

^{176}Au α decay (1.05 s) [2014An10](#),[1975Ca06](#),[1984ScZQ](#)

Type	Author	History	Literature Cutoff Date
Full Evaluation	Balraj Singh	Citation ENSDF	31-Dec-2015

Parent: ^{176}Au : $E=0+x$; $J^\pi=(3^-,4^-)$; $T_{1/2}=1.05\text{ s}$; $Q(\alpha)=6434\text{ keV}$; $\% \alpha$ decay=75.8

^{176}Au -E: Absolute energies of the g.s. and isomer in ^{176}Au are not known according to [2014An10](#).

^{176}Au - J^π : As given in [2014An10](#) based on (3^-) suggested by [2004GoZZ](#) and (4^-) in [2013KoZR](#), both from possible configuration= $\pi s_{1/2} \otimes \nu(f_{7/2}$ or $h_{9/2})$. [2012Au07](#) list (5^-) from α decay to a 168.4-keV level in ^{172}Ir , but this level is no longer supported by results of detailed ^{176}Au α -decay study by [2014An10](#).

^{176}Au - $T_{1/2}$: From [2004GoZZ](#). Others: 1.2 s [4](#) ([2013KoZR](#)), 0.84 s [+17-14](#) ([2002Ro17](#)), 0.83 s [14](#) ([1999Da18](#)), 1.00 s [20](#) ([1990SeZW](#)), 1.25 s [30](#) ([1975Ca06](#), from decay of 6260 α , but this α is no longer supported by [2004GoZZ](#) and [2014An10](#)).

^{176}Au - $Q(\alpha)$: From $E\alpha=6288\text{ keV}$ [7](#). Other: 6558 keV [7](#) ([2012Wa38](#)).

^{176}Au - $\% \alpha$ decay: $\% \alpha=75.8$ ([2013KoZR](#)).

[2014An10](#): ^{176}Au produced in $^{141}\text{Pr}(^{40}\text{Ca},5n), E(^{40}\text{Ca})=208, 212\text{ MeV}$ reaction using UNILAC accelerator and SHIP separator at GSI. Measured $E\alpha$, $I\alpha$, $E\gamma$, $I\gamma$, (implants) α correlations, $\alpha\gamma$ and $\alpha\alpha$ correlations using 300 μm thick 35x80 mm² 16-sided position-sensitive 16-sided Si detector, and three tof detectors to distinguish between reaction products and scattered beam particles. Gamma rays were detected using a four-crystal Clover Ge detector with a lower detection threshold of $\approx 20\text{ keV}$ photon energy. Another experiment was carried out for ^{180}Tl α decay to ^{176}Au using RILIS at ISOLDE-CERN facility. This decay preferentially populates low-spin isomer of ^{176}Au since parent $J^\pi(^{180}\text{Tl})=(4^-,5^-)$ proposed in Authors' earlier studies or (5^-) in [2013KoZR](#). In this study correlated radiations: 6157 α -126.3 γ , 6138 α -151.5 γ , 6054 α -236.6 γ and 5798 α -500.0 γ were seen which match the $\alpha\gamma$ correlations seen in GSI experiment, thus confirming the assignment of the α groups and γ rays to the decay of low-spin isomer of ^{176}Au .

[2013KoZR](#): measured $E\alpha$ and half-life of ^{176}Au decay.

[1990SeZW](#): $^{106}\text{Cd}(^{74}\text{Se},n3p)$ $E=340\text{ MeV}$. Recoil-mass separator. Measured $T_{1/2}$.

[1984ScZQ](#): measured $E\alpha$, $I\alpha$, $E\gamma$, $T_{1/2}$.

[1975Ca06](#): activity produced by $^{141}\text{Pr}(^{40}\text{Ca},5n)$ $E=180\text{-}290\text{ MeV}$, and identified by excitation functions and systematics of $E\alpha$ in Au isotopes. Measured $E\alpha$, $I\alpha$.

 ^{172}Ir Levels

A 168.4, (5^-) level reported in [1984ScZQ](#) and [1975Ca06](#) is not confirmed by [2014An10](#).

E(level) [†]	J^π	Comments
0+x	$(3^-,4^-)$	J^π : from 2014An10 based on favored α decay from $(3^-,4^-)$ parent state of ^{176}Au . Possible configuration= $\pi 1/2^+, (s_{1/2} \text{ orbital}) \otimes \nu 7/2^-, (f_{7/2} \text{ or } h_{9/2} \text{ orbital})$.
126.3+x 3		
151.5+x 3		
236.6+x 3		
500.0+x 5		

[†] From $E\gamma$ data in [2014An10](#), absolute energies of the g.s. and isomer in ^{172}Ir are not known according to [2014An10](#).

 α radiations

A 6228 10α group reported by [1984ScZQ](#) and assigned to α decay of ^{176}Au to a 168.4, (5^-) level in ^{172}Ir has been interpreted by [2014An10](#) (also in [2004GoZZ](#)) as due to 6117 α +ce sum line seen at 6222 keV by [2014An10](#) in the decay of 1.36-s ^{176}Au decay.

A 6260 10α group reported by [1975Ca06](#) has not been confirmed in other α -decay studies.

Continued on next page (footnotes at end of table)

^{176}Au α decay (1.05 s) 2014An10,1975Ca06,1984ScZQ (continued) α radiations (continued)

$E\alpha^{\dagger}$	$E(\text{level})$	$I\alpha^{\dagger\#}$	$\text{HF}^{\ddagger}$	Comments
5798 20	500.0+x	<0.4	>9	Reduced α width $\delta^2_{\alpha}<10.3$ keV 23 (2014An10).
6054 20	236.6+x	<1	>45	Reduced α width $\delta^2_{\alpha}<2.1$ keV 5 (2014An10).
6138 15	151.5+x	<5	>20	Reduced α width $\delta^2_{\alpha}<4.8$ keV 9 (2014An10).
6157 20	126.3+x	<2	>60	Reduced α width $\delta^2_{\alpha}<1.6$ keV 3 (2014An10).
6288 7	0+x	100	4.1 5	$E\alpha$: weighted average of 6287 7 (2014An10), 6294 10 (2013KoZR), 6282 10 (1984ScZQ) and 6290 10 (1975Ca06). Reduced α width $\delta^2_{\alpha}=25$ keV 3 (2014An10).

† From 2014An10 unless otherwise stated.

‡ Deduced by the evaluator using ALPHAD code with $r_0=1.5517$ 160 (deduced from interpolation of neighboring even-even nuclei), and assuming $x=0$ for parent and daughter nuclei are listed under comments. 2014An10 list hindrance factors normalized to 1 for α to 0+x level.

$^{\#}$ For absolute intensity per 100 decays, multiply by 0.75 8.

 $\gamma(^{172}\text{Ir})$

A 168.4 γ with proposed M2 multipolarity in 1984ScZQ is not confirmed by 2014An10.

E_{γ}	$E_i(\text{level})$	E_f	J_f^{π}	Mult. †	$\alpha^{\ddagger}$
126.3 3	126.3+x	0+x	(3 ⁻ ,4 ⁻)	[D,E2]	1.7 15
151.5 3	151.5+x	0+x	(3 ⁻ ,4 ⁻)	[D,E2]	1.0 9
236.6 3	236.6+x	0+x	(3 ⁻ ,4 ⁻)		
500.0 5	500.0+x	0+x	(3 ⁻ ,4 ⁻)		

† From considerations of observed intensities of K x rays of Ir as compared to the photon intensities of 175.2 γ and 211.6 γ from the decay of high-spin isomer of ^{176}Au and 126.3 γ and 151.5 γ from the decay of low-spin isomer of ^{176}Au .

‡ From BrIcc code, values overlap E1, M1 and E2 multipolarities.

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Legend

Decay Scheme

● Coincidence

