Adopted Levels, Gammas

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 112,1115 (2011)	31-Oct-2010

Q(β^-)=−870 *4*; S(n)=6288.6 *23*; S(p)=7073 *4*; Q(α)=6404.66 *10* 2012Wa38
Note: Current evaluation has used the following Q record −869 4 *6288.6 23* 7073 4 *6404.6710* 2009AuZZ,2003Au03.
Additional information 1.
Historic Note: This isotope was originally called Thoron with symbol Tn.

Mass measurements: Penning-trap mass spectrometer (2009Ne03); Schottky mass spectrometry (2005LiZZ).
γ-ray linear polarization following α decay (2005JoZY).
Calculations, compilations, systematics:
^{14}C decay rate: 1986De32.
Cluster model for α decay, Geiger-Nuttall plot: 1991Bu05.
α decay: 2006StZX, 2003Da24, 1997Al22, 1996Wi27, 1992De44.
Effect of octupole and 2^6 pole deformation on binding energies: 1986Ch23.
Equilibrium deformation energy: 1988So08, 1984Na22.
$K^\pi=0^+$ and $K^\pi=0^-$ bands: 1980Sh07.
Levels, $\beta(\lambda)$ ratios: 1995De13.
n-p interaction energy: 1990Mo11.
Quasibands in even-even nuclei: 1984Sa37.
Single-particle levels: 1984So09.
Spontaneous emission of heavy ions: 1986Po06.
Super- and hyper-deformed configurations: 1995We02.

^{220}Rn Levels

Cross Reference (XREF) Flags

- A ^{220}At β^- decay
- B ^{232}Th(^{136}Xe,Xγ)
- C ^{224}Ra α decay

E(level)†	J$^\pi$	T$_{1/2}$	XREF	Comments
0‡	0$^+$	55.6 s *1*	ABC	%α=100 T$_{1/2}$: from 1966Hu20 (value is rounded off from 55.61 s *4*). Others: 55.3 s *3* (1963Gi07), 56.3 s *2* (1961Ro14), 51.5 s *10* (1955Sc81), 61 s $^{+10}_{-8}$ (2003Da24).
240.986‡ *6*	2$^+$	0.146 ns *5*	ABC	J$^\pi$: E2 γ ray to 0$^+$. T$_{1/2}$: from $\alpha\gamma$(t) (1960Be25) (weighted average of 0.150 ns *10* and 0.145 ns *5*).
533.68‡ *10*	4$^+$		ABC	J$^\pi$: $\alpha\gamma(\theta)$ from 0$^+$ parent (^{224}Ra α decay).
645.44# *9*	1$^-$		ABC	J$^\pi$: $\alpha\gamma(\theta)$ from 0$^+$ parent (^{224}Ra α decay).
663.03# *10*	(3$^-$)		ABC	J$^\pi$: probable member of $K^\pi=0^-$ band. For energy and α hindrance factor systematics see 1981Pe09.
851.9# *4*	(5$^-$)		B	
873.88‡ *22*	(6$^+$)		B	
1128.2# *4*	(7$^-$)		B	
1244.3‡ *3*	(8$^+$)		B	
1462.1# *5*	(9$^-$)		B	
1631.1‡ *4*	(10$^+$)		B	
1834.0# *7*	(11$^-$)		B	

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Adopted Levels, Gammas (continued)

^{220}Rn Levels (continued)

E(level)†	Jπ	XREF	E(level)†	Jπ	XREF	E(level)†	Jπ	XREF
2033.9‡ *7*	(12+)	B	2887.0‡ *10*	(16+)	B	3763.9‡ *12*	(20+)	B
2227.1# *9*	(13−)	B	3068.6# *11*	(17−)	B	3961.5?# *13*	(21−)	B
2452.7‡ *8*	(14+)	B	3325.3‡ *11*	(18+)	B			
2638.3# *10*	(15−)	B	3509.8# *12*	(19−)	B			

† Deduced by evaluators from least-squares fit to adopted γ-ray energies.
‡ Band(A): g.s. $K^{\pi}=0^{+}$ rotational band.
# Band(B): $K^{\pi}=0^{-}$ γ vibrational band.

γ(^{220}Rn)

E_i(level)	J_i^{π}	E_{γ}†	I_{γ}†	E_f	J_f^{π}	Mult.†	α#	Comments
240.986	2+	240.986‡ *6*	100‡	0	0+	E2	0.276	B(E2)(W.u.)=47.6 *17*
533.68	4+	292.70‡ *10*	100‡	240.986	2+	(E2)	0.1487	
645.44	1−	404.2‡ *2*	41‡ *10*	240.986	2+			
		645.50‡ *10*	100‡ *17*	0	0+			
663.03	(3−)	422.04‡ *10*	100‡	240.986	2+			
851.9	(5−)	188.8 *5*	25 *8*	663.03	(3−)	E2	0.644 *11*	ce(K)/(γ+ce)=0.1125 *17*; ce(L)/(γ+ce)=0.206 *4*; ce(M)/(γ+ce)=0.0552 *11*; ce(N+)/(γ+ce)=0.0176 *4* ce(N)/(γ+ce)=0.0144 *3*; ce(O)/(γ+ce)=0.00292 *6*; ce(P)/(γ+ce)=0.000335 *7*
		318.3 *5*	100 *15*	533.68	4+	E1	0.0291	ce(K)/(γ+ce)=0.0229 *4*; ce(L)/(γ+ce)=0.00405 *6*; ce(M)/(γ+ce)=0.000958 *14*; ce(N+)/(γ+ce)=0.000308 *5* ce(N)/(γ+ce)=0.000248 *4*; ce(O)/(γ+ce)=5.31×10^{-5} *8*; ce(P)/(γ+ce)=7.34×10^{-6} *11*
873.88	(6+)	340.2 *2*	100	533.68	4+	E2	0.0956	ce(K)/(γ+ce)=0.0480 *7*; ce(L)/(γ+ce)=0.0292 *4*; ce(M)/(γ+ce)=0.00762 *11*; ce(N+)/(γ+ce)=0.00245 *4* ce(N)/(γ+ce)=0.00199 *3*; ce(O)/(γ+ce)=0.000410 *6*; ce(P)/(γ+ce)=5.00×10^{-5} *8*
1128.2	(7−)	254.3 *5*	41 *10*	873.88	(6+)	E1	0.0487	ce(K)/(γ+ce)=0.0375 *6*; ce(L)/(γ+ce)=0.00680 *10*; ce(M)/(γ+ce)=0.001613 *24*; ce(N+)/(γ+ce)=0.000518 *8* ce(N)/(γ+ce)=0.000417 *7*; ce(O)/(γ+ce)=8.89×10^{-5} *14*; ce(P)/(γ+ce)=1.215×10^{-5} *18*
		276.2 *5*	100 *2*	851.9	(5−)	E2	0.178 *3*	ce(K)/(γ+ce)=0.0700 *10*; ce(L)/(γ+ce)=0.0600 *9*; ce(M)/(γ+ce)=0.01583 *25*; ce(N+)/(γ+ce)=0.00507 *8* ce(N)/(γ+ce)=0.00412 *7*; ce(O)/(γ+ce)=0.000847 *14*; ce(P)/(γ+ce)=0.0001006 *16*
1244.3	(8+)	370.4 *2*	100	873.88	(6+)	E2	0.0755	ce(K)/(γ+ce)=0.0408 *6*; ce(L)/(γ+ce)=0.0219

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Adopted Levels, Gammas (continued)

$\gamma(^{220}Rn)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[#]	Comments
								3; ce(M)/(γ+ce)=0.00568 *8*; ce(N+)/(γ+ce)=0.00183 *3* ce(N)/(γ+ce)=0.001480 *21*; ce(O)/(γ+ce)=0.000307 *5*; ce(P)/(γ+ce)=3.78×10^{-5} *6*
1462.1	(9$^-$)	217.9 *5*	14 *4*	1244.3	(8$^+$)	E1	0.0701	ce(K)/(γ+ce)=0.0527 *8*; ce(L)/(γ+ce)=0.00977 *15*; ce(M)/(γ+ce)=0.00232 *4*; ce(N+)/(γ+ce)=0.000743 *12* ce(N)/(γ+ce)=0.000598 *9*; ce(O)/(γ+ce)=0.0001273 *20*; ce(P)/(γ+ce)=1.72×10^{-5} *3*
		333.9 *5*	100 *15*	1128.2	(7$^-$)	E2	0.1008	ce(K)/(γ+ce)=0.0497 *7*; ce(L)/(γ+ce)=0.0312 *5*; ce(M)/(γ+ce)=0.00814 *13*; ce(N+)/(γ+ce)=0.00261 *4* ce(N)/(γ+ce)=0.00212 *4*; ce(O)/(γ+ce)=0.000438 *7*; ce(P)/(γ+ce)=5.32×10^{-5} *8*
1631.1	(10$^+$)	386.8 *2*	100	1244.3	(8$^+$)	E2	0.0671	ce(K)/(γ+ce)=0.0375 *5*; ce(L)/(γ+ce)=0.0190 *3*; ce(M)/(γ+ce)=0.00490 *7*; ce(N+)/(γ+ce)=0.001575 *23* ce(N)/(γ+ce)=0.001277 *18*; ce(O)/(γ+ce)=0.000265 *4*; ce(P)/(γ+ce)=3.29×10^{-5} *5*
1834.0	(11$^-$)	371.9 *5*	100	1462.1	(9$^-$)	E2	0.0746	ce(K)/(γ+ce)=0.0404 *6*; ce(L)/(γ+ce)=0.0216 *4*; ce(M)/(γ+ce)=0.00561 *9*; ce(N+)/(γ+ce)=0.00180 *3* ce(N)/(γ+ce)=0.001460 *22*; ce(O)/(γ+ce)=0.000303 *5*; ce(P)/(γ+ce)=3.73×10^{-5} *6*
2033.9	(12$^+$)	402.8 *5*	100	1631.1	(10$^+$)	E2	0.0603	ce(K)/(γ+ce)=0.0347 *5*; ce(L)/(γ+ce)=0.01657 *24*; ce(M)/(γ+ce)=0.00428 *7*; ce(N+)/(γ+ce)=0.001374 *21* ce(N)/(γ+ce)=0.001114 *17*; ce(O)/(γ+ce)=0.000232 *4*; ce(P)/(γ+ce)=2.89×10^{-5} *5*
2227.1	(13$^-$)	393.1 *5*	100	1834.0	(11$^-$)	E2	0.0643	ce(K)/(γ+ce)=0.0363 *5*; ce(L)/(γ+ce)=0.0180 *3*; ce(M)/(γ+ce)=0.00464 *7*; ce(N+)/(γ+ce)=0.001492 *22* ce(N)/(γ+ce)=0.001209 *18*; ce(O)/(γ+ce)=0.000251 *4*; ce(P)/(γ+ce)=3.12×10^{-5} *5*
2452.7	(14$^+$)	418.8 *5*	100	2033.9	(12$^+$)	E2	0.0545	ce(K)/(γ+ce)=0.0321 *5*; ce(L)/(γ+ce)=0.01459 *21*; ce(M)/(γ+ce)=0.00376 *6*; ce(N+)/(γ+ce)=0.001207 *18* ce(N)/(γ+ce)=0.000978 *15*; ce(O)/(γ+ce)=0.000204 *3*; ce(P)/(γ+ce)=2.55×10^{-5} *4*
2638.3	(15$^-$)	411.2 *5*	100	2227.1	(13$^-$)	E2	0.0572	ce(K)/(γ+ce)=0.0333 *5*; ce(L)/(γ+ce)=0.01549 *23*; ce(M)/(γ+ce)=0.00399 *6*; ce(N+)/(γ+ce)=0.001283 *19* ce(N)/(γ+ce)=0.001039 *16*; ce(O)/(γ+ce)=0.000216 *4*; ce(P)/(γ+ce)=2.71×10^{-5} *4*
2887.0	(16$^+$)	434.3 *5*	100	2452.7	(14$^+$)	E2	0.0497	ce(K)/(γ+ce)=0.0300 *5*; ce(L)/(γ+ce)=0.01298 *19*; ce(M)/(γ+ce)=0.00333 *5*; ce(N+)/(γ+ce)=0.001071 *16* ce(N)/(γ+ce)=0.000867 *13*; ce(O)/(γ+ce)=0.000181 *3*; ce(P)/(γ+ce)=2.28×10^{-5} *4*
3068.6	(17$^-$)	430.3 *5*	100	2638.3	(15$^-$)	E2	0.0509	ce(K)/(γ+ce)=0.0305 *5*; ce(L)/(γ+ce)=0.01337 *20*; ce(M)/(γ+ce)=0.00343 *5*; ce(N+)/(γ+ce)=0.001104 *16* ce(N)/(γ+ce)=0.000894 *13*; ce(O)/(γ+ce)=0.000186 *3*; ce(P)/(γ+ce)=2.35×10^{-5} *4*
3325.3	(18$^+$)	438.3 *5*		2887.0	(16$^+$)			

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Adopted Levels, Gammas (continued)

$\gamma(^{220}Rn)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[#]	Comments
3509.8	(19^-)	441.2 *5*	100	3068.6	(17^-)	E2	0.0478	ce(K)/(γ+ce)=0.0291 *4*; ce(L)/(γ+ce)=0.01234 *18*; ce(M)/(γ+ce)=0.00316 *5*; ce(N+)/(γ+ce)=0.001018 *15* ce(N)/(γ+ce)=0.000824 *12*; ce(O)/(γ+ce)=0.0001720 *25*; ce(P)/(γ+ce)=2.17×10^{-5} *4*
3763.9	(20^+)	438.6 *5*		3325.3	(18^+)			
3961.5?	(21^-)	451.7 *5*		3509.8	(19^-)			

† From ^{232}Th(^{136}Xe,Xγ), unless otherwise specified.

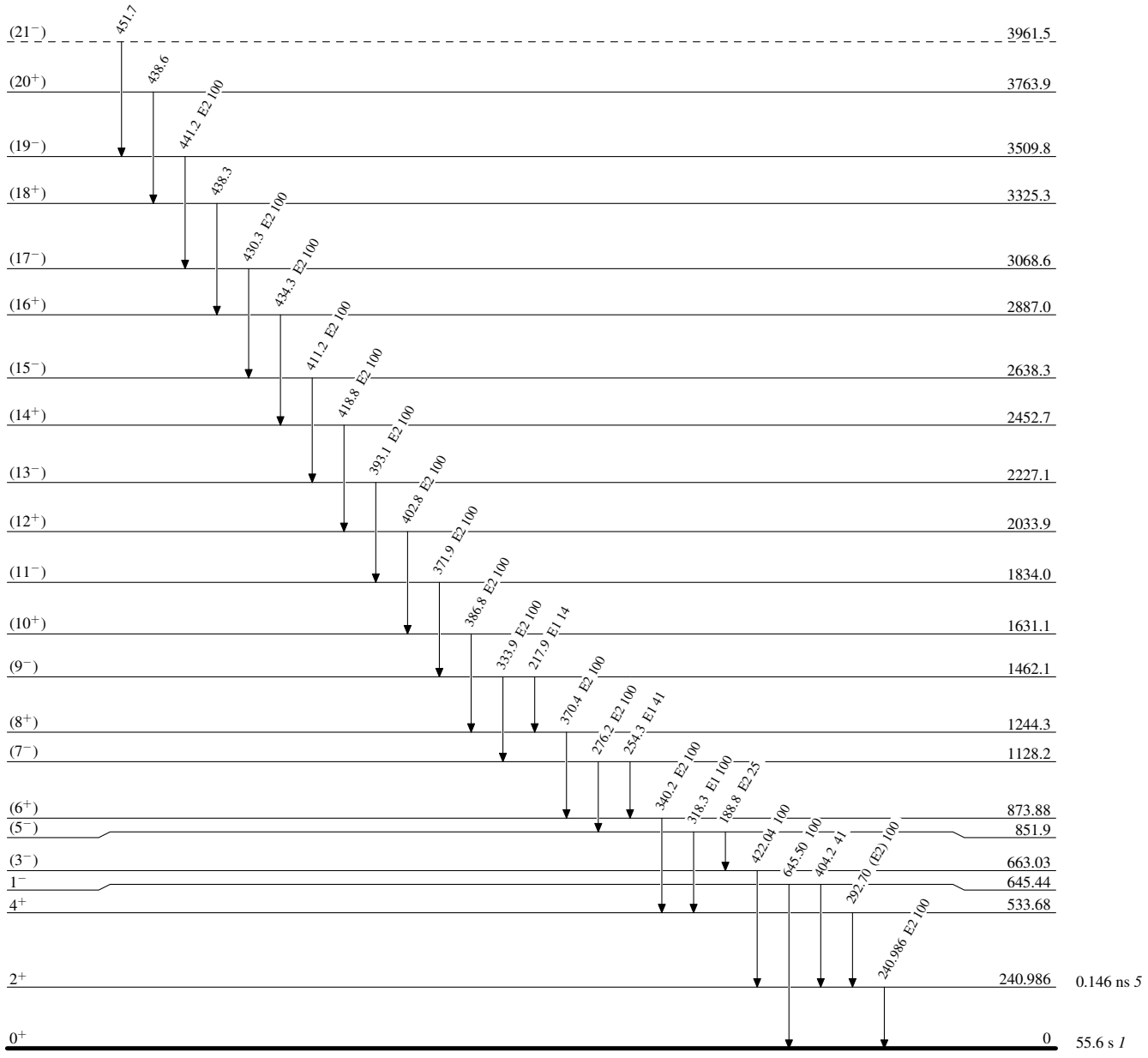
‡ From ^{224}Ra α decay.

Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Adopted Levels, Gammas

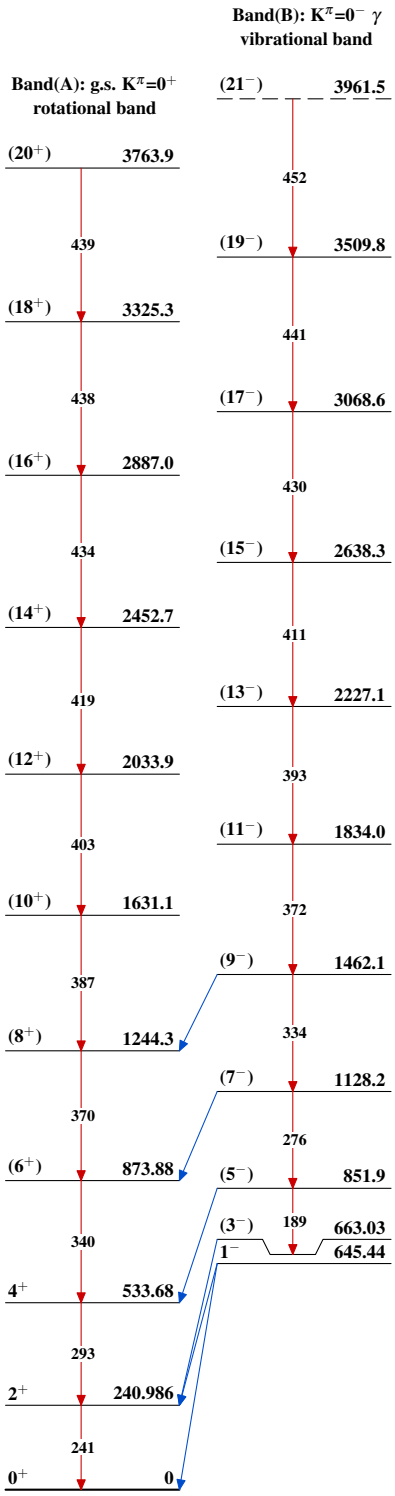
Level Scheme

Intensities: Relative photon branching from each level



$^{220}_{86}Rn_{134}$

Adopted Levels, Gammas



$^{220}_{86}Rn_{134}$