^{181}Ta(^{18}O,7nγ), (^{16}O,5nγ) 1980Kr02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 113, 1871 (2012)	15-Jun-2012

Others: 1982Da17, 1982Sc27, 1983Ma79 ((^{16}O,5nγ), E=100 MeV).

1980Kr02: E(^{18}O)=105-125 MeV, E(^{16}O)=95-105 MeV; natural tantalum targets; measured Eγ, Iγ (Ge(Li)), multiparameter coin, γ-ray angular distributions (20° to 90°), excitation functions. The level scheme and data are from 1980Kr02.

1982Sc27, 1983Ma79: E(^{16}O)=100 MeV, recoil implantation into Bi, nuclear orientation, differential perturbed angular distributions; measured quadrupole interaction for 8$^-$ level; deduced estimate for quadrupole moment (see ^{192}Tl Adopted Levels).

Assignment of γ-rays to ^{192}Tl was based on excitation functions (for strong lines) and $\gamma\gamma$ coin (for weak lines). The ^{192}Tl level structure and population of ^{192}Hg are both consistent with formation of a high-spin isomer, similar to those known in ^{194}Tl, ^{196}Tl, ^{198}Tl.

^{192}Tl Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0+x	7$^+$		E(level): from Adopted Levels, x=138 *45*.
250.6+x *2*	8$^-$	296 ns *5*	%IT=100 $T_{1/2}$: $\gamma\gamma$(t) (1982Da17). Other value: 272 ns *10* ($\gamma\gamma$(t), 1980Kr02). g-factor=+0.207 *5* (1982Da17).
0.0+y?			Represents possible J=9 and/or 10 member(s) of expected (π $h_{9/2}$)⊗(ν $i_{13/2}$) multiplet. 1980Kr02 postulate that highly converted, Eγ≤40 keV transition(S) analogous to a transition known In ^{196}Tl May occur between the cascading 83γ and the delayed 250.6γ.
83.0+y[@] *10*	J[#]		J$^\pi$: 11$^-$ favored by 1980Kr02; adopted value is (10$^-$) based on the presumption that this is the level fed In ^{196}Bi α decay: high spin.
359.0+y[@] *11*	J+1[#]		
621.0+y[@] *11*	J+2[#]		
1017.3+y[@] *11*	J+3[#]		
1326.0+y[@] *11*	J+4[#]		
1784.2+y[@] *11*	J+5[#]		
2005.1+y?[@] *11*	J+6[#]		band assignment and deexciting γ unconfirmed In ^{160}Gd(^{37}Cl,5nγ) (1996RiZZ), so level is not ADOPTED.

† Level energies are from a least-squares fit to Eγ assuming E=0.0+x for the (7$^+$) isomer and E=0.0+y for the the level fed by the 83γ. this allows for the possibility that highly-converted transition(S) with unknown Eγ≤40 keV May exist In the γ cascade between the known 83γ and the delayed 250.6γ. From Adopted Levels, x=138 *45*.

‡ From 1980Kr02, with J=9+I and I≥0; based on $\gamma(\theta)$ and analogy to other Tl isotopes. Two quasiparticle plus rotor model calculations predict an 8$^-$ through 11$^-$ multiplet based on Configuration=((π $h_{9/2}$)⊗(ν $i_{13/2}$)) and, in this mass region, the 8$^-$ state is expected to have the lowest energy. The energy splitting of the multiplet is expected to decrease with decreasing N, and a ΔJ=1 band (with level energy staggering similar to known bands in nearby odd-A Tl isotopes) is expected above the multiplet (1980Kr02).

\# See comment on π=−, ΔJ=1 sequence.

@ Band(A): π=−, ΔJ=1 sequence. An unknown J=9+I with I≥0 was proposed by 1980Kr02 to accommodate the possible existence of unobserved level(s) between those deexcited by the 83γ and the 250.6γ. sequence supported by γ-ray multipolarities and systematics. In Adopted Levels, J$^\pi$ values correspond to I=1, but 1980Kr02 favored I=2.

^{181}Ta(^{18}O,7nγ), (^{16}O,5nγ) 1980Kr02 (continued)

γ(^{192}Tl)

E_γ	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult. ‡	α #	Comments
83 *1*	22 *7*	83.0+y	J	0.0+y?		(M1)	2.71 *11*	I_γ: deduced from coincidence data; corrected for unresolved Kβ x ray peaks using observed Kα x ray and theoretical (Kβ x ray)/(Kα x ray) (1980Kr02). Mult.: not E1 based on α(exp)≥1.0 *7* (from intensity balance at 83+y level) cf. α(E1)=0.146, α(M1)=2.71 and α(E2)=12.87. M1 assignment also supported by comparison with similar structures In heavier Tl isotopes (1980Kr02). Existence of transition is evident from $\gamma\gamma$ coin and greatly enhanced (Kβ x ray)/(Kα x ray) intensity ratio.
^{x}128.6 *2*	8.3 *12*							A_2=−0.09 *10*, A_4=−0.12 *16* (1980Kr02).
^{x}145.2 *2*	12.8 *19*					D+Q		A_2=−0.30 *4*, A_4=−0.04 *7* (1980Kr02).
^{x}161.4 *2*	1.7 *3*							coincident with 260γ.
220.9@ *2*	5.1 *8*	2005.1+y?	J+6	1784.2+y	J+5	D+Q		A_2=−0.73 *24*, A_4=+0.28 *35* (1980Kr02).
250.6 *2*	100.0	250.6+x	8^-	0.0+x	7^+	(E1)	0.0439	A_2=−0.12 *3*, A_4=+0.01 *6* (using target thick enough to stop all recoils) (1980Kr02). Mult.: D from $\gamma(\theta)$; E1 hindrance (B(E1)(W.u.)=4×10^{-8} cf. B(M1)(W.u.)=3×10^{-6}) consistent with systematics. Additionally, Ti(422.8γ, ^{192}Hg daughter)/Iγ(251)=2.6 *4* is incompatible with M2 or higher.
^{x}260.1 *2*	7.7 *12*					D+Q		A_2=−0.59 *8*, A_4=+0.12 *12* (1980Kr02).
261.8 *2*	19 *3*	621.0+y	J+2	359.0+y	J+1	D+Q		A_2=−0.73 *8*, A_4=−0.11 *12* (1980Kr02).
275.8 *2*	27 *4*	359.0+y	J+1	83.0+y	J	D+Q		A_2=−0.66 *4*, A_4=−0.06 *5* (1980Kr02).
308.7 *2*	8.9 *13*	1326.0+y	J+4	1017.3+y	J+3	D+Q		Includes contribution from 308.5γ in ^{192}Pt. A_2=−0.52 *9*, A_4=−0.09 *14* (1980Kr02).
359.0@ *2*	5.5 *8*	359.0+y	J+1	0.0+y?				
396.4 *2*	11.0 *17*	1017.3+y	J+3	621.0+y	J+2	D(+Q)		A_2=−0.41 *7*, A_4=+0.18 *14* (1980Kr02).
^{x}444.9 *2*	14.9 *22*							
458.2 *2*	5.2 *8*	1784.2+y	J+5	1326.0+y	J+4	D+Q		A_2=−0.89 *19*, A_4=−0.10 *27* (1980Kr02).
538.2 *2*	8.7 *13*	621.0+y	J+2	83.0+y	J			
658.3 *2*	7.8 *11*	1017.3+y	J+3	359.0+y	J+1			
705.0 *2*	24 *4*	1326.0+y	J+4	621.0+y	J+2	Q		A_2=+0.32 *5*, A_4=−0.07 *7* (1980Kr02).
767.6@		1784.2+y	J+5	1017.3+y	J+3			E_γ: from figs. 1 and 4 of 1980Kr02.

† Relative to Iγ(250.6γ)=100 in ^{181}Ta(^{16}O,5nγ), E(^{16}O)=100 MeV. Uncertainties for weak lines are reported to range from 5% to 15% (evaluator assigns 15% throughout).

‡ From $\gamma(\theta)$. 1980Kr02 assumed mult=M1+E2 for D+Q transitions and mult=E2 for stretched Q transitions, except as noted.

\# 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.

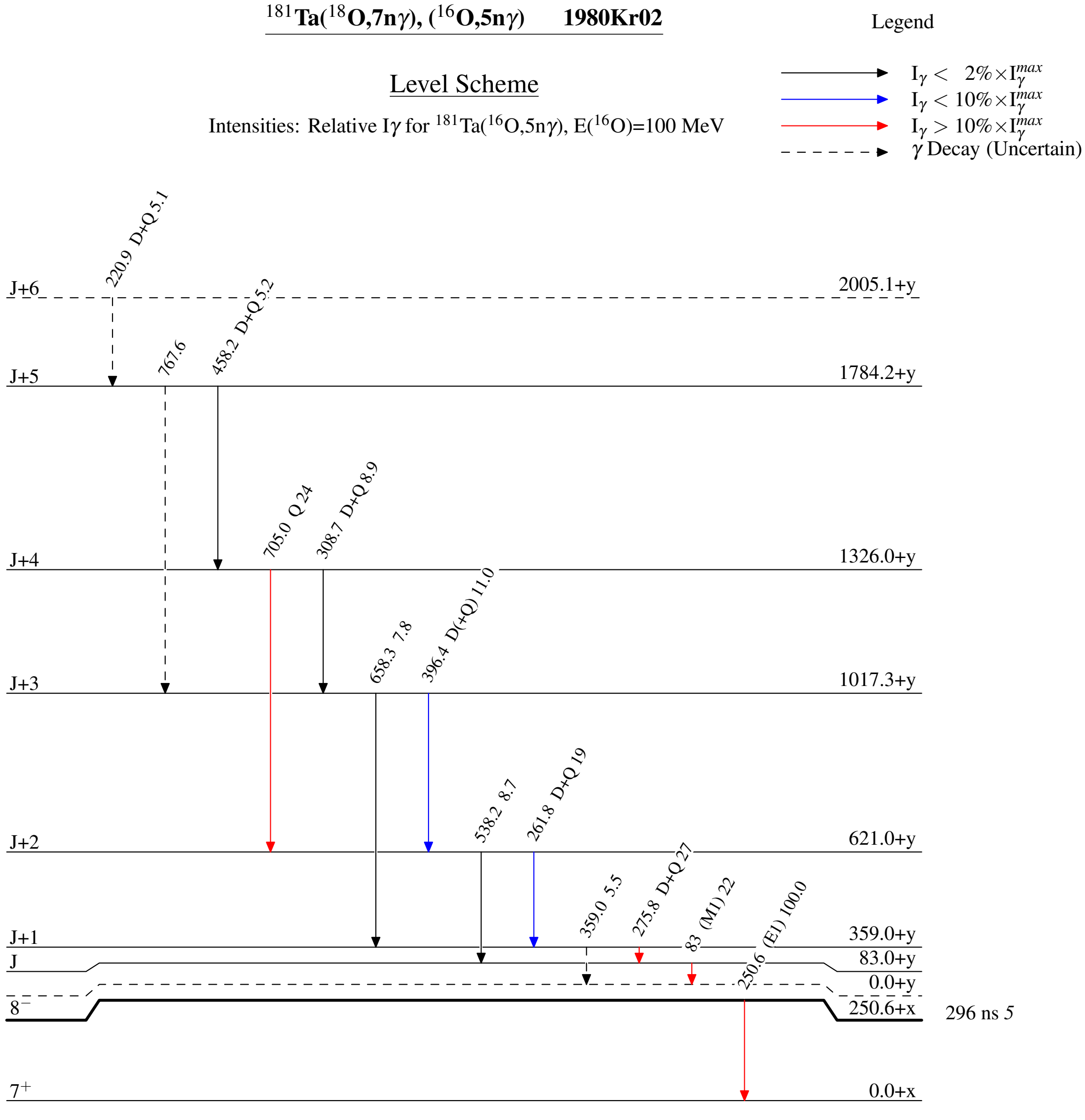
@ Placement of transition in the level scheme is uncertain.

^{x} γ ray not placed in level scheme.

^{181}Ta(^{18}O,7nγ), (^{16}O,5nγ) 1980Kr02

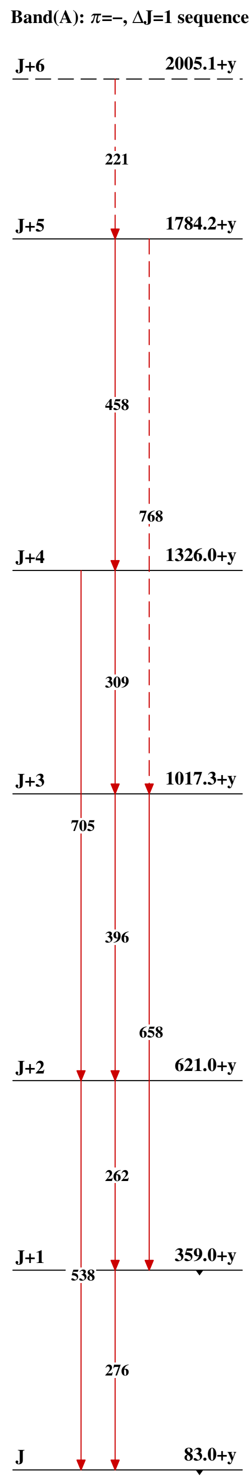
Level Scheme

Intensities: Relative Iγ for ^{181}Ta(^{16}O,5nγ), E(^{16}O)=100 MeV



$^{192}_{81}Tl_{111}$

$^{181}Ta(^{18}O,7n\gamma)$, $(^{16}O,5n\gamma)$ 1980Kr02



$^{192}_{81}Tl_{111}$