^{213}Ra α decay (2.18 ms) 2006Ku26,1976Ra37

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. Chen # and F. G. Kondev	NDS 126, 373 (2015)	30-Sep-2013

Parent: ^{213}Ra: E=1770 *5*; J^π=(17/2$^-$); $T_{1/2}$=2.18 ms *4*; Q(α)=6861.3 *23*; %α decay=0.6 *4*

^{213}Ra-E: from 2006Ku26.

^{213}Ra-$T_{1/2}$: weighted average of 2.1 ms *1* (1976Ra37), 2.2 ms *1* (2004He25) and 2.20 ms *5* (2006Ku26).

^{213}Ra-Q(α): From Eα=6732.3 keV *23*, as evaluated in the present work. 6861.8 keV *23* in 2012Wa38.

^{213}Ra-%α decay: from Adopted Levels of ^{213}Ra.

2006Ku26: ^{213}Ra isotopes were produced by the ^{170}Er(^{50}Ti,xn) reaction with the E=4.35 MeV/nucleon ^{50}Ti beam from the UNILAC at GSI, Darmstadt. Evaporation residues were separated by the velocity filter ship and implanted into a position-sensitive 16-strips pips detector. γ-rays were detected with a Ge-Clover detector (5.0(5)% efficiency at 1.3 MeV). Measured Eγ, Iγ, Eα, Iα, $\gamma\gamma$-coin, $\gamma\gamma\gamma$-coin, $\alpha\gamma$-coin, I(ce). Deduced levels, J^π, γ- and α- branchings, conversion coefficients.

1976Ra37: ^{213}Ra isotopes were produced by ^{209}Bi(^{10}B,6nγ) and Pb(^{12}C,xnγ) reactions with E=60-100 MeV beams from the Yale University's Heavy Ion Accelerator (hilac). α particles were detected with an Si(Au) surface barrier detector and γ-rays were detected with two Ge(Li) detectors. Measured Eγ, Iγ, Eα, Iα, I(x-ray), $\gamma\gamma$-coin. Deduced levels, J^π, γ-branchings, α-branchings, conversion coefficients.

^{209}Rn Levels

E(level)†	J^π‡
0.0	5/2$^-$
110.1 *1*	1/2$^-$
214.7 *2*	3/2$^-$

† From a least-squares fit to Eγ.
‡ From Adopted Levels.

α radiations

Eα	E(level)	Iα‡	HF†	Comments
8267 *10*	214.7	3.5 *20*	1.6×10^4 *15*	Eα: weighted average of 8266 *10* (1976Ra37) and 8270 *20* (2006Ku26). Iα: from 3 *2* (1976Ra37) and 4 *2* (2006Ku26).
8356 *9*	110.1	29 *6*	3.8×10^3 *27*	Eα: weighted average of 8358 *10* (1976Ra37) and 8355 *9* (2006Ku26). Iα: weighted average of 28 *6* (1976Ra37) and 33 *13* (2006Ku26).
8468 *5*	0.0	68 *7*	3.2×10^3 *22*	Eα: weighted average of 8467 *5* (1976Ra37) and 8469 *6* (2006Ku26). Iα: weighted average of 69 *7* (1976Ra37) and 63 *13* (2006Ku26).

† r_0(^{209}Rn)=1.461 *5*, average of r_0(^{208}Rn)=1.466 *8* and r_0(^{210}Rn)=1.4552 *21*, deduced from HF=1.0.
‡ For absolute intensity per 100 decays, multiply by 0.006 *4*.

γ(^{209}Rn)

E$_\gamma$†	I$_\gamma$‡a	E$_i$(level)	J^π_i	E$_f$	J^π_f	Mult.#	δ#&	α@	Comments
104.8 *2*	0.18 *11*	214.7	3/2$^-$	110.1	1/2$^-$	M1(+E2)	≤0.8	10.6 *10*	α(K)=7.5 *18*; α(L)=2.3 *6*; α(M)=0.58 *18* α(N)=0.15 *5*; α(O)=0.032 *9*; α(P)=0.0042 *9* I$_\gamma$: I(104.8γ)/I(214.9γ)=29 *5*/100 *3* (2006Ku26).
110.2 *1*	4.8 *10*	110.1	1/2$^-$	0.0	5/2$^-$	E2		5.50	α(K)=0.362 *5*; α(L)=3.79 *6*; α(M)=1.021 *15* α(N)=0.266 *4*; α(O)=0.0537 *8*; α(P)=0.00597 *9*
214.9 *1*	0.6 *4*	214.7	3/2$^-$	0.0	5/2$^-$	M1(+E2)	<1.2	1.2 *4*	α(K)=0.9 *4*; α(L)=0.212 *8*; α(M)=0.0521 *8*

Continued on next page (footnotes at end of table)

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$\gamma(^{209}Rn)$ (continued)

E_γ [†]	E_i(level)	Comments
		α(N)=0.01357 *20*; α(O)=0.00291 *7*; α(P)=0.00040 *4*

† Weighted average of values from 2006Ku26 and 1976Ra37.
‡ Deduced by the evaluators from intensity balances, Iα and conversion coefficients. Relative photon intensity with respect to I(1063γ in ^{213}Ra)=100 were measured in 1976Ra37. However, those values probably include contributions from the 2.73-min ^{213}Ra α decay, since they are found to be inconsistent with the Iα values.
# From Adopted Gammas.
@ Additional information 1.
& Additional information 2.
a For absolute intensity per 100 decays, multiply by 0.006 *4*.

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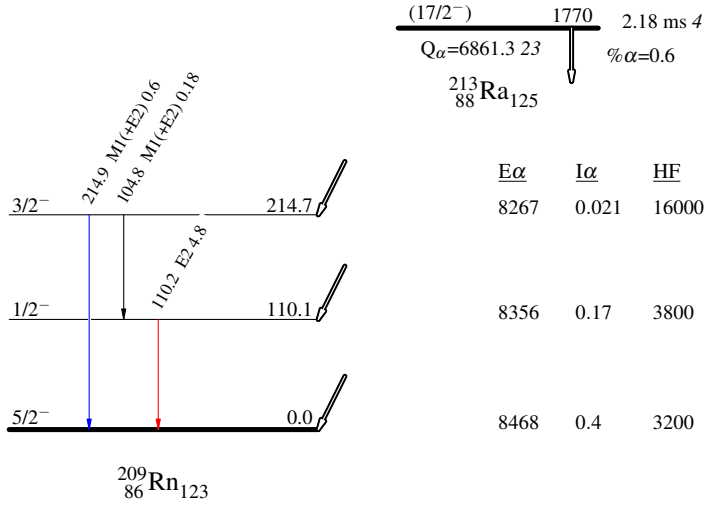
Decay Scheme

Intensities: Relative I_γ

Legend

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



Eα	Iα	HF
8267	0.021	16000
8356	0.17	3800
8468	0.4	3200