

<sup>141</sup>Sm ε decay (10.2 min) [1977Ke03](#)

| Type            | Author  | History Citation | Literature Cutoff Date |
|-----------------|---------|------------------|------------------------|
| Full Evaluation | N. Nica | NDS 187,1 (2023) | 12-Oct-2022            |

Parent: <sup>141</sup>Sm: E=0.0; J<sup>π</sup>=1/2<sup>+</sup>; T<sub>1/2</sub>=10.2 min 2; Q(ε)=4589 16; %ε+%β<sup>+</sup> decay=100

<sup>141</sup>Sm-Q(ε): From [2021Wa16](#).

Measured: γ, γγ, ce ([1977Ke03](#),[1973VaYZ](#)), β<sup>+</sup>, βγ ([1983A106](#),[1977Ke03](#)).

<sup>141</sup>Pm Levels

| E(level) <sup>†</sup> | J <sup>π</sup> <sup>‡</sup> | T <sub>1/2</sub> <sup>‡</sup> | E(level) <sup>†</sup> | J <sup>π</sup> <sup>‡</sup> |
|-----------------------|-----------------------------|-------------------------------|-----------------------|-----------------------------|
| 0.0                   | 5/2 <sup>+</sup>            | 20.90 min 5                   | 1515.3 3              |                             |
| 403.87 8              | 3/2 <sup>+</sup>            |                               | 1884.95 22            |                             |
| 438.29 9              | (1/2) <sup>+</sup>          |                               | 1902.51 21            | (1/2,3/2) <sup>+</sup>      |
| 728.27 16             | 3/2 <sup>+</sup>            |                               | 1992.1 4              |                             |
| 1046.40 20            |                             |                               | 2004.62 20            | (1/2,3/2) <sup>+</sup>      |
| 1292.56 14            | (3/2) <sup>+</sup>          |                               | 2037.94 20            | (1/2,3/2) <sup>+</sup>      |
| 1495.65 12            | (1/2,3/2) <sup>+</sup>      |                               |                       |                             |

<sup>†</sup> From least-squares fit to Eγ data.

<sup>‡</sup> Adopted values.

ε,β<sup>+</sup> radiations

Measured Eβ<sup>+</sup>=3180 50, 3100 50, 2170 80, 1510 90 F-K analyses ([1977Ke03](#)), see also [1970Ar17](#), [1972Ep01](#), [1973VaYZ](#).

No ε+β<sup>+</sup> feeding to g.s. (≤4%) ([1977Ke03](#)).

| E(decay)  | E(level) | Iβ <sup>+</sup> <sup>†</sup> | Iε <sup>†</sup> | Log ft   | I(ε+β <sup>+</sup> ) <sup>†</sup> | Comments   |
|-----------|----------|------------------------------|-----------------|----------|-----------------------------------|--|
| (2551 16) | 2037.94  | 0.64 7                       | 3.1 3           | 5.95 5   | 3.7 4                             | av Eβ=690.0 72; εK=0.699 4; εL=0.1004 6; εM+=0.02882 18  |
| (2584 16) | 2004.62  | 0.93 8                       | 4.2 3           | 5.83 4   | 5.1 4                             | av Eβ=704.9 72; εK=0.691 5; εL=0.0992 7; εM+=0.02845 18  |
| (2597 16) | 1992.1   | 0.17 3                       | 0.77 13         | 6.57 8   | 0.94 16                           | E(decay): Eβ <sup>+</sup> =1510 90 from (β <sup>+</sup> )(1600.7γ) ( <a href="#">1977Ke03</a> ).<br>av Eβ=710.5 72; εK=0.687 5; εL=0.0987 7; εM+=0.02832 18                                  |
| (2687 16) | 1902.51  | 0.73 9                       | 2.7 3           | 6.05 6   | 3.4 4                             | av Eβ=750.5 72; εK=0.663 5; εL=0.0952 7; εM+=0.02730 19  |
| (2704 16) | 1884.95  | 0.34 3                       | 1.19 12         | 6.41 5   | 1.53 15                           | av Eβ=758.4 72; εK=0.659 5; εL=0.0945 7; εM+=0.02710 19  |
| (3074 16) | 1515.3   | 0.23 3                       | 0.45 6          | 6.95 6   | 0.68 9                            | av Eβ=924.9 73; εK=0.553 5; εL=0.0791 7; εM+=0.02267 20  |
| (3093 16) | 1495.65  | 3.1 2                        | 5.7 3           | 5.849 23 | 8.8 4                             | av Eβ=933.8 73; εK=0.547 5; εL=0.0782 7; εM+=0.02243 20  |
| (3296 16) | 1292.56  | 3.7 2                        | 5.0 3           | 5.96 3   | 8.7 5                             | av Eβ=1026.0 73; εK=0.490 5; εL=0.0699 7; εM+=0.02003 19   |
| (3543 16) | 1046.40  | 0.74 7                       | 0.75 7          | 6.85 4   | 1.49 13                           | E(decay): Eβ <sup>+</sup> =2170 80 from (β <sup>+</sup> )(1292.6γ) ( <a href="#">1977Ke03</a> ).<br>av Eβ=1138.4 74; εK=0.424 4; εL=0.0604 6; εM+=0.01731 17                                 |
| (3861 16) | 728.27   | 1.6 2                        | 1.2 2           | 6.74 7   | 2.8 4                             | av Eβ=1284.5 74; εK=0.349 4; εL=0.0496 5; εM+=0.01422 15   |
| (4151 16) | 438.29   | 20.1 10                      | 10.6 5          | 5.839 25 | 30.7 15                           | av Eβ=1418.5 75; εK=0.291 3; εL=0.0413 5; εM+=0.01184 12   |
| (4185 16) | 403.87   | 21.2 5                       | 10.8 3          | 5.837 15 | 32.0 7                            | E(decay): Eβ <sup>+</sup> =3100 50 from (β <sup>+</sup> )(438.2γ) ( <a href="#">1977Ke03</a> ).<br>Other: 3020 60 ( <a href="#">1983A106</a> ).<br>av Eβ=1434.4 75; εK=0.285 3; εL=0.0405 4; |

Continued on next page (footnotes at end of table)

<sup>141</sup>Sm ε decay (10.2 min) **1977Ke03 (continued)**

ε,β<sup>+</sup> radiations (continued)

| E(decay) | E(level) | Comments  |
|----------|----------|---|
|          |          | εM+=0.01159 12<br>E(decay): Eβ+=3180 50 from (β <sup>+</sup> )(403.9γ) (1977Ke03). Other: 3020 60 (1983Al06). |

† Absolute intensity per 100 decays.

γ(<sup>141</sup>Pm)

I<sub>γ</sub> normalization: ΣI(γ+ce)(g.s.)=100% assuming no ε or β<sup>+</sup> to g.s.

| E <sub>γ</sub>        | I <sub>γ</sub> <sup>@</sup> | E <sub>i</sub> (level) | J <sub>i</sub> <sup>π</sup> | E <sub>f</sub> | J <sub>f</sub> <sup>π</sup> | Mult. <sup>†‡</sup> | δ    | α <sup>#</sup> | Comments   |
|-----------------------|-----------------------------|------------------------|-----------------------------|----------------|-----------------------------|---------------------|------|----------------|--|
| 324.4 2               | 5.9 6                       | 728.27                 | 3/2 <sup>+</sup>            | 403.87         | 3/2 <sup>+</sup>            | M1                  |      | 0.0605         | %I <sub>γ</sub> =2.51 26<br>α(K)=0.0516 8; α(L)=0.00705 10; α(M)=0.001503 22<br>α(N)=0.000339 5;<br>α(O)=5.13×10 <sup>-5</sup> 8;<br>α(P)=3.28×10 <sup>-6</sup> 5<br>Mult.: α(K)exp=0.033 10, may be M1+E2.                            |
| 403.9 1               | 100                         | 403.87                 | 3/2 <sup>+</sup>            | 0.0            | 5/2 <sup>+</sup>            | E2+M1               | ≈1.4 | ≈0.0263        | %I <sub>γ</sub> =42.5 6<br>α(K)≈0.0218; α(L)≈0.00352;<br>α(M)≈0.000762<br>α(N)≈0.0001704;<br>α(O)≈2.48×10 <sup>-5</sup> ;<br>α(P)≈1.303×10 <sup>-6</sup><br>Mult.: α(K)exp=0.022 2 (1977Ke03). Other: 0.018 3 (1973VaYZ).              |
| 438.2 1               | 88.6 30                     | 438.29                 | (1/2) <sup>+</sup>          | 0.0            | 5/2 <sup>+</sup>            | E2                  |      | 0.01764        | %I <sub>γ</sub> =37.7 8<br>α(K)=0.01441 21; α(L)=0.00254 4; α(M)=0.000554 8<br>α(N)=0.0001233 18;<br>α(O)=1.766×10 <sup>-5</sup> 25;<br>α(P)=8.26×10 <sup>-7</sup> 12<br>Mult.: α(K)exp=0.013 2 (1977Ke03). Other: 0.012 3 (1973VaYZ). |
| 728.4 3               | 3.0 6                       | 728.27                 | 3/2 <sup>+</sup>            | 0.0            | 5/2 <sup>+</sup>            | D                   |      |                | %I <sub>γ</sub> =1.28 25   |
| 767.5 3               | 2.7 2                       | 1495.65                | (1/2,3/2) <sup>+</sup>      | 728.27         | 3/2 <sup>+</sup>            |                     |      |                | %I <sub>γ</sub> =1.15 9  |
| 854.3 2               | 3.1 2                       | 1292.56                | (3/2) <sup>+</sup>          | 438.29         | (1/2) <sup>+</sup>          |                     |      |                | %I <sub>γ</sub> =1.32 9  |
| 888.5 3               | 1.5 2                       | 1292.56                | (3/2) <sup>+</sup>          | 403.87         | 3/2 <sup>+</sup>            |                     |      |                | %I <sub>γ</sub> =0.64 9  |
| 1046.4 2              | 3.5 3                       | 1046.40                |                             | 0.0            | 5/2 <sup>+</sup>            |                     |      |                | %I <sub>γ</sub> =1.49 13   |
| 1057.1 2              | 7.7 5                       | 1495.65                | (1/2,3/2) <sup>+</sup>      | 438.29         | (1/2) <sup>+</sup>          |                     |      |                | %I <sub>γ</sub> =3.28 22   |
| 1091.9 2              | 6.1 4                       | 1495.65                | (1/2,3/2) <sup>+</sup>      | 403.87         | 3/2 <sup>+</sup>            |                     |      |                | %I <sub>γ</sub> =2.59 17   |
| 1292.6 2              | 15.9 9                      | 1292.56                | (3/2) <sup>+</sup>          | 0.0            | 5/2 <sup>+</sup>            |                     |      |                | %I <sub>γ</sub> =6.8 4   |
| <sup>x</sup> 1336.5 4 | 1.2 4                       |                        |                             |                |                             |                     |      |                | %I <sub>γ</sub> =0.51 17   |
| <sup>x</sup> 1352.7 4 | 0.9 4                       |                        |                             |                |                             |                     |      |                | %I <sub>γ</sub> =0.38 17   |
| 1446.6 4              | 0.7 2                       | 1884.95                |                             | 438.29         | (1/2) <sup>+</sup>          |                     |      |                | %I <sub>γ</sub> =0.30 9  |
| 1463.9 4              | 4.5 9                       | 1902.51                | (1/2,3/2) <sup>+</sup>      | 438.29         | (1/2) <sup>+</sup>          |                     |      |                | %I <sub>γ</sub> =1.9 4   |
| 1481.0 5              | 1.2 2                       | 1884.95                |                             | 403.87         | 3/2 <sup>+</sup>            |                     |      |                | %I <sub>γ</sub> =0.51 9  |
| 1495.7 2              | 4.2 3                       | 1495.65                | (1/2,3/2) <sup>+</sup>      | 0.0            | 5/2 <sup>+</sup>            |                     |      |                | %I <sub>γ</sub> =1.79 13   |
| 1499.1 4              | 1.4 2                       | 1902.51                | (1/2,3/2) <sup>+</sup>      | 403.87         | 3/2 <sup>+</sup>            |                     |      |                | %I <sub>γ</sub> =0.60 9  |
| 1515.3 3              | 1.6 2                       | 1515.3                 |                             | 0.0            | 5/2 <sup>+</sup>            |                     |      |                | %I <sub>γ</sub> =0.68 9  |

Continued on next page (footnotes at end of table)

$^{141}\text{Sm}$   $\varepsilon$  decay (10.2 min)  $^{197}\text{Ke03}$  (continued) $\gamma(^{141}\text{Pm})$  (continued)

| $E_\gamma$ | $I_\gamma$ <sup>@</sup> | $E_i(\text{level})$ | $J_i^\pi$     | $E_f$  | $J_f^\pi$ | Comments             |
|------------|-------------------------|---------------------|---------------|--------|-----------|----------------------|
| 1565.9 5   | 0.5 2                   | 2004.62             | $(1/2,3/2)^+$ | 438.29 | $(1/2)^+$ | %I $\gamma$ =0.21 9  |
| 1587.9 5   | 0.6 3                   | 1992.1              |               | 403.87 | $3/2^+$   | %I $\gamma$ =0.26 13 |
| 1599.9 5   | 1.4 6                   | 2037.94             | $(1/2,3/2)^+$ | 438.29 | $(1/2)^+$ | %I $\gamma$ =0.60 26 |
| 1600.7 3   | 9.5 9                   | 2004.62             | $(1/2,3/2)^+$ | 403.87 | $3/2^+$   | %I $\gamma$ =4.0 4   |
| 1634.1 3   | 0.8 2                   | 2037.94             | $(1/2,3/2)^+$ | 403.87 | $3/2^+$   | %I $\gamma$ =0.34 9  |
| 1885.0 3   | 1.7 2                   | 1884.95             |               | 0.0    | $5/2^+$   | %I $\gamma$ =0.72 9  |
| 1902.4 3   | 2.1 2                   | 1902.51             | $(1/2,3/2)^+$ | 0.0    | $5/2^+$   | %I $\gamma$ =0.89 9  |
| 1992.3 4   | 1.6 2                   | 1992.1              |               | 0.0    | $5/2^+$   | %I $\gamma$ =0.68 9  |
| 2004.8 3   | 2.1 2                   | 2004.62             | $(1/2,3/2)^+$ | 0.0    | $5/2^+$   | %I $\gamma$ =0.89 9  |
| 2037.8 3   | 6.6 5                   | 2037.94             | $(1/2,3/2)^+$ | 0.0    | $5/2^+$   | %I $\gamma$ =2.81 21 |

<sup>†</sup> Adopted values.

<sup>‡</sup>  $\alpha(\text{K})_{\text{exp}}$  were normalized to  $\alpha(\text{K})=0.200$  for M1 196.6 $\gamma$  in  $\varepsilon$  decay of  $^{141}\text{Sm}$  (22.5 min).

# [Additional information 1](#).

<sup>@</sup> For absolute intensity per 100 decays, multiply by 0.425 6.

<sup>x</sup>  $\gamma$  ray not placed in level scheme.

$^{141}\text{Sm}$   $\epsilon$  decay (10.2 min)  $^{1977}\text{Ke03}$

Decay Scheme

Intensities:  $I_{(\gamma+ce)}$  per 100 parent decays

Legend

- $I_{\gamma} < 2\% \times I_{\gamma}^{max}$
- $I_{\gamma} < 10\% \times I_{\gamma}^{max}$
- $I_{\gamma} > 10\% \times I_{\gamma}^{max}$

$^{141}_{62}\text{Sm}_{79}$   $1/2^{+}$  0.0 10.2 min 2  
 $Q_{\epsilon} = 4589.16$   
 $\% \epsilon + \% \beta^{+} = 100$

