

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli		NDS 114, 1849 (2013)	31-Dec-2012

$Q(\beta^-)=6.46\times 10^3$  21;  $S(n)=6.68\times 10^3$  32;  $S(p)=15.96\times 10^3$  27;  $Q(\alpha)=-9.72\times 10^3$  25 2012Wa38

[Additional information 1.](#)

Nuclear Structure. Theory.

Calculated E(lev), B(E2): [2012Ca30](#), [2012Pr08](#), [2012Sa33](#), [2011Yo04](#), [2010Le20](#), [2010Ya17](#), [2009Ro06](#), [2008Ka41](#), [2008Ya14](#), [2005Ch12](#), [2005Ho32](#), [2004Mi54](#), [2002Ca48](#).

Nuclear Reactions.

${}^9\text{Be}({}^{76}\text{Ge},\text{X})$ : [2010Ga06](#), [2009Cr02](#).

Production and identification:

[1988Bo06](#):  ${}^{60}\text{Mn}$  from  $\text{W}({}^{76}\text{Ge},\text{X})$ ,  $E=11.5$  MeV/nucleon, mass separation.

[1996Do23](#):  ${}^{65}\text{Cu}^{26+}$  beam on  ${}^9\text{Be}$  target,  $E=64.5$  MeV/A.

Identification by energy loss and tof. Measured  $\beta(t)$ .

 ${}^{60}\text{Cr}$  LevelsCross Reference (XREF) Flags

<b>A</b>	${}^{60}\text{V}$ $\beta^-$ decay (40 ms)	<b>D</b>	Coulomb excitation
<b>B</b>	${}^{61}\text{V}$ $\beta^-n$ decay	<b>E</b>	${}^1\text{H}({}^{60}\text{Cr},{}^{60}\text{Cr}'\gamma)$
<b>C</b>	${}^{14}\text{C}({}^{48}\text{Ca},2p\gamma)$	<b>F</b>	${}^{238}\text{U}({}^{64}\text{Ni},\text{X}\gamma)$

E(level)	$J^\pi$ †	$T_{1/2}$	XREF	Comments
0.0#	0 <sup>+</sup>	0.49 s 1	ABCDEF	$\% \beta^- = 100$ ; $\% \beta^- n = ?$ $T_{1/2}$ : from <a href="#">2006Li15</a> . $T_{1/2}$ $1/2=0.57$ s 6 from <a href="#">1988Bo06</a> , $4\pi\beta$ time spectrum, ${}^{60}\text{Mn}$ (1.77 s) activity subtracted. $T_{1/2}$ $1/2=0.51$ s 15 if ${}^{60}\text{Mn}$ g.s. is fed in $\beta^-$ decay, or 0.47 s 15 if 3 <sup>+</sup> , ${}^{60}\text{Mn}$ (1.77 s) isomer is fed in 100% of $\beta^-$ decays ( <a href="#">1996Do23</a> ), 0.4 s 1 ( <a href="#">1997AmZZ</a> ), 0.38 s 3 ( <a href="#">1995AmZX</a> ).
643.90# 20	(2 <sup>+</sup> )	23 ps 3	ABCDEF	$J^\pi$ : From systematics for even-even nuclides. $T_{1/2}$ : From Coul. Ex.
1460.7# 5	(4 <sup>+</sup> )		BC F	
1818.9 11	(3,4)‡		C	
2446.0# 5	(6 <sup>+</sup> )		C F	
2630.0 11	(5,6)‡		C	
3477.4# 6	(8 <sup>+</sup> )		C	
4681.47# 12	(10 <sup>+</sup> )		C	

† Rotational band structure, unless given otherwise.

‡ From [2006Zh42](#).

# Band(A):  $K^\pi=0^+$  g.s. rotational band.

Adopted Levels, Gammas (continued)

$\gamma({}^{60}\text{Cr})$								
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\ddagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Mult.	$\alpha^\dagger$	Comments
643.90	(2 <sup>+</sup> )	643.9 2	100	0.0	0 <sup>+</sup>	[E2]	0.000505 7	$\alpha=0.000505$ 7; $\alpha(\text{K})=0.000456$ 7; $\alpha(\text{L})=4.25\times 10^{-5}$ 6; $\alpha(\text{M})=5.59\times 10^{-6}$ 8; $\alpha(\text{N+..})=2.07\times 10^{-7}$ 3
1460.7	(4 <sup>+</sup> )	816.8 4	100	643.90	(2 <sup>+</sup> )	[E2]	0.000260 4	$\alpha(\text{N})=2.07\times 10^{-7}$ 3 $\alpha=0.000260$ 4; $\alpha(\text{K})=0.000235$ 4; $\alpha(\text{L})=2.18\times 10^{-5}$ 3; $\alpha(\text{M})=2.87\times 10^{-6}$ 4; $\alpha(\text{N+..})=1.071\times 10^{-7}$ 15 $\alpha(\text{N})=1.071\times 10^{-7}$ 15
1818.9	(3,4)	1175.0 10	100	643.90	(2 <sup>+</sup> )			
2446.0	(6 <sup>+</sup> )	985.3 2	100	1460.7	(4 <sup>+</sup> )	[E2]	0.0001611 23	$\alpha=0.0001611$ 23; $\alpha(\text{K})=0.0001458$ 21; $\alpha(\text{L})=1.351\times 10^{-5}$ 19; $\alpha(\text{M})=1.777\times 10^{-6}$ 25 $\alpha(\text{N})=6.65\times 10^{-8}$ 10
2630.0	(5,6)	811.1 4	100	1818.9	(3,4)			
3477.4	(8 <sup>+</sup> )	1031.4 3	100	2446.0	(6 <sup>+</sup> )	[E2]	0.0001443 21	$\alpha=0.0001443$ 21; $\alpha(\text{K})=0.0001305$ 19; $\alpha(\text{L})=1.209\times 10^{-5}$ 17; $\alpha(\text{M})=1.590\times 10^{-6}$ 23 $\alpha(\text{N})=5.96\times 10^{-8}$ 9
4681.4?	(10 <sup>+</sup> )	1204.0 <sup>#</sup> 10	100	3477.4	(8 <sup>+</sup> )	[E2]	0.0001105 16	$\alpha=0.0001105$ 16; $\alpha(\text{K})=9.12\times 10^{-5}$ 13; $\alpha(\text{L})=8.44\times 10^{-6}$ 12; $\alpha(\text{M})=1.110\times 10^{-6}$ 16; $\alpha(\text{N+..})=9.73\times 10^{-6}$ $\alpha(\text{N})=4.17\times 10^{-8}$ 6; $\alpha(\text{IPF})=9.69\times 10^{-6}$ 21

<sup>†</sup> Additional information 2.

<sup>‡</sup> From  ${}^{14}\text{C}({}^{48}\text{Ca}, 2p\gamma)$ .

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

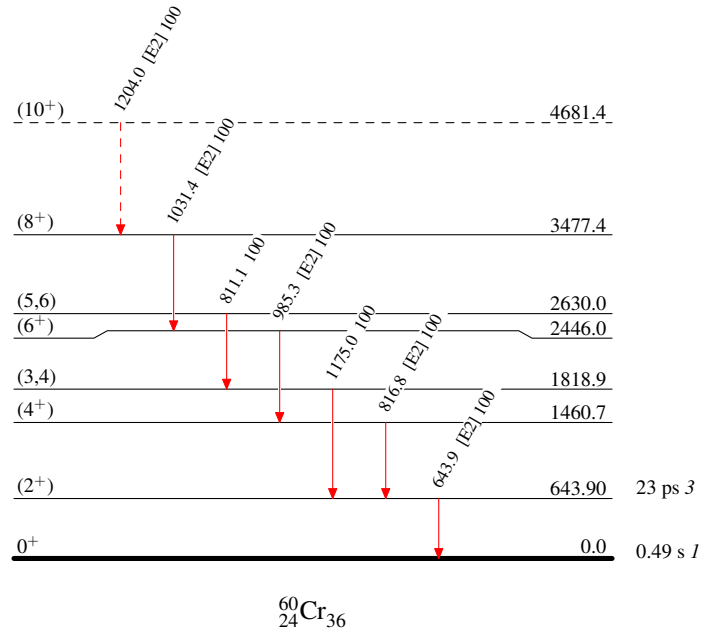
**Adopted Levels, Gammas**

## Legend

Level Scheme

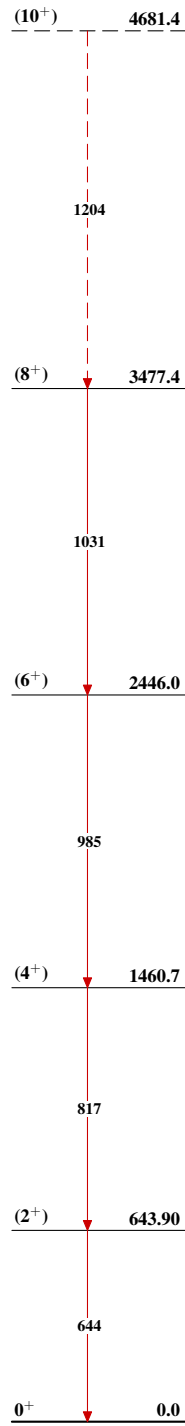
Intensities: Type not specified

- ▶  $I_\gamma < 2\% \times I_\gamma^{max}$
- ▶  $I_\gamma < 10\% \times I_\gamma^{max}$
- ▶  $I_\gamma > 10\% \times I_\gamma^{max}$
- - - -▶  $\gamma$  Decay (Uncertain)

 ${}^{60}_{24}\text{Cr}_{36}$

**Adopted Levels, Gammas**

Band(A):  $K^\pi=0^+$  g.s.  
rotational band

 ${}^{60}_{24}\text{Cr}_{36}$