

³³P – Comments on evaluation of decay data by V. Chisté and M. M. Bé

1) Decay Scheme

³³P disintegrates by β^- emission (100 %) to the ground state of the stable nuclide ³³S.

2) Nuclear Data

The Q value (248,5 (11) keV) is from Audi and Wapstra evaluation (1995Au04), and has been calculated with the formula:

$$Q = M(A, Z) - M(A, Z + 1),$$

where M(A,Z) and M(A,Z+1) are the measured atomic masses of ³³P and ³³S, respectively.

Q, calculated with the formula, is in agreement with a weighted average value of 248,5 (10) keV, which the evaluators have calculated from measured values of the β^- end-point energy (see **β^- Transition**).

The measured ³³P half-life values (in days) are given below:

T_{1/2}

Reference	Value (days)
Sheline(1951Sheline)	25 (2)
Jensen (1952Je12)	24,8 (5)
Westermarck (1952Westermarck)	25 (2)
Nichols (1954Ni06)	24,4 (2)
Westermarck (1954Westermarck)	25,4 (2)
Russell (1958Ru66)	25 (1)
Fogelstrom-Fineman (1960Fo05)	25,2 (5)
Reynolds (1968Re04)	25,30 (5)
Lagoutine (1972La14)	25,56 (7)

Nichol's value (24,4 (2)) is an outlier (based on Chauvenet's criterion). The weighted average of the eight remaining values (excluding Nichol's value) is 25,383 days with an internal uncertainty of 0,040 days ($\chi^2 = 1,6$). Thus we recommend a half-life of 25,383 (40) d.

β^- Transition

Evaluators calculated, using the LOGFT program, a *lg ft* value of 5 for this allowed transition. This value agrees with those given by Endt (1967En05, 1973EnVA, 1978En02, 1990En08 and 1998En04).

The evaluators have calculated a weighted mean of the β^- end-point energy (or Q) from the following measured values (in keV):

Reference	Values (keV)
Sheline (1951Sheline)	270 (20)
Jensen (1952Je12)	260 (20)
Westermarck (1952Westermarck)	246 (5)
Nichols (1954Ni06)	249 (2)
Elbek (1954Elbek)	252 (5)
Elbek (1954Elbek)	250 (5)
Westermarck (1954Westermarck)	246 (5)
Russell (1958Ru66)	238 (5)
Polak (1984Po02)	248,3 (13)

Evaluators calculated the weighted average of these 9 values using the Lweight program (version 3) as 248,2 keV with an internal uncertainty of 1,0 keV and a reduced- χ^2 of 0,87. The 2 values of Elbek (1954Elbek) are independents measurements. The Sheline (1951Sheline), Jensen (1952Je12) and Russell (1958Ru66) values have been shown to be outliers by the Lweight program, based on the Chauvenet's criterion. For the remaining 6 values, the largest contributions to the weighted average come from the values of Polak (1984Po02), with a relative statistical weight of 59 %.

The weighted average of the six remaining input values is 248,5 keV with an internal uncertainty of 1,0 keV and a reduced- χ^2 of 0,23. This value is in agreement with the adopted Q value (1995Au04) in this evaluation.

Atomic Data

Atomic values (ω_K and n_{KL}) are from (1996Sc06).

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