### **Adopted Levels, Gammas**

		History	
Туре	Author	Citation	Literature Cutoff Date
Full Evaluation	J. Tuli	ENSDF	15-Aug-2015

 $Q(\beta^{-})=-7170 \ 19$ ;  $S(n)=8266 \ 20$ ;  $S(p)=3201 \ 42$ ;  $Q(\alpha)=5055 \ 6 \ 2012Wa38$ Identification: comparison of  $\alpha$ -intensity yield curves for  $^{164}Er(^{16}O,xn)$  with theoretical curve shapes suggests x=6, 7, and 8 for three of the products;  $^{173}Os$  as 7n product was confirmed by presence of  $123.7\gamma$  ( $^{173}Hf$  decay) and  $172.2\gamma$  ( $^{173}Ta$  decay) in the corresponding  $\gamma$ -ray yield peak (1971Bo06).

# <sup>173</sup>Os Levels

### Cross Reference (XREF) Flags

<b>A</b> <sup>1</sup>	<sup>73</sup> Ιr ε	decay	(2.20	s)
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- <sup>173</sup>Ir  $\varepsilon$  decay (9.0 s) <sup>177</sup>Pt  $\alpha$  decay В
- С
- D  $(HI,xn\gamma)$

E(level) <sup>†</sup>	$J^{\pi \ddagger}$	T <sub>1/2</sub>	XREF	Comments
0.0#	5/2-	22.4 s 9	ABCD	$%ε+%β^+=99.6 2$ ; %α=0.4 2 (1995Hi02) %α from 1995Hi02. %α=0.021 9 (1971Bo06). J <sup>π</sup> : Favored α decay from 5/2 <sup>-177</sup> Pt. 5/2 <sup>-</sup> 5/2[523] Nilsson state assigned, as for the neighboring N=97 isotones <sup>171</sup> W, <sup>169</sup> Hf, and <sup>167</sup> Yb. T <sub>1/2</sub> : from α(t), γ-K x ray(t) (1995Hi02). Other: 22.4 s α(t) (2002Du22); 16 s 5 (1971Bo06).
91.6 <sup>@</sup> 1	7/2-		ABCD	$J^{\pi}$ : $\alpha$ (HF)=3.7 from 5/2 <sup>-177</sup> Pt.
141.2 <sup>&amp;</sup> 2	(9/2+)	>28 ns	AB D	T <sub>1/2</sub> : estimate from prompt $\gamma\gamma$ -timing width in <sup>173</sup> Ir $\varepsilon$ decay (2.20 s), <sup>173</sup> Ir $\varepsilon$ decay (9.0 s).
141.2+x <sup>&amp;</sup>	(13/2+)		D	$J^{\pi}$ : 13/2 <sup>+</sup> 5/2[642] Nilsson state assignment from systematics for N=97 isotones and features of band structure. x<60 keV, estimated by 1990Ba29.
169.8 5			D	
$187.5 + x^{a} 3$	$(11/2^+)$		D	
219.6 <sup>#</sup> 1	9/2-		A D	
310 1	$(9/2^{-})$		D	
$373.9 + x^{\alpha} 3$	$(17/2^+)$		D	
388.0 <sup><sup>(0)</sup> 1</sup>	11/2-		A D	
$406.1 + x^{\alpha} 3$	$(15/2^+)$		D	
430.5 2	12/2-		D	
$535.1^{"}$ I	13/2		D	
721.8 2	15/2		ע	
757.2	$(21/2^{+})$		ע	
$769.7 \pm x^{a}$ 3	(21/2) $(19/2^+)$		ע ח	
890 5 <sup>#</sup> 2	$(17/2^{-})$		ם ד	
$1094.3^{@}2$	$10/2^{-}$		ם ח	
$1215.4 + x^{a}$ 3	$(23/2^+)$		D	
$1249.2 + x^{\&}3$	$(25/2^+)$		D	
$1290.9^{\#}2$	(20/2)		D	
$15195^{@}2$	23/2-		- D	
$1717.9 + x^{a}$ .3	$(27/2^+)$		D	
1740.1 <sup>#</sup> 2	25/2-		D	
			-	

# Adopted Levels, Gammas (continued)

E(level) <sup>†</sup>	J <b>π</b> ‡	XREF	E(level) <sup>†</sup>	Jπ‡	XREF	E(level) <sup>†</sup>	$J^{\pi \ddagger}$	XREF
1785.7+x <sup>&amp;</sup> 3	$(29/2^+)$	D	3444? 1		D	5023.6 <sup>@</sup> 3	$(47/2^{-})$	D
1997.1 <sup>@</sup> 2	$27/2^{-}$	D	3536.9+x <sup>a</sup> 3	$(39/2^+)$	D	5042.2+x <sup>&amp;</sup> 4	$(49/2^+)$	D
2235.1 <sup>#</sup> 3	29/2-	D	3616.2+x <sup>&amp;</sup> 4	$(41/2^+)$	D	5315.9 <sup>#</sup> 3	$(49/2^{-})$	D
2264.8		D	3683.5 <sup>@</sup> 3	39/2-	D	5725 <sup>@</sup> 1	$(51/2^{-})$	D
2272.4+x <sup>a</sup> 3	$(31/2^+)$	D	3751? <i>1</i>		D	5782.1+x <sup>a</sup> 6	$(51/2^+)$	D
2359.2+x <sup>&amp;</sup> 3	$(33/2^+)$	D	3950.4 <sup>#</sup> 3	$41/2^{-}$	D	5824.8+x <sup>&amp;</sup> 4	$(53/2^+)$	D
2523.3 <sup>@</sup> 3	$31/2^{-}$	D	4064? 2		D	6018.6 <sup>#</sup> 3	$(53/2^{-})$	D
2769.3 <sup>#</sup> 3	33/2-	D	4243.8+x <sup><i>a</i></sup> 3	$(43/2^+)$	D	6436 <sup>@</sup> 2	$(55/2^{-})$	D
2878.8+x <sup>a</sup> 3	$(35/2^+)$	D	4305.4+x <sup>&amp;</sup> 3	$(45/2^+)$	D	6605+x <sup><i>a</i></sup> 1	$(55/2^+)$	D
2919? <i>1</i>		D	4335.2 <sup>@</sup> 3	$43/2^{-}$	D	6645+x <sup>&amp;</sup> 1	$(57/2^+)$	D
2969.0+x <sup>&amp;</sup> 3	$(37/2^+)$	D	4418? 2		D	6754 <sup>#</sup> 1	$(57/2^{-})$	D
3087.5 <sup>@</sup> 3	35/2-	D	4618.6 <sup>#</sup> 3	$45/2^{-}$	D	7166 <sup>@</sup> 2	$(59/2^{-})$	D
3148? 1		D	4727? 2		D	7496+x <sup>&amp;</sup> 2	$(61/2^+)$	D
3336.8 <sup>#</sup> 3	37/2-	D	4994.6+x <sup>a</sup> 3	$(47/2^+)$	D	7541 <sup>#</sup> 2	(61/2 <sup>-</sup> )	D

# <sup>173</sup>Os Levels (continued)

 $^{\dagger}$  From least-squares fit of levels and gammas in (HI,xn $\gamma).$ 

<sup>±</sup> From  $\gamma$ -ray multipolarities, coincidence data, and analysis of rotational structure in (HI,xn $\gamma$ ).

<sup>4</sup> From  $\gamma$ -ray multipolarities, coincid <sup>#</sup> Band(A): 5/2(523) band,  $\alpha$ =+1/2. <sup>@</sup> Band(B): 5/2(523) band,  $\alpha$ =-1/2. <sup>a</sup> Band(C): 5/2(642) band,  $\alpha$ =-1/2.

# $\gamma(^{173}\text{Os})$

All  $\gamma$ -ray properties are from (HI,xn $\gamma$ ), except where noted.

E <sub>i</sub> (level)	$\mathbf{J}_i^{\pi}$	Eγ	$I_{\gamma}^{\dagger}$	$E_f$	$J_f^{\pi}$	Mult.	δ	$\alpha^{\ddagger}$	Comments
91.6	$7/2^{-}$	9167	100	0.0	5/2-	M1+E2	0.30.16	7 35 11	$\delta$ : from $\alpha(K) \exp (5.74 \text{ in } 173 \text{ Jr} \epsilon \text{ decay} (2.20 \text{ s}) (1992 \text{ sc} 16)$
141.2	$(9/2^+)$	49.6 2	100	91.6	$7/2^{-}$	E1	0.00 10	0.518	$B(E1)(W.u.) < 4.3 \times 10^{-5}$
									$E_{\gamma}$ : from <sup>173</sup> Ir $\varepsilon$ decay (2.20 s), <sup>173</sup> Ir $\varepsilon$ decay (9.0 s).
219.6	$9/2^{-}$	128.0 <i>I</i>	100 7	91.6	$7/2^{-}$	M1+E2		2.3 6	$\delta = -2.7 + 11 - 27$ or $-0.16 + 17 - 21$ .
									$\alpha$ : brackets combined range for M1 and E2.
		219.6 <i>1</i>	66 6	0.0	5/2-	E2		0.246	
310	$(9/2^{-})$	218 <sup>#</sup> 1	<75	91.6	$7/2^{-}$				
		310 <i>I</i>	100 25	0.0	5/2-				
373.9+x	$(17/2^+)$	232.7 1	100	141.2+x	$(13/2^+)$	E2		0.204	
388.0	$11/2^{-}$	168.4 <i>1</i>	35.8 <i>23</i>	219.6	9/2-	M1+E2	-0.63 +13-52	1.12 20	
		218.2 5	11.9 <i>14</i>	169.8					
		296.4 <i>1</i>	100 7	91.6	7/2-	E2		0.0956	
406.1+x	$(15/2^+)$	218.6 <i>1</i>	72 5	187.5+x	$(11/2^+)$	E2		0.250	
		264.9 <i>1</i>	100 6	141.2+x	$(13/2^+)$	M1		0.375	
535.1	$13/2^{-}$	147.0 5	5.3 11	388.0	$11/2^{-}$	M1		1.93	
		225 1	9.4 15	310	$(9/2^{-})$	E2		0.227	
		315.5 1	100 4	219.6	9/2-	E2		0.0795	
721.8	$15/2^{-}$	186.7 5	5.5 13	535.1	$13/2^{-}$				
		265.3 1	12.6 11	456.5	11/0-	50		0.0675	
	(01 /0±)	333.8 1	100 5	388.0	11/2	E2		0.0675	
764.1+x	$(21/2^+)$	390.2 1	100	3/3.9+x	$(17/2^{+})$	E2 E2		0.0436	
/69./+x	$(19/2^{+})$	363.6 1	100 6	406.1+x	$(15/2^+)$	E2		0.0530	
200 5	17/0-	395.8 1	41 4	3/3.9+X	$(1/2^{+})$	(M1)		0.127	
890.5	1//2	133.3	286	737.2	15/2-				
		108.0 J 355 A I	2.80	721.0 535.1	$\frac{13}{2}$	F2		0.0565	
1004.3	$10/2^{-}$	203.6.5	3 4 10	800.5	13/2 $17/2^{-}$	E2		0.0505	
1094.5	19/2	205.0 5	100.5	721.8	$\frac{17/2}{15/2^{-1}}$	F2		0.0405	
$1215.4 \pm x$	$(23/2^+)$	445.6.1	100 5	721.0 769 7+x	$(19/2^+)$	E2 F2		0.0495	
1215.11X	(23/2)	451 4 1	18 6 24	764 1+x	$(1)/2^{+})$	M1		0.0896	
1249.2 + x	$(25/2^+)$	485 1 1	100	764 1+x	$(21/2^+)$ $(21/2^+)$	E2		0.0247	
1290.9	$\frac{(23/2^{-})}{21/2^{-}}$	400.4 1	100	890.5	$17/2^{-1}$	E2		0.0407	
1519.5	$\frac{23}{2}$	425.2 1	100	1094.3	$19/2^{-}$	E2		0.0346	
1717.9 + x	$(27/2^+)$	468.6 1	14.5 16	1249.2 + x	$(25/2^+)$	M1		0.0813	
		502.6 1	100 7	1215.4+x	$(23/2^+)$	E2		0.0227	
1740.1	$25/2^{-}$	449.2 1	100	1290.9	21/2-	E2		0.0300	
1785.7+x	$(29/2^+)$	536.5 1	100	1249.2+x	$(25/2^+)$	E2		0.0193	
1997.1	$27/2^{-1}$	477.6 <i>1</i>	100	1519.5	$\frac{23}{2^{-1}}$	E2		0.0257	
2235.1	29/2-	495.0 <i>1</i>	100	1740.1	$25/2^{-}$	E2		0.0235	

From ENSDF

# $\gamma(^{173}Os)$ (continued)

E <sub>i</sub> (level)	$\mathbf{J}_i^\pi$	$E_{\gamma}$	$I_{\gamma}^{\dagger}$	$E_f$	$\mathbf{J}_{f}^{\pi}$	Mult.	$\alpha^{\ddagger}$
2264.8		524.7	100	1740.1	25/2-		
2272.4+x	$(31/2^+)$	486.8 5	12 4	1785.7+x	$(29/2^+)$		
2250 2	(22/2+)	554.5 1	100 9	1717.9+x	$(27/2^+)$	E2	0.0179
2359.2+x	$(33/2^{+})$	573.4 1	100	1/85./+x	$(29/2^+)$	E2	0.0165
2525.5	31/2 33/2-	520.2 I 534 2 I	100	1997.1	21/2	EZ E2	0.0205
2709.3 2878 8+x	$(35/2^+)$	519.2.5	11 4	22350.1 2359 2+x	$(33/2^+)$	M1	0.0195
2070.01X	(35/2)	606.4 <i>1</i>	100 9	2272.4+x	$(33/2^+)$ $(31/2^+)$	E2	0.0145
2919?		684 <sup>#</sup> 1	100	2235.1	29/2-		
2969.0+x	$(37/2^+)$	609.8 1	100	2359.2+x	$(33/2^+)$	E2	0.0143
3087.5	35/2-	564.2 1	100	2523.3	$31/2^{-}$	E2	0.0172
3148?		625 <sup>#</sup> 1	100	2523.3	$31/2^{-}$		
3336.8	37/2-	567.5 1	100	2769.3	33/2-	E2	0.0169
3444?		525 <sup>#</sup> 1	91 9	2919?			
		675 <sup>#</sup> 1	100 9	2769.3	$33/2^{-}$		
3536.9+x	$(39/2^+)$	658.1 <i>1</i>	100	2878.8+x	$(35/2^+)$	E2	0.0121
3616.2+x	$(41/2^+)$	647.2 <i>1</i>	100	2969.0+x	$(37/2^+)$	E2	0.0125
3683.5	39/2-	596.0 <i>1</i>	100	3087.5	35/2-	E2	0.0151
3751?		603 <sup>#</sup> 1	100 13	3148?			
		664 <sup>#</sup> 1	46 7	3087.5	$35/2^{-}$		
3950.4	$41/2^{-}$	613.6 <i>1</i>	100	3336.8	$37/2^{-}$	E2	0.0141
4064?		620 <sup>#</sup> 1	100	3444?			
4243.8+x	$(43/2^+)$	706.9 <i>1</i>	100	3536.9+x	$(39/2^+)$	(E2)	0.0103
4305.4+x	$(45/2^+)$	689.2 1	100	3616.2+x	$(41/2^+)$	E2	0.0109
4335.2	43/2-	651.7 I	100	3683.5	39/2-	E2	0.0123
4418?		667 <b>"</b> 1	100	3751?			
4618.6	45/2-	668.2 <i>I</i>	100	3950.4	41/2-	E2	0.0117
4727?		663 <b>#</b> 1	100	4064?			
4994.6+x	$(4^{7}/2^{+})$	750.8 1	100	4243.8+x	$(43/2^{+})$	(E2)	0.00906
5023.6	(4//2)	688.4 I	100	4335.2	43/2	EO	0.00042
$5042.2 \pm x$ 5315.0	(49/2)	/ 30.8 I 607 3 I	100	4505.4+X	(43/2)	$E_2$	0.00945
5725	(49/2) $(51/2^{-})$	701 1	100	5023.6	$(47/2^{-})$	$(E_2)$ F2	0.0100
5782 1+x	$(51/2^+)$	787 5 5	100	4994 6+x	$(47/2^+)$	112	0.0105
5824.8 + x	$(53/2^+)$	782.6 1	100	5042.2 + x	$(49/2^+)$		
6018.6	$(53/2^{-})$	702.7 1	100	5315.9	$(49/2^{-})$		
6436	$(55/2^{-})$	711 <i>I</i>	100	5725	$(51/2^{-})$		
6605+x	$(55/2^+)$	823 <i>I</i>	100	5782.1+x	$(51/2^+)$		
6645+x	$(57/2^+)$	820 1	100	5824.8+x	$(53/2^+)$	(E2)	0.00752
6754	$(57/2^{-})$	735 1	100	6018.6	(53/2-)		
7166	$(59/2^{-})$	730 1	100	6436	$(55/2^{-})$		

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 $^{173}_{76}\mathrm{Os}_{97}\text{-}4$ 

#### Adopted Levels, Gammas (continued)

# $\gamma(^{173}\text{Os})$ (continued)

E <sub>i</sub> (level)	$\mathbf{J}_i^{\pi}$	Eγ	$I_{\gamma}^{\dagger}$	$E_f$	$\mathbf{J}_f^{\pi}$
7496+x	(61/2 <sup>+</sup> )	851 <i>1</i>	100	6645+x	(57/2 <sup>+</sup> )
7541	(61/2 <sup>-</sup> )	787 <i>1</i>	100	6754	(57/2 <sup>-</sup> )

<sup>†</sup> Relative photon branching from each level. <sup>‡</sup> Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on  $\gamma$ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

<sup>#</sup> Placement of transition in the level scheme is uncertain.

### Adopted Levels, Gammas

Legend

### Level Scheme

Intensities: Relative photon branching from each level

 $--- \rightarrow \gamma$  Decay (Uncertain)



 $^{173}_{76}\mathrm{Os}_{97}$ 

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#### Adopted Levels, Gammas Legend Level Scheme (continued) Intensities: Relative photon branching from each level γ Decay (Uncertain) ----↓ <sup>55</sup><sup>4</sup>5 <sup>£2</sup>100 100 E2 100 + <sup>+</sup> + <sup>+</sup> + 90 $(31/2^+)$ 2272.4+x 2264.8 2235.1 29/2 + 47.6 E2 100 27/2 1997.1 + 336.5 22 100 + 400 $(29/2^+)$ 1785.7+x $\frac{25/2^-}{(27/2^+)}$ 1740.1 1717.9+x + 252 E2 100 | 1519.5 23/2 + 400.4 E2 100 + \*25, E2 100 $= \frac{451}{451} \frac{451}{100}$ 1290.9 $\frac{21/2^-}{(25/2^+)}$ $\frac{1}{2} \frac{3}{23} \frac{5}{23} \frac{5}{23} \frac{1}{40} \frac{1}{10}$ 1249.2+x ¥ (23/2 1215.4+x 19/2-1094.3 <sup>355</sup>4 168. & 100 133.3 2.8 $\frac{1}{1+3} \frac{3s_1^{1}}{s_3} a_{1} a$ 1 3002 1 1 3002 1 2 2 200 17/2-890.5 55.00 5.50 (19/2+) 769.7+x 764.1+x 757.2 $(21/2^+)$ \* \* -<u>6.6.</u> .^.^. $\left( \frac{1}{25} \frac{3}{55} \frac{5}{5} \frac{5}{5} \frac{5}{10} \frac{1}{10} \frac{1}{55} \frac{5}{5} \frac{5}{10} \frac{1}{10} \frac{1}{5} \frac{5}{5} \frac{5}{5} \frac{5}{10} \frac{1}{10} \frac{1}{5} \frac{5}{5} \frac{5}{5}$ 15/2 721.8 0.4 M. + 2 35.8 9 13/2-535.1 40/ 6.6% < 18.6 Ð 2 456.5 $(15/2^+)$ 406.1+x $\frac{\frac{11/2^{-}}{(17/2^{+})}}{(17/2^{+})}$ Ð. 8 388.0 310-278-1 -2 373.9+x + 21<sub>96</sub>, 128.0 (9/2-) 310 $\frac{9/2^-}{(11/2^+)}$ 8\_8 219.6 × -47 187.5+x ŵ ŧ - %-169.8 -È ¥ ¥ \_\_\_\_ $(13/2^+)$ 141.2+x \_\_\_\_ (9/2+) ¥ ↓ ↓ à 141.2 $>\!\!28~ns$ 7/2-5/2-91.6 0.0 22.4 s 9

<sup>173</sup><sub>76</sub>Os<sub>97</sub>

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### Adopted Levels, Gammas

Band(A): 5/2(523) band, α=+1/2		Band(C): 5/2(642) band, α=+1/2	
(61/2 <sup>-</sup> ) 7541	Band(B): 5/2(523) band, α=-1/2	(61/2 <sup>+</sup> ) 7496+x	
787	(59/2 <sup>-</sup> ) 7166	851	Band(D): 5/2(642) band,
(57/2 <sup>-</sup> ) 6754	730	(57/2 <sup>+</sup> ) 6645+x	$\alpha = -1/2$ (55/2 <sup>+</sup> ) 6605+x
735	(55/2 <sup>-</sup> ) 6436		
(53/2 <sup>-</sup> ) 6018.6	711	820	823
703	(51/2 <sup>-</sup> ) 5725	(53/2 <sup>+</sup> ) 5824.8+x	(51/2 <sup>+</sup> ) 5782.1+x
(49/2 <sup>-</sup> ) 5315.9	701	783	788
697	(47/2 <sup>-</sup> ) 5023.6	(49/2 <sup>+</sup> ) 5042.2+x	(47/2 <sup>+</sup> ) 4994.6+x
45/2- 4618.6	688	737	751
668	43/2- 4335.2	(45/2 <sup>+</sup> ) 4305.4+x	(43/2 <sup>+</sup> ) 4243.8+x
41/2- 3950.4	652	689	707
614	<u>39/2-</u> <u>3683.5</u>	(41/2 <sup>+</sup> ) 3616.2+x	(39/2 <sup>+</sup> ) 3536.9+x
37/2- 3336.8	596 35/2- 3087.5	647	658
568 33/2- 2769.3	564	(37/2 <sup>+</sup> ) 2969.0+x	(35/2 <sup>+</sup> ) 2878.8+x
534	<u>31/2</u> <u>2523.3</u>	610 (22/2 <sup>+</sup> )	606
<u>29/2</u> <u>2235.1</u>	526	(33/2 <sup>-</sup> ) 2359.2+x	(31/2 <sup>+</sup> ) 2272.4+x
495	27/2 1997.1	573 (29/2 <sup>+</sup> ) 1785 7+x	554
25/2- 1740.1	478 23/2 <sup>-</sup> 1519.5		(27/2 <sup>+</sup> ) 1717.9+x
449 21/2 <sup>-</sup> 1290.9	425	(25/2 <sup>+</sup> ) 1249.2+x	503 (23/2 <sup>+</sup> ) 1215 4+x
400	<u>19/2-</u> <u>1094.3</u>	485	
<u>17/2</u> 890.5 355	372 15/2 <sup>-</sup> 721.8	(21/2 <sup>+</sup> ) 764.1+x	(19/2 <sup>+</sup> ) 769.7+x
<u>13/2</u> 535.1	334 11/2- 388.0	390 (17/2 <sup>+</sup> ) 373.9+x (13/2 <sup>+</sup> ) 111.2	(15/2 <sup>+</sup> ) 364 406.1+x
$\frac{9/2}{5/2^-}$ $\frac{219.6}{0.0}$	7/2- 91.6	$(15/2^{+}) \xrightarrow{233} 141.2 + x$ $(9/2^{+}) \xrightarrow{1} 141.2$	$(11/2^+)$ $\stackrel{217}{\checkmark}$ 187.5+x

<sup>173</sup><sub>76</sub>Os<sub>97</sub>