Adopted Levels, Gammas

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 114, 1041 (2013)	1-Mar-2012

Q(β^-)=−4341 *SY*; S(n)=6426 *21*; S(p)=3168 *84*; Q(α)=9083 *8* 2012Wa38
Estimated ΔQ(β^-)=203 (2012Wa38).
Additional information 1.

Calculations, compilations:
Half-life: 2012Po01, 2011He12, 2010Si27, 2008Do12, 2008Ro06, 2007Zh41, 2006Xu04, 2005Xu03, 2005Zh24, 2004Xu02, 2001Re13.
Q(α): 2011Ad15, 2009Do22, 2008Do12, 2008Ro06.
^{208}Pb(^{50}Ti,N), measured σ: 2011Ca08, 2011Ca14, 2011Wa41, 2010Li32, 2010Wa39, 2008Za07, 2007Fe17, 2005Fe05, 2005Sm02, 2005Sw01, 2004Ad32, 2004Ch31, 2003Sw01, 2001De23, 2001Sm06, 2001Za10, 2000Ad15, 2000De09, 2000Sm01, 1999Ad05, 1999Ch42, 1999Sm02, 1998Ad06.
Rf K x ray energies: 2008Th05.
Masses: 2004Mu27.
Spontaneous fission half-life: 2004Ro01, 2003Zu02.
Favored α decay: 1993Bu09, 1992Bu03.
g.s. properties: 1997Mo25, 1995Mo29.
Single-particle Nilsson levels: 2010Se10, 2005Pa73, 1994Cw02.

1994Cw02 calculate the following single-particle level sequence: g.s., 1/2[620]; 0.09 MeV, 3/2[622]; 0.21 MeV, 11/2[725]; 0.28 MeV, 7/2[613]; 0.46 MeV, 9/2[734]; 0.69 MeV, 9/2[615]; 0.87 MeV, 7/2[624].

Assignment: ^{249}Cf(^{12}C,4n) excit, parent of ^{253}No (1969Gh01,1973Be33). ^{208}Pb(^{50}Ti,n) E(^{50}Ti)=4.75-4.85 MeV/nucleon, parent of ^{253}No (1985He06).

The 4.4 s (1/2$^+$) isomer is populated in the alpha decay of 0.18 s ^{261}Sg; the 4.1 s (11/2$^-$) isomer, however, is not populated in the decay of 0.18 s ^{261}Sg (1997He29).

^{257}Rf Levels

Cross Reference (XREF) Flags

A ^{261}Sg α decay
B ^{208}Pb(^{50}Ti,nγ)

E(level)‡	J$^\pi$#	$T_{1/2}$	XREF	Comments
0.0	(1/2$^+$)	4.4 s *+6−5*	AB	%α=79.3 *14*; %ε=19.4 *14*; %SF=1.3 *3* (2010St14) J$^\pi$: In analogy with N=153 nuclei ^{249}Cm and ^{251}Cf (configuration=1/2$^+$[620]). Calculations in 1994Cw01 predict this single-particle Nilsson configuration. $T_{1/2}$: From 2009Qi04, recommended value in 2010Be16. Other values: 5.5 s *4* (2010St14); 4.8 s *2* (2010Be16); 7.2 s *+13−11* (2008Dr05); 4.3 s *+13−8* (1985He06); 3.8 s *8* (1985So03); 4.8 s *3* (1974BeWM); 4.8 s *5* (1971Gh03); 4.5 s *10* (1969Gh01).
50 *1*	[5/2$^+$]		A	
≈75†	(11/2$^-$)	4.1 s *4*	B	%α=88 *2*; %ε=11 *2*; %SF≤1.4 J$^\pi$: Supported by alpha-hindrance factor HF=21 to ^{253}No g.s. (9/2$^-$[734]). $T_{1/2}$=4.1 s is consistent with this J$^\pi$ assignment. $T_{1/2}$: From 2009Qi04, recommended in 2010Be16. Other values: 4.9 s *7* (2010St14), 4.6 s *3* (other value in 2010Be16), 4.1 s *+7−6* (2008Dr05). From 1997He29, 1999He11.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{257}Rf Levels (continued)

E(level)‡	Jπ#	$T_{1/2}$	XREF	Comments
				Decay branchings measured for a combined source of ^{257}Rf (4.4 s) and ^{257}Rf (4.1 s): %SF=2 *1* (2009Qi04), %SF<3.5 (1985He06), %SF= 14 *9* (1985So03), %SF≈12 (1984Og03). Other: 2000Ho27.
148† *1*	(13/2⁻)		B	
157 *1*	(3/2⁺)		A	Possible configuration=3/2⁺[622].
234† *1*	(15/2⁻)		B	
334† *1*	(17/2⁻)		B	
446† *1*	(19/2⁻)		B	
572† *1*	(21/2⁻)		B	
711† *1*	(23/2⁻)		B	
1157 *1*	(21/2,23/2)	139.9 μs *77*	B	Jπ: γ rays to (21/2⁻) and (23/2⁻) in ^{257}Rf. $T_{1/2}$=140 μs is expected for ΔK=5 or 6 transitions (2010Be16). $T_{1/2}$: From 2010Be16. Other values: 160 μs *+42−31* (2009Qi04); 109 μs *13* (2009Je01). E(level): E≈1125 keV, measured with conversion electrons added to the energies of coincident γ rays, agrees with value from decay scheme.

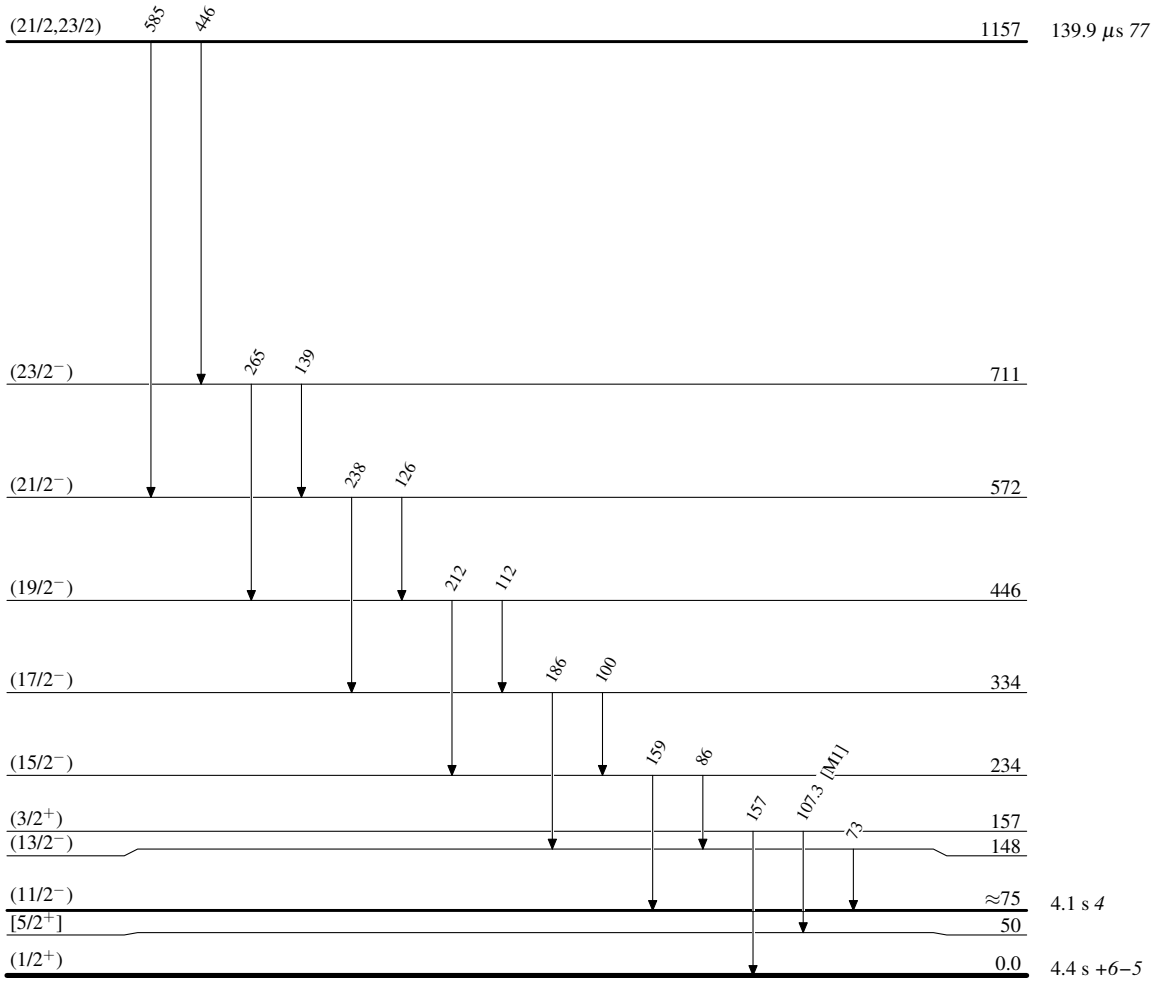
† Band(A): rotational band (11/2⁻[725]).
‡ From ^{208}Pb(^{50}Ti,nγ), unless otherwise noted (2010Be16,2009Qi04).
# Based on rotational-band structure, unless otherwise noted.

γ(^{257}Rf)

E_i(level)	J^π_i	E_γ	E_f	J^π_f	Mult.	E_i(level)	J^π_i	E_γ	E_f	J^π_f
148	(13/2⁻)	73	≈75	(11/2⁻)		446	(19/2⁻)	212 *1*	234	(15/2⁻)
157	(3/2⁺)	107.3	50	[5/2⁺]	[M1]	572	(21/2⁻)	126 *1*	446	(19/2⁻)
		157 *1*	0.0	(1/2⁺)				238 *1*	334	(17/2⁻)
234	(15/2⁻)	86 *1*	148	(13/2⁻)		711	(23/2⁻)	139 *1*	572	(21/2⁻)
		159 *1*	≈75	(11/2⁻)				265 *1*	446	(19/2⁻)
334	(17/2⁻)	100 *1*	234	(15/2⁻)		1157	(21/2,23/2)	446 *1*	711	(23/2⁻)
		186 *1*	148	(13/2⁻)				585 *1*	572	(21/2⁻)
446	(19/2⁻)	112 *1*	334	(17/2⁻)						

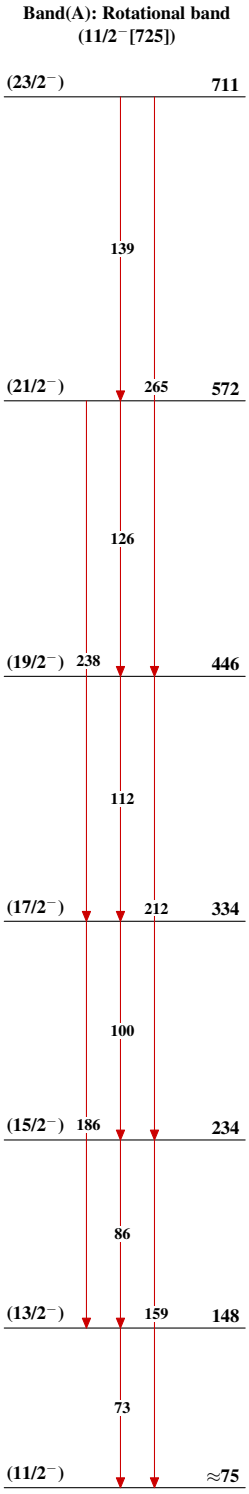
Adopted Levels, Gammas

Level Scheme



$^{257}_{104}Rf_{153}$

Adopted Levels, Gammas



$^{257}_{104}Rf_{153}$