Adopted Levels

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, M. S. Basunia, Jun Chen et al. ,	NDS 192,315 (2023)	25-Sep-2023

Q(β^-)=−581 *11*; S(n)=5980 *60*; S(p)=3631 *6*; Q(α)=7137.4 *20* 2021Wa16

Q(ε)=2302 *6*, S(2n)=13265 *7*, S(2p)=9438 *6* (2021Wa16).

1952Me13, 1964Mc21, 1968Ha14: identified ground state of ^{222}Ac as daughter of ^{226}Pa α decay, and parent of ^{218}Fr (7130α) (1972Es03).

1972Es03: isomer in ^{222}Ac identified in Pb(^{18}O,pxn), as parent of ^{218}Fr through 7870α, and grand-parent of ^{214}At from 8810α at the Berkeley heavy-ion linear accelerator. Measured half-lives of the two activities in ^{222}Ac and isomeric ratio.

Theoretical calculations:

1992Ch20: calculated well depths, quadrupole and hexadecapole deformations, level energies, static moments of inertia, oblate and prolate superdeformed features using fermion dynamic symmetry model.

2022He18: calculated $T_{1/2}$ for α decay, α-preformation factor using density-dependent cluster model with RMF NN and M3Y NN interactions and universal decay law (UDL).

2022Ka09: calculated $T_{1/2}$ for α decay for bare nuclei and He-like ions using adiabatic approach.

2021Sa52: calculated Q(2α), $T_{1/2}$ for 2α-decay with and without the deformation effects using the modified generalized liquid drop model, and Coulomb and proximity potential model with different preformation factors for double α decay.

2020Zh36: calculated $T_{1/2}$ for α decay, shell correction energies of the spherical parent and daughter nuclei using generalized liquid drop model, with the effects of the Strutinsky shell correction.

2013Sa54: calculated $T_{1/2}$ for α and ^{14}C decays from hypernucleus ^{222}Ac and non-strange normal nucleus using fission model, the Coulomb and proximity potential model (CPPM).

Additional information 1.

^{222}Ac Levels

Cross Reference (XREF) Flags

A ^{226}Pa α decay (1.8 min)

E(level)	J$^\pi$	$T_{1/2}$	XREF	Comments
0	1$^-$	4.9 s *5*	A	%α=99 *1*; %ε+%β^+=1 *1* %α=99 *1*. Possible ε branching was estimated by 1966Wa23 as 1-2% from Iα(7.13-MeV α) of ^{218}Rn shown in ^{222}Ac α spectrum by 1964Mc21. Theoretical partial $T_{1/2}$>100 s for ^{222}Ac ε+β^+ decay (2019Mo01) gives (%ε+%β^+)<5. J$^\pi$: favored α decay (HF=2.6) to 1$^-$ g.s. of ^{218}Fr. $T_{1/2}$: weighted average of 5 s *1* (1972Es03), 4.2 s *5* (1958To25) and 5.5 s *5* (1952Me13).
0+x		64 s *3*		%α=94 *5*; %IT=5 *5* (1972Es03); %ε+%β^+=1.35 *65* (1972Es03) %IT≤10 was deduced by 1972Es03 from ratio of Iα values of 4.9-s ^{222}Ac and 64-s ^{222}Ac. %ε+%β^+=0.7 to 2 was deduced by 1972Es03 from the intensities of α lines from ^{218}Rn, ^{214}Po and 64-s ^{222}Ac. From α-energy considerations, either of the 4.9-s and 64-s activities could be the g.s., and the other as an isomer. From the number of counts in the α-spectra recorded in the movable detectors (in the off-wheel position) combined with the spectra recorded by the stationary detectors, 1972Es03 interpreted that the 64-sec state also decays by γ-ray emission, feeding the 4.0-s state, estimating the isomeric decay between 3% and 10%, with the implication that the 64-s state lies higher than the 4.9-s state. E(level): x=9 keV *20*, deduced from Eα=7008.6 *20* and 7000 *20* from the α decays of the 4.9-s and 64-s activities of ^{222}Ac, respectively, both α transitions populating the g.s. of ^{218}Fr. J$^\pi$: on the basis of measured production cross-section ratio, 1972Es03 suggested that the 64-s isomeric state has higher spin than that of the 4.9-s g.s. Authors suggested Nilsson assignment of ν13/2[606]⊗π3/2[651], with the 5$^+$ state as the lowest in the multiplet according to the Gallagher-Moszkowski coupling rule.

Continued on next page (footnotes at end of table)

Adopted Levels (continued)

^{222}Ac Levels (continued)

E(level)	XREF	Comments
		$T_{1/2}$: weighted average of 66 s *3* (1972Es03), 62 s *3* (1973Mo07), 60 s *10* (1982Bo04). Other: 1970GhZY.
40 *14*	A	
137 *14*	A	