^{172}Au α decay (7.7 ms) 2009Ha42,1996Pa01,1993Se09

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 111, 1807 (2010)	15-Jun-2010

Parent: ^{172}Au: E=0+x; $T_{1/2}$=7.7 ms *14*; Q(α)=6923 *10*; %α decay≈100.0

^{172}Au-$T_{1/2}$: Unweighted average of 9 ms *+2−1* from 6870α(t) (2009Ha42) and 6.3 ms *15* from 6878α(t) (1996Pa01). others: 4 ms *1* (1993Se09, from time difference of implanted fragments and decay events); 8 ms *+5−2* from 6800α(t) (2009Ha42).

^{172}Au-J^{π}: Possibly (9^+), analogous to that suggested by 2004GoZZ for ^{174}Au and ^{176}Au (2009Ha42).

^{172}Au-%α decay: α decay only has been observed. Proton decay is possible, but 2009Ha42 and 1993Se09 set upper limits on %p of 0.02 (from correlation between 6453α from ^{171}Pt and any preceding ^{172}Au decay) and 2, respectively. No experimental information about $\varepsilon+\beta^+$ decay of ^{172}Au is available, but gross β decay theory (1973Ta30) predicts $T_{1/2}(\varepsilon+\beta^+)$≈0.9 s which implies %($\varepsilon+\beta^+$)≈0.9.

1993Se09: source from ^{106}Cd(^{70}Ge,P3N), E=354 MeV; 80% ^{106}Cd target; mass separated residues implanted into double-sided Si strip detector; measured Eα, $T_{1/2}$(172AU) from (implant)-α(t).

1996Pa01: sources from heavy-ion fusion-evaporation reactions; recoil mass separator, double-sided Si strip detector (FWHM≤20 keV); measured Eα, parent $T_{1/2}$.

2009Ha42: ^{172}Au source from ^{96}Ru(^{78}Kr,pnγ), E=342, 348 MeV; 96% enriched ^{96}Ru target followed by C charge reset foil; In-flight mass separation using RITU gas-filled separator; fusion-evaporation residues implanted In 2 double-sided Si strip detectors In the GREAT spectrometer (which also includes a multiwire proportional counter, 28 Si PIN diode detectors, a segmented planar Ge detector and a HPGe clover detector) At the RITU focal plane; measured Eα, α(t), α branching(^{168}Ir), α correlations.

^{168}Ir Levels

E(level)	$T_{1/2}$	Comments
0.0+x	159 ms *+16−13*	$T_{1/2}$: from Adopted Levels.
72+x *12*		E(level): from energy difference between α feeding this level and that feeding the 0+x level (2009Ha42). consistent with E=65.0 *4* and 73.0 *6* for photons observed to Be correlated with 6800α from ^{172}Au, but those energies (and their relative Iγ) are also close to expectation for Kα x ray and Kβ x ray for Ir so they probably result, instead, from a highly-converted transition At somewhat higher energy. if so, the presence of K x ray implies Eγ>76 keV, the K shell binding energy for Ir.

α radiations

Eα	E(level)	Iα[†][#]	Comments
6800[‡] *10*	72+x	29 *10*	Eα: from 2009Ha42.
6870[‡] *6*	0.0+x	70 *9*	Eα: weighted average of 6860 *10* (1993Se09), 6878 *9* (1996Pa01) and 6870 *10* (2009Ha42). This Eα would imply Q(α)(^{172}Au)=7034 *9* were it a g.s. to g.s. transition (cf. Q(α)=7030 *50* In 2003Au03, 2009AuZZ), but it appears, instead, to connect excited states In ^{172}Au and In ^{168}Ir.

[†] From I(6870α):I(6800α)=53 *5*:22 *10* (2009Ha42) normalized so Σ (Iα)=100.

[‡] Correlated with 6320α and 6260α from isomeric ^{168}Ir, 5623α from ^{164}Re isomer and 5412α from ^{160}Ta isomer.

[#] For absolute intensity per 100 decays, multiply by ≈1.0.

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$\gamma(^{168}Ir)$

E_γ	E_i(level)	E_f	Comments
72† *12*	72+x	0.0+x	E_γ: from level energy difference. see also the comment on E(72+x level).

† Placement of transition in the level scheme is uncertain.

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Legend

Decay Scheme