

⁹³Zr β⁻ decay 2010Ca01,2010Ya01,1972FIZM

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 112, 1163 (2011)	15-Dec-2010

Parent: ⁹³Zr: E=0; J^π=5/2⁺; T_{1/2}=1.61×10⁶ y 5; Q(β⁻)=90.8 16; %β⁻ decay=100.0

Other: 1950St90.

2010Ca01: concentration of chemically-separated ⁹³Zr In solution measured by mass spectrometry using isotopic dilution technique; ⁹³Zr activity measured by liquid scin using an activity tracing method; activity concentration of (+93m)Iβ normalization measured by x-ray spectrometry; deduced T_{1/2}(⁹³Zr), %Iβ to 31-keV level in ⁹³Nb.

2010Ya01: ⁹³Zr In HNO₃ liquid source; ⁹³Zr isolated from high-level liquid wastes using silica gel absorption with tri-N-butyl-phosphate extraction; activity determined by liquid scintillation counting, mass concentration by multi-collector inductively-coupled plasma spectrometry; HPGe detector for γ spectrometry; deduced T_{1/2}(⁹³Zr).

1972FIZM report T_{1/2} for ⁹³Zr(g.s.), and Eβ and Iβ for β⁻ branch to ⁹³Nb(31 level); however, no details of measurements are given. This work is presumed to supersede that from the same laboratory presented In 1950St90 and In subsequent Argonne National Laboratory reports ANL4833 (1952) and ANL5000 (1953).

⁹³Nb Levels

E(level) [‡]	J ^π [†]
0	9/2 ⁺
30.77 2	1/2 ⁻

[†] From Adopted Levels.

[‡] From Eγ.

β⁻ radiations

E(decay)	E(level)	Iβ ⁻ [†]	Log ft	Comments
60 3	30.77	73 6	10.17 ^{1u} 6	av Eβ=18.9 6 E(decay): measured value (1972FIZM). Other: 60 5 (1950St90). Iβ ⁻ : from 2010Ca01. other:≥95 (1972FIZM).
(90.8 16)	0	27 6	12.10 10	av Eβ=23.8 4 Iβ ⁻ : 100% - Iβ(31 level).

[†] Absolute intensity per 100 decays.

γ(⁹³Nb)

I(γ+ce) normalization: based on measured Iβ(31 level)=73 6 from 2010Ca01.

E _γ [†]	I _γ [‡]	E _i (level)	J _i ^π	E _f	J _f ^π	Mult. [†]	α [#]	I _(γ+ce) [‡]	Comments
30.77 2	0.00043 4	30.77	1/2 ⁻	0	9/2 ⁺	M4	1.693×10 ⁵	73 6	ce(K)/(γ+ce)=0.153 3; ce(L)/(γ+ce)=0.680 8; ce(M)/(γ+ce)=0.147 3; ce(N+)/(γ+ce)=0.0193 4 ce(N)/(γ+ce)=0.0191 4; ce(O)/(γ+ce)=0.000285 6 I _γ : from I(γ+ce) and α(31γ).

[†] From Adopted Levels.

Continued on next page (footnotes at end of table)

${}^{93}\text{Zr}$ β^- decay [2010Ca01](#), [2010Ya01](#), [1972FIZM](#) (continued)

$\gamma({}^{93}\text{Nb})$ (continued)

‡ Absolute intensity per 100 decays.

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.

${}^{93}\text{Zr}$ β^- decay 2010Ca01,2010Ya01,1972FIZMDecay SchemeIntensities: I_γ per 100 parent decays