$^{108}Ag^{m}$ – Comments on evaluation of decay data by V. Chisté and M. M. Bé

The full decay data evaluation was completed in 2005. The literature available by January 2005 was included.

1. Decay Scheme

$^{108}Ag^{m}$ disintegrates 90.9 (6) % by electron capture to the 1 771 keV excited state in Pd-108, and by 9.1 (6) % through isomeric transitions (two gamma-rays in cascade) in Ag-108.

2. Nuclear Data

The Q value (= 2 031 (6) keV) is from the 2003Au03.

Level energies, spin and parities are from J. Blachot (2000Bl21).

The measured $^{108}Ag^{m}$ half-life values are, in years :

1969Vo11	310 ± 132
1970Ha30	127 ± 7
1992Schötzig	418 ± 15
2004Sc04	438 ± 9

The evaluators have chosen as their recommended value the most recent result from Schrader (2004Sc04) who followed the decay by using a ionisation chamber for about 20 years.

2.1 Electron capture transition

For the 260 keV electron capture transition, the adopted value has been deduced from the decay-scheme balance at the 1 771 keV level.

P_K, P_L, P_M have been calculated for allowed electron capture transition in the decay of $^{108}Ag^{m}$ to the 1 771 keV excited state in Pd-108 using the EC Capture computer program.

2.4 Gamma transitions

Probabilities

The transition probabilities have been calculated using the gamma-ray emission intensities and the relevant internal conversion coefficients (see **Gamma ray Emission**)

Multipolarity and internal conversion coefficients

The multipolarities for the 30 (M4) and 79 keV gamma-ray transitions (E1) in ^{108}Ag, and the 433 ([E2]), 614 (E2) and 722 keV (E2) gamma-ray transitions in ^{108}Pd have been taken from J. Blachot (2000Ba21, see also 1982Ha61).

The internal conversion coefficients (α_T, α_K and α_L) for these gamma-ray transitions have been interpolated from the tables of Band (2002Ba85) using the ICC Computer Code (program Icc99v3a – GETICC dialog). Their uncertainties are taken to be 3 %.

3. Atomic data

Atomic values for ω_K, ϖ_L and η_{KL}, are from Schönfeld (1996Sc06).

The X-ray and Auger electron emission probabilities have been calculated from the data set values by using the program EMISSION.

4. Photon Emissions

4.1 Gamma-ray Emissions

The energy of the 433, 614 and 722 keV gamma-ray lines are from Helmer et al. (2000He14).

The measured relative emission intensities are given in table 1, they are relative to the 433 keV gamma ray taken as 100. Energy values are in keV.

Table 1: Measured relative emission intensities, in %.

Energy (keV)	Kistner (1966Ki03)	Kracíková (1968Kr04)	Hamilton (1971Ha17)	Heath (1974HeYW)	Weighted Average values
γ in ^{108}Ag					
30.309 (8)	none	none	none	none	none
79.131 (3)	7.3 (8)	8.3 (9)	none	none	7.7 (6)
γ in ^{108}Pd					
433.938 (4)	100	100	100	100 (5)	100
614.276 (4)	103 (3)	105 (10)	99.3 (20)	100 (5)	100.5 (16)
722.907 (10)	102 (2)	102 (10)	100.4 (20)	100 (5)	100.8 (16)

Adopted values are weighted averages (calculated by the Lweight program, version 3) of the four values measured with uncertainties. The normalization factor to convert the relative emission intensities to absolute emission intensities is calculated with the formula:

$$\text{Normalization} = \frac{100}{[(1 + \alpha_T(433))P_{rel}(433)] + [(1 + \alpha_T(79))P_{rel}(79)]}$$

where the 79 and 433 keV gamma-ray transitions populate the ground state level of ^{108}Ag and ^{108}Pd, respectively.

From the theoretical α_T and the relative evaluated emission intensities of the 79 and 433 keV gamma-rays (table 1), the normalization factor becomes 0.901 (6). The uncertainty was calculated through the propagation on the formula given above. Absolute emission intensities are given in table 2.

Table 2: Absolute emission intensities for the γ-rays, in %.

Energy (keV)	Relative Emission intensity	Absolute emission intensity
79.131 (3)	7.7 (6)	6.9 (5)
433.938 (4)	100	90.1 (6)
614.276 (4)	100.5 (16)	90.5 (16)
722.907 (10)	100.8 (16)	90.8 (16)

The 30 keV transition probability in the decay of $^{108}Ag^{m} \rightarrow {}^{108}Ag$ is equal to 9.1 (6) % (from decay scheme transition probability balance).

Energy (keV)	Transition probability (%)	Absolute emission intensity (%)
30.309 (8)	9.1 (6)	0.0000215 (18)

The 30 keV absolute emission intensity has been deduced the from total transition probability and the theoretical α_T (Band *et al.* , 2002) for a M4 transition.

5. References

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