

^{72}Co β^- decay **2005Ma59,2003Sa40**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	D. Abriola(a), A. A. Sonzogni		NDS 111,1 (2010)	1-May-2009

Parent: ^{72}Co : $E=0.0$; $J^\pi=[6^-,7^-]$; $T_{1/2}=59.9$ ms 17; $Q(\beta^-)=1.493\times 10^4$ 60; $\% \beta^-$ decay=100.0

^{72}Co - $Q(\beta^-)$: $Q_{\beta^-}=14930$ 600 (from mass excess measurements of 2007Ra27 and 2003Au03).

2005Ma59: ^{72}Co produced in fragmentation of ^{86}Kr beam in a ^9Be target at $E=140$ MeV/nucleon. Reaction products selected according to their momentum over charge ratio using the A1900 spectrometer of the National Superconducting Cyclotron Laboratory (NSCL). Measured E_γ , I_γ , $\gamma\gamma$, γ - β coin, γ -fragment coin, tof and ΔE with the NSCL beta-counting system, a double-sided Si strip detector (DSSD) and the SeGa array of Ge detectors.

2003Sa40: ^{72}Co from fragmentation of $^{86}\text{Kr}^{+36}$ beam at $E=58$ MeV/nucleon on a natural Ta target; LISE2000 spectrometer for ion selection. Measured β , γ correlated with β events, E_γ , I_γ .

The decay scheme is incomplete, fewer γ rays than what would be expected from a decay with a $Q(\beta^-)$ value of nearly 15 MeV were reported, and the $\% \beta^-$ n in ^{72}Co is not precisely known. As a result, absolute intensities can not be obtained. Estimates of the β^- intensities can be made by assuming that the absolute gamma ray intensity of the 1096 γ is about 100%, therefore the $I(\beta^-)$ to the 3593 level will be $\approx 30\%$, and the $I(\beta^-)$ to the 2396 level will be $\approx 24\%$. The intensities of the 845- and 1096-keV γ rays are inconsistent with the decay scheme shown here. However, they suggest the existence of β^- population to levels that have not been observed but that gamma decay to the 1941-keV level, thus increasing the intensities of these two γ rays.

 ^{72}Ni Levels

E(level) [†]	J^π
0.0	0 ⁺
1096.0 20	(2 ⁺)
1941 3	(4 ⁺)
2396 3	(6 ⁺)
3593 4	(5 ⁻ ,6 ⁻ ,7 ⁻)

[†] From E_γ .

 β^- radiations

E(decay)	E(level)	$I\beta^-$ [†]	Log ft	Comments
(1.13×10^4 6)	3593	≈ 30	≈ 4.9	av $E\beta=5.34\times 10^3$ 30
(1.25×10^4 6)	2396	≈ 24	≈ 5.2	av $E\beta=5.92\times 10^3$ 30

[†] Absolute intensity per 100 decays.

 $\gamma(^{72}\text{Ni})$

E_γ [†]	I_γ [†]	E_i (level)	J_i^π	E_f	J_f^π	Comments
455 2	54 10	2396	(6 ⁺)	1941	(4 ⁺)	$E_\gamma=455$ 1, $I_\gamma=33$ 10 (2003Sa40).
^x 700 2	21 5					
^x 830 2	9 4					
845 2	80 14	1941	(4 ⁺)	1096.0	(2 ⁺)	$E_\gamma=845$ 2, $I_\gamma=75$ 17 (2003Sa40).
1096 2	100 17	1096.0	(2 ⁺)	0.0	0 ⁺	$E_\gamma=1096$ 1, $I_\gamma=100$ 26 (2003Sa40).
1197 2	30 7	3593	(5 ⁻ ,6 ⁻ ,7 ⁻)	2396	(6 ⁺)	$E_\gamma=1197$ 3, $I_\gamma=29$ 21 (2003Sa40).

[†] From 2005Ma59.

^x γ ray not placed in level scheme.

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Decay Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
- Coincidence

