

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	K. Auranen and E. A. McCutchan		NDS 168, 117 (2020)	1-Aug-2020

$Q(\beta^-)=-4830$  50;  $S(n)=8000$  70;  $S(p)=8.4\times 10^2$  5;  $Q(\alpha)=7520$  50 [2017Wa10](#)

$S(2n)=17660$  80;  $S(2p)=3970$  50;  $Q(\epsilon p)=4130$  50 ([2017Wa10](#)).

Assignment:  $^{197}\text{Au}(^{20}\text{Ne},5n)$ ,  $^{203}\text{Tl}(^{16}\text{O},7n)$  excit ([1968Va04](#)).

[2014Ya19](#): the nuclei of interest were produced in a  $^{40}\text{Ca}(193\text{ MeV}) + ^{175}\text{Lu}$  complete fusion reaction at the HIRFL-Lanzhou facility. The target was a  $500\text{-}\mu\text{g}/\text{cm}^2$ -thick layer of natural Lu ( $>97.4\%$   $^{175}\text{Lu}$ ) evaporated on a  $40\text{ }\mu\text{g}/\text{cm}^2$  carbon backing. The residues were selected using gas-filled recoil separator SHANS, and implanted into position sensitive silicon detectors. Time and position correlation were measured between evaporation residue implantation (ER) and the subsequent  $\alpha$ -decay events.  $E\alpha$ , half-lives, ER- $\alpha$ - $\alpha$  correlations were measured.

[2015Ma63](#): the  $^{212}\text{Ac}$  nuclei were produced using a fusion-evaporation reaction of  $^{162}\text{Dy}(^{54}\text{Cr},p3n)^{212}\text{Ac}$ . The  $403\text{-}\mu\text{g}/\text{cm}^2$ -thick target was on  $75\text{-}\mu\text{g}/\text{cm}^2$ -thick carbon backing and the  $^{54}\text{Cr}$  beam energy, accelerated by the K500 superconducting cyclotron of Texas A&M, was reduced stepwise with aluminium degraders ( $E(^{54}\text{Cr})=243, 248, 253\text{ MeV}$ ). The residues were selected with the momentum achromat recoil spectrometer (MARS) and implanted into a position sensitive silicon detector.  $E\alpha$  and  $\sigma(p2n)+\sigma(p3n)$  were measured.

[2017Gr18](#), [2016Fe11](#): the  $^{212}\text{Ac}$  nuclei were produced using a fusion-evaporation reaction of  $^{197}\text{Au}(^{20}\text{Ne},5n)^{212}\text{Ac}$  at the Cyclotron Research Centre, Louvain-la-Neuve, Belgium. The  $1\text{-}\mu\text{m}$ -thick target was placed on an angle of  $20^\circ$  with respect to the  $145\text{ MeV }^{20}\text{Ne}$  beam axis. Residues were extracted using Leuven Isotope Separator On-Line (LISOL). g factor, quadrupole moment, and spin of the ground state were measured through optical hyperfine spectra obtained using in-gas-cell laser ionization and spectroscopy (IGLIS) technique.

[2018Ro14](#): mass measurement. Mass excess of  $7304\text{ keV }24$  compared compared with  $7277\text{ keV }51$  from AME-2016 ([2017Wa10](#)).

 $^{212}\text{Ac}$  LevelsCross Reference (XREF) Flags

A  $^{216}\text{Pa}$   $\alpha$  decay

E(level)	$J^\pi$	$T_{1/2}$	XREF	Comments
0.0	(7 <sup>+</sup> )	880 ms 35	A	$\% \alpha = 95$ calc; $\% \epsilon + \% \beta^+ = 5$ calc $\mu = 4.98$ 28 ( <a href="#">2017Gr18</a> ) $\% \alpha, \% \epsilon + \% \beta^+$ : from theoretical partial $\beta$ -decay half-life ( <a href="#">2019Mo01</a> ). $T_{1/2}$ : from <a href="#">2014Ya19</a> . Others: $930\text{ ms }50$ ( <a href="#">1968Va04</a> ), $880\text{ ms }110$ ( <a href="#">2000He17</a> ). $J^\pi$ : (7 <sup>+</sup> ) if observed $\alpha$ decay feeds the $^{208}\text{Fr}$ 7 <sup>+</sup> g.s. ( $\text{HF} \approx 1.9$ ). $J(^{208}\text{Fr})=7$ was determined in <a href="#">2015Vo05</a> based on hyperfine spectrum measurement. $J=(6)$ or (7) from a fit to the hyperfine spectrum in <a href="#">2017Gr18</a> . Configuration $[(\pi h_{9/2})(\nu f_{5/2})]_{J=7}$ from $g=0.711$ 39 ( <a href="#">2017Gr18</a> ). $\mu$ : from g factor, measured with reference to $g$ factor= $0.920$ 13 for the 17/2 and 21/2 isomers in $^{215}\text{Ac}$ , measured as $0.920$ 19 by <a href="#">1983De08</a> , and adjusted to $0.920$ 13 by <a href="#">2017Gr18</a> . Uncertainty in the g factor is quadratic addition of statistical uncertainty of 0.013, and systematic uncertainty of 0.037, as given by <a href="#">2017Gr18</a> . $g=0.818$ 15 if g.s. $J=6$ , uncertainty is statistical only.
133.6 3			A	E(level): from $E\gamma$ .
158 20			A	E(level): from measured $E\alpha$ and $Q(\alpha)=8097\text{ keV }15$ ( <a href="#">2017Wa10</a> ).

Adopted Levels, Gammas (continued) $\gamma(^{212}\text{Ac})$ 

<u><math>E_i(\text{level})</math></u>	<u><math>E_\gamma</math></u>	<u><math>E_f</math></u>	<u><math>J_f^\pi</math></u>	<u>Comments</u>
133.6	133.6 3	0.0	(7 <sup>+</sup> )	$E_\gamma$ : from $^{216}\text{Pa}$ $\alpha$ decay (2000He17).

Adopted Levels, GammasLevel Scheme