^{90}Zr(α,3nγ), ^{92}Mo(α,α'nγ) 1973Ni04

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 114, 1293 (2013)	1-Sep-2013

Additional information 1.
Includes ^{77}Se(^{16}O,3nγ) (1983Ra08).
1973Ni04: (α,3nγ) E=37-43 MeV, (α,α'nγ); enriched target;Ge(Li) detectors, FWHM=2.5 keV at 1173 keV and 1.3 keV at 600 keV. Measured Eγ, Iγ, excitation functions, $\gamma\gamma$, α-$\gamma(\theta)$, α-γ(t), and Doppler-shift attenuation.

^{91}Mo Levels

The level scheme is that of 1973Ni04, except that the order of the 285 keV and 617 keV cascade gammas has been reversed (for consistency with Adopted Levels, Gammas).

E(level)	J$^\pi$[†]	T$_{1/2}$[‡]	Comments
0	9/2$^+$		
1413.90 *21*	13/2$^+$		
2067.7 *3*	17/2$^+$		
2267.2 *4*	21/2$^+$	47 ns *1*	g=+0.846 *7* g: Weighted average of +0.839 *8* (1983Ra08) and +0.854 *9* (1978Ha52), both from time-differential perturbed angular distribution. T$_{1/2}$: from time-differential perturbed angular distribution (1978Ha52). Other: 40 ns *4* from α-γ(t) (1973Ni04).
2279.4 *4*	(17/2$^-$)	38 ns *4*	g=+0.531 *7* g: From time-differential perturbed angular distribution in ^{77}Se(^{16}O,3nγ) (1983Ra08). T$_{1/2}$: from α-γ(t) (1973Ni04).
2939.8 *4*	23/2$^{(+)}$	0.08 ps	
3545.3 *5*	25/2$^{(+)}$	0.11 ps	
3809.4 *5*	25/2$^{(-)}$	>20 ps	J$^\pi$: adopted π=(+).
4341.6 *5*	27/2$^{(-)}$	0.20 ps	
4958.5 *6*	29/2$^{(-)}$	0.12 ps	E(level): 4626.2 *6* in 1973Ni04 because order of 617γ and 285γ is reversed in 1973Ni04.
5243.0 *6*	31/2$^{(-)}$	0.40 ps	

[†] From 1973Ni04, based on measured $\gamma(\theta)$, excit and $\gamma\gamma$ coin.
[‡] From Doppler-shift attenuation (1973Ni04), unless noted otherwise. Additionally, T$_{1/2}$<10 ns for transitions seen in "prompt" coincidence.

γ(^{91}Mo)

Other HI-induced reactions were studied to observe time-differential perturbed angular distributions: 1983Ra08 (^{78}Se(^{16}O,3nγ)), 1978Ha52 (reaction(s) unspecified).

E$_\gamma$	I$_\gamma$[†]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[‡]	α[&]	Comments
199.5[@] *2*	56 *6*	2267.2	21/2$^+$	2067.7	17/2$^+$	E2	0.1000	A$_2$=+0.13 *2*, A$_4$=−0.02 *3* (1973Ni04).
211.7[@] *2*	17.0 *17*	2279.4	(17/2$^-$)	2067.7	17/2$^+$			A$_2$=+0.11 *2*, A$_4$=0.00 *5* (1973Ni04).
264.2[a] *2*	2.30 *23*	3809.4	25/2$^{(-)}$	3545.3	25/2$^{(+)}$			A$_2$=+0.33 *2* (1973Ni04).
284.5 *2*	4.5 *5*	5243.0	31/2$^{(-)}$	4958.5	29/2$^{(-)}$	D+Q		A$_2$=−0.36 *4*, A$_4$=+0.025 *25* (1973Ni04).
[x]409.7 *2*	[#]							
532.2 *2*	12.0 *12*	4341.6	27/2$^{(-)}$	3809.4	25/2$^{(-)}$	D		A$_2$=−0.20 *2*, A$_4$=+0.04 *3* (1973Ni04).
605.5 *2*	9.1 *9*	3545.3	25/2$^{(+)}$	2939.8	23/2$^{(+)}$	D(+Q)		A$_2$=−0.33 *6*, A$_4$=+0.10 *8* (1973Ni04).

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^{90}Zr(α,3nγ), ^{92}Mo(α,α'nγ) 1973Ni04 (continued)

γ(^{91}Mo) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
616.9 *2*	4.7 *5*	4958.5	29/2$^{(-)}$	4341.6	27/2$^{(-)}$		
653.8[@] *2*	82 *8*	2067.7	17/2$^+$	1413.90	13/2$^+$	E2	A_2=+0.15 *2*, A_4=−0.02 *3* (1973Ni04). I_γ: 14% prompt, 86% delayed.
672.6[@] *2*	36 *4*	2939.8	23/2$^{(+)}$	2267.2	21/2$^+$	D(+Q)	A_2=−0.32 *2*, A_4=−0.01 *2* (1973Ni04).
[x]803.7 *2*	[#]						
869.6 *2*	18.0 *18*	3809.4	25/2$^{(-)}$	2939.8	23/2$^{(+)}$	D	A_2=−0.26 *2*, A_4=+0.04 *3* (1973Ni04).
[x]878.5 *2*	[#]						
[x]903.7 *2*	[#]						
[x]1032.7 *2*	[#]						
1413.9[@] *2*	100 *10*	1413.90	13/2$^+$	0	9/2$^+$	Q	A_2=+0.15 *2*, A_4=−0.04 *3* (1973Ni04). I_γ: 13% prompt, 87% delayed.

[†] Relative intensity in (α,3nγ) at E=43 MeV.
[‡] From α-$\gamma(\theta)$. RUL eliminates mult=M2 for the 654γ and 200γ stretched Q transitions.
[#] Weak γ reported in fig. 1 of 1973Ni04; assignment to ^{91}Mo considered by authors to be probable, but assignment remains unconfirmed.
[@] Also observed in (α,α'nγ) (1973Ni04).
[&] 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.
[a] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

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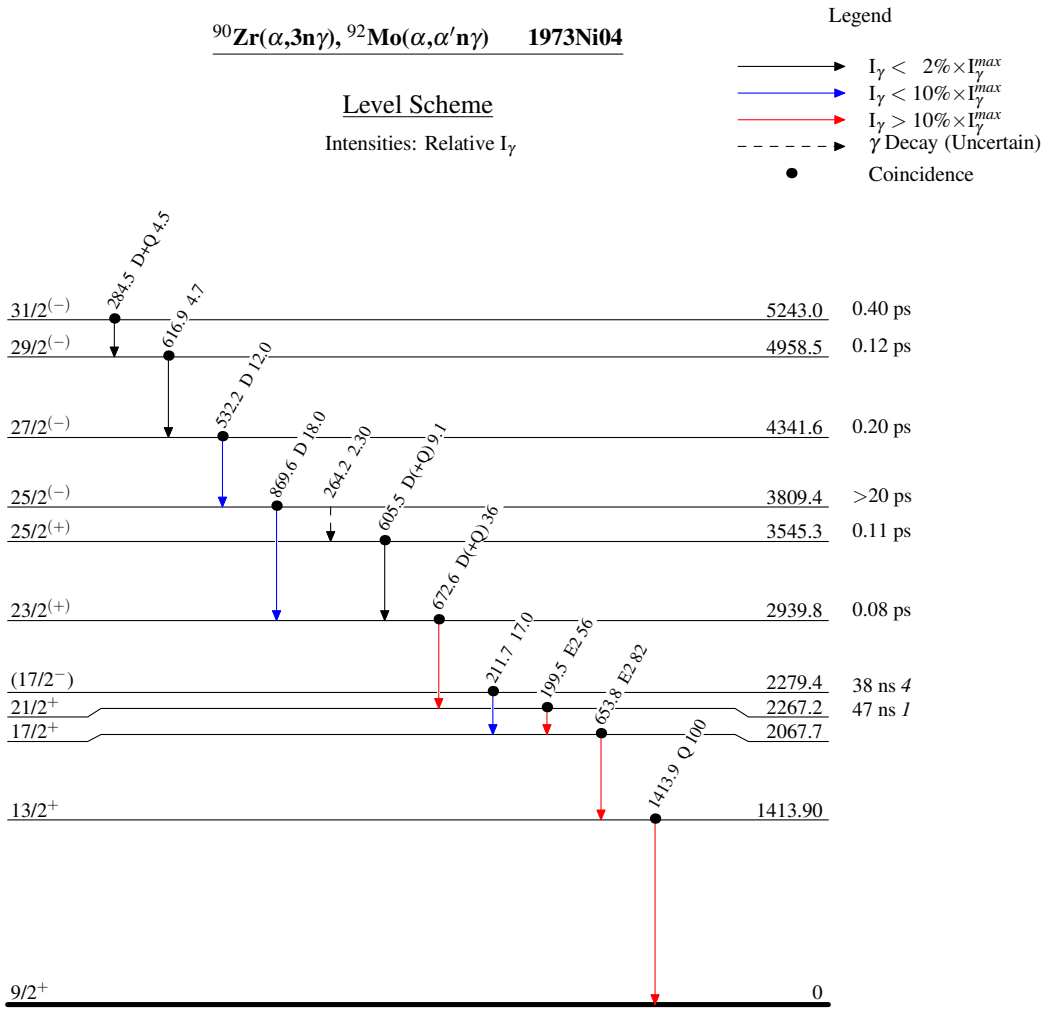
Level Scheme

Intensities: Relative I_γ



$^{91}_{42}Mo_{49}$