^{90}Ru ε decay   2004De40

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. K. Basu, E. A. Mccutchan	NDS 165, 1 (2020)	1-Mar-2020

Parent: ^{90}Ru: E=0.0; J^{π}=0$^+$; $T_{1/2}$=11.7 s 9; Q(ε)=5841 4; %ε+%β^+ decay=100.0

2004De40: ^{90}Ru isotope produced in the ^{58}Ni(^{36}Ar^{10+}, 2n2p) reaction with E=150 MeV. Nuclei recoiling out of the target were stopped and neutralised by 500 mbar of purified Ar gas inside a cell. Reaction products were ionized selectively, according to Z, using two dye lasers tuned to the resonant atomic transitions of the particular element. Laser-ionized nuclei were guided to the LISOL mass separator by a sextupole ion guide. Measured Eγ, Iγ, $\gamma\gamma$, $\beta\gamma$ (coin), Iβ, isotopic $T_{1/2}$ with two HPGe detectors arranged in a compact configuration around β-sensitive plastic ΔE detectors.

1991Zh29, 1994Zh26: Enriched ^{58}Ni(^{35}Cl,2np) E(^{35}Cl)=112-132 MeV; Si(Li), Compton-suppressed HPGe and neutron detectors; Wheel transportation system; Measured σ(E(^{58}Ni), Eγ) and γ(t); Identification of ^{90}Ru decay based on comparison of σ(E(^{58}Ni)) with cascade calculations; 37 γ-rays identified in coincidence with Tc Kα x ray by 1994Zh26 but not placed in a decay scheme.

^{90}Tc Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$	Comments
144.1 17	1$^+$	8.7 s 2	E(level),$T_{1/2}$: from the Adopted Levels.
298.7 17			
636.9 17			

[†] From Eγ, except where noted.
[‡] From Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ [‡]	Iε[‡]	Log ft[†]	I($\varepsilon+\beta^+$)[‡]	Comments
(5204 4)	636.9	9 2	0.3 1	5.19 11	9 2	av Eβ=1987.4 20; εK=0.03155 9; εL=0.003825 11; εM+=0.0008894 2
(5542 4)	298.7	41 5	1.2 1	4.67 7	42 5	av Eβ=2149.8 20; εK=0.02544 7; εL=0.003082 8; εM+=0.0007167 1
(5697 4)	144.1	48 11	1.3 3	4.67 11	49 11	av Eβ=2224.2 20; εK=0.02316 6; εL=0.002806 7; εM+=0.0006525 1 I($\varepsilon+\beta^+$): isomer feeding was determined by 2004De20 from measurement of 511-keV annihilation intensity. 2004De20 do not provide value for Iγ(511γ).

[†] Values should be regarded as lower limits, as there is a large difference between the allowed energy for decay (5.8 MeV) and the highest observed excited level (0.6 MeV).
[‡] Absolute intensity per 100 decays.

γ(^{90}Tc)

Iγ normalization: from ΣIγ(to 144-keV isomer)=51 11, based on 144-keV isomer I($\varepsilon+\beta^+$) feeding of 49 11 from 2004De20 derived from a measurement of 511-keV annihilation intensity.

2004De40 confirm only two γ rays out of 37 γ rays reported by 1994Zh26.

^{90}Ru ε decay   **2004De40** (continued)

$\gamma(^{90}$Tc) (continued)

$E_\gamma^\dagger$	$I_\gamma^{\dagger\ddagger}$	E_i(level)	E_f	J_f^π	Comments
154.6 *1*	100	298.7	144.1	1$^+$	E_γ: strong γ-ray identified in coincidence with Tc Kα x ray but not placed in a decay scheme by 1994Zh26.
492.8 *1*	21 *4*	636.9	144.1	1$^+$	E_γ: strong γ-ray identified in coincidence with Tc Kα x ray but not placed in a decay scheme by 1994Zh26.

† From 2004De20.
‡ For absolute intensity per 100 decays, multiply by 0.42 *9*.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend

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