**Adopted Levels, Gammas**

| | Type | Author | History<br>Citation | Literature Cutoff Date |
|---|---|---|---|---|
| | Full Evaluation | C. D. Nesaraja | NDS 130, 183 (2015) | 30-Sep-2015 |

Q($\beta^-$)=−2330 *SY*; S(n)=6093.3 *21*; S(p)=5097 *14*; Q($\alpha$)=6185.2 *6*    2012Wa38
Δ(Q($\beta^-$))=−200 (syst, 2012Wa38).

### $^{241}$Cm Levels

#### Cross Reference (XREF) Flags

| | | |
|---|---|---|
| A | $^{245}$Cf $\alpha$ decay | |
| B | $^{241}$Bk $\varepsilon$ decay | |

| E(level) | J$^\pi$ | T$_{1/2}$ | XREF | Comments |
|---|---|---|---|---|
| 0.0$^\#$ | 1/2$^+$ | 32.8 d *2* | AB | %$\varepsilon$=99.0 *1*; %$\alpha$=1.0 *1*<br>%$\alpha$: I$\alpha$/(I$\alpha$+I$\varepsilon$)=0.010 *1* from a measurement of I$\alpha$e(145.536$\gamma$) in $^{237}$Pu following<br>  $\alpha$ decay of $^{241}$Cm (1974Po08). Other: %$\alpha$=0.96 *9* from absolute counting<br>  (1960Gl01).<br>T$_{1/2}$: From least squares decay analyses of the 471.8 keV $\gamma$ using a Ge(Li) detector.<br>  Others: 35 d (1952Hi11), 37 d (1967Ba42).<br>J$^\pi$: HF=2.5 *3* for $\alpha$ decay to the 1/2$^+$ 145.54 level in $^{237}$Pu with configuration<br>  1/2[631]. |
| 5.5$^\#$ | (3/2$^+$)$^\dagger$ | | AB | E(level): From $\alpha$ decay. |
| 57.1$^\#$ | (5/2$^+$)$^\dagger$ | | AB | |
| 81? | (7/2$^+$) | | A | E(level),J$^\pi$: Possible 7/2$^+$ member of the 1/2[631] band, but see the evaluator′s<br>  comment in the $^{245}$Cf $\alpha$ decay dataset. |
| 163? | (9/2$^+$) | | A | E(level),J$^\pi$: Possible 9/2$^+$ member of the 1/2[631] band, but see the evaluator′s<br>  comment in the $^{245}$Cf $\alpha$ decay dataset. |
| 267.8 | (5/2$^+$)$^\ddagger$ | | B | Configuration=5/2$^+$[622] (2003As01). |
| 420.2 | (7/2$^+$)$^\ddagger$ | | B | Configuration=7/2$^+$[624] (2003As01). |
| ≈2300 | | 15.3 ns *10* | | %SF=100<br>%SF: Only SF decay observed. From calculations of T$_{1/2}$ for SF and for T$_{1/2}$ for $\gamma$<br>  decay (1972We09) one predicts the isomeric decay branch to be 1.3×10$^{-5}$%.<br>E(level): From a fit to the $^{239}$Pu($\alpha$,2n) excitation function, reported values are 2.3<br>  MeV *2* (1971Br39) and 2.6 MeV *2* (1972Vy07). 1972We09 calculate 2.11 MeV.<br>T$_{1/2}$: measured values and production methods: 20 ns      $^{239}$Pu($\alpha$,2n)<br>  (1969Me11); 19 ns *8*     $^{241}$Am(d,n) (1970Po01); 25 ns *15*    $^{243}$Am(p,3n)<br>  (1971Re11); 15.3 ns *10* $^{239}$Pu($\alpha$,2 n) (1971Br39 ); 20 ns      $^{239}$Pu($\alpha$,2n)<br>  (1972Ga42); 10 ns *1*    $^{239}$Pu($\alpha$,2n) (1974SpZS ).<br>For theoretical calculations of T$_{1/2}$(SF) see, for example, 1978Po09, 1985Lo17, and<br>  1990Bh02.<br>$^{239}$Pu(a,2nf): fission fragment angular distributions were measured; spin and<br>  configuration assignments were proposed by 1974SpZS, 1974GaZD. See also<br>  1975Kh06 for possible spins deduced from angular-distribution measurements of<br>  1974SpZS.<br>($^3$He,tF): fission probability was obtained from measured fission counts (singles) and<br>  the observed coincidences between fission fragments; barrier heights were deduced<br>  by 1976Ga11. Barrier parameters were also deduced by 1981Re06 from analysis of<br>  fission probability data of 1976Ga11. See 1972We09, 1980Ku14 and 1984Ku05 for<br>  calculated barrier parameters.<br>$^{238}$Pu($\alpha$,nF): Γ(n)/Γ(f) was deduced, compared with theory including pairing by<br>  1973Me23. |

**Adopted Levels, Gammas (continued)**

$^{241}$Cm Levels (continued)

† The following arguments are based on those given by 1996Ma72 in their $^{245}$Cf $\alpha$ decay paper. On the basis of the observation of 56.1 and 50.6 gammas in coincidence with the 7083$\alpha$, and the absence of any gammas in coincidence with the 7138$\alpha$, the authors propose the existence of excited levels at 5.6 and 56.1. From systematics, the g.s. configuration for $^{245}$Cf is expected to be 5/2[622] or 1/2[631]. HF(7138$\alpha$)<4 identifies the 7138$\alpha$ as the favored transition connecting states of the same configuration, and HF(7083$\alpha$)=20 suggests that the 7083$\alpha$ and 7138$\alpha$ feed members of the same band. If the configuration of $^{245}$Cf is 5/2[622], then the 7138 and 7083 $\alpha$'s must feed the 5/2$^+$ and 7/2$^+$ members of this band in the daughter $^{245}$Cm; however, the deduced rotational parameters do not agree with systematics for this configuration. The evaluator notes that these systematics lead to an expected 7/2 − 5/2 separation of 44 keV rather than 56 keV. On the other hand, if the parent configuration is 1/2[631], then the 7138 $\alpha$ feeds the g.s., and the assumption that the 5.6 and 56.1 levels are the 3/2$^+$ and 5/2$^+$ members of this band gives rotational parameters consistent with systematics for the 1/2[631] band. The evaluator adopts these assignments.

‡ 2003As01 suggest that the $\varepsilon$ decay proceeds from the parent 7/2[633] state to the 7/2[624] state in $^{241}$Cm, expected to lie at $\approx$420 keV. They point out that the inverse transition in $^{243}$Pu $\beta^-$ decay has log $ft$=5.5, and the similar transitions from 5/2[642] to 5/2[633] in $^{232}$Np, $^{233}$Np, $^{235}$Pu, and $^{236}$Am $\varepsilon$ decays have log $ft$ values in the range 4.8 to 5.4. For the 420 level, a log $ft$ of 5.0 to 5.5 lead to a deduced T$_{1/2}$($^{241}$Bk) of 4.4 to 14 minutes, consistent with the measured T$_{1/2}$. The authors further suggest that the three transitions they observe in $\varepsilon$ decay can be assigned as decay from the 7/2[624] level to the 5/2[622] band head, followed by transitions to the 3/2 and 5/2 members of the 1/2[631] g.s. band. The energy of the 3/2$^+$ member of the 1/2[631] has been determined in $^{245}$Cf $\alpha$ decay.
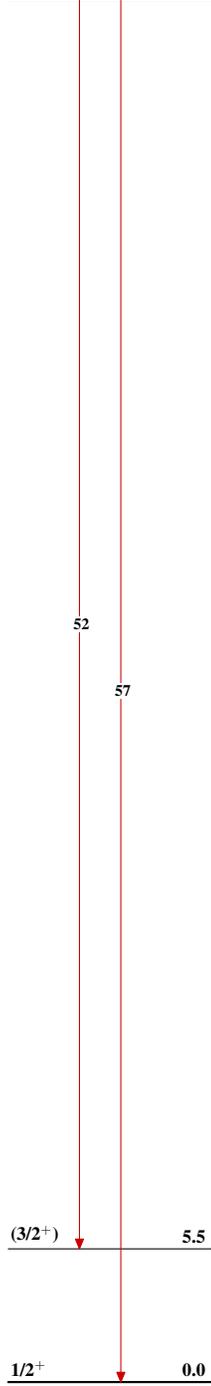
\# Band(A): 1/2$^+$[631] band.

$\gamma(^{241}$Cm$)$

| E$_i$(level) | J$^\pi_i$ | E$_\gamma$ | E$_f$ | J$^\pi_f$ | Comments |
|---|---|---|---|---|---|
| 57.1 | (5/2$^+$) | 51.6 | 5.5 | (3/2$^+$) | E$_\gamma$: From E$\gamma$(262.3 *1*)-(210.7 *2*) from the 268 level in $\varepsilon$ decay E=50.6 is reported in $\alpha$ decay. |
|  |  | 57.1 | 0.0 | 1/2$^+$ | E$_\gamma$: From E$\gamma$(262.3 *1*) from the 268 level in $\varepsilon$ decay and E(5.5 level) from $\alpha$ decay. E=56.1 is reported in $\alpha$ decay. |

**Adopted Levels, Gammas**

Level Scheme
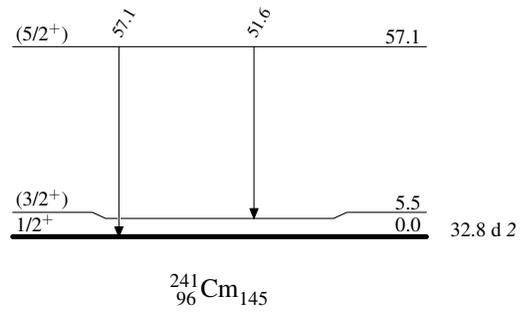


$^{241}_{96}$Cm$_{145}$

## Adopted Levels, Gammas

**Band(A): 1/2$^+$[631] band**

(5/2$^+$)                    57.1

52

57

(3/2$^+$)                    5.5

1/2$^+$                      0.0

$^{241}_{96}$Cm$_{145}$