 1980], 70,810 (33) [Vaninbroukx], 70,780 (43) [Lagoutine], 71,1 (2) [Werner], 70,8 (9) [Crisler 1972], 70,4 (10) [Crisler 1972], 71,54 (75) [Decowski], 71,83 (612) [Araminowicz]. The uncertainty of Houtermans was multiply by two. The reduced-χ^2 = 1,7. The final uncertainty is increased to recover the most precise value.

Electron Capture and Positron Emission

- The lg ft values, the fractionnal atomic shell electron capture probabilities and the average β+ energies are calculated with the LOGFT program.
- The electro capture probabilities to upper levels in Fe-58 nucleus, if they exist, are of very weak intensities, no gamma radiations have been observed from these levels.
- The electron capture probability to the 1674 keV level is deduced from the decay scheme.
- The electron capture and the β+ emission probability to the 810 keV level are deduced from the level balance ($\varepsilon_{0,1}$ + $\beta+_{0,1}$ = 98,96 (3)) and from the theoretical EC/ β+ ratio = 5,61 (8) used in the LOGFT calculations.
The deduced value 15,0 (2) for the $\beta+_{0,1}$ transition implies a 511 keV gamma emission of 30,0 (4) which is in agreement with the measured values : 29,2 (Gunnink) and 32,3 (3) (Heath).

Gamma Rays

- The gamma ray energies are from Helmer.
- Considering the decay scheme, the absolute emission probability of the 810 gamma ray is calculated by:
$\Sigma I(\gamma + ce)(810 + 1674) = 100$

- the 864 gamma-ray emission probability, relative to the 810 keV line, is the weighted mean of :

0,77 (4)	(Hill)
0,645 (15)	(Bambynek)
0,81 (3)	(Ritter)
0,70 (2)	(Dyer)
0,69 (2)	(Denecke)
0,69 (2)	(Legrand)
0,74 (4)	(Heath)
0,682 (17)	(Grütter)

The reduced-χ^2 = 4,4 ; internal uncertainty = 0,008 ; external uncertainty = 0,016
The adopted value is : 0,69 (1)

- the 1674 gamma-ray emission probability, relative to the 810 keV line, is the weighted mean of :

0,68 (5)	(Hill)
0,506 (15)	(Bambynek)
0,57 (3)	(Bitter)
0,49 (3)	(Dyer)
0,527 (15)	(Denecke)
0,525 (13)	(Legrand)
0,54 (4)	(Heath)
0,511 (15)	(Grütter)

reduced-χ^2 = 2,2 ; internal uncertainty = 0,007 ; external uncertainty = 0,01
The adopted value is : 0,52 (1)

- The α coefficients are from the LPRI Table de Radionucléides, i.e. for the 810 and 863 transitions from Bambynek and Legrand (1973) and for the 1674 transition from the theoretical tables of Hager and Seltzer.
For the 810 (pure E2) and 863 (85% E2) transitions theoretical calculations from the new tables of Band *et al.* (see Gorozanhkin, 2002) leads to the values : 3,3 and 2,7 $\times$ 10^{-4} respectively which are very closed to the experimental ones.

Atomic Data

The ω_K value (0,352 (4)) is from the measurement of Solé (1992) and is in agreement with the Bambynek value (0,355 (3)).
The ϖ_L value is from Hubbell (1989)
The X-ray and Auger electron emission probabilities are calculated by using the program RADLST.

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