^{138}Cs IT decay (2.91 min)   1971Ca21,1978Au08

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 146, 1 (2017)	30-Sep-2017

Parent: ^{138}Cs: E=79.9 *3*; J$^\pi$=6$^-$; T$_{1/2}$=2.91 min *10*; %IT decay=81 *3*

1971Ca21: source of ^{138}Cs was produced via the thermal-neutron induced fissions of ^{235}U and also the ^{138}Ba(n,p) reaction, at CEN, Grenoble. γ and x rays were detected with Ge(Li) detectors (FWHM=1.2 keV at 122 keV, 3-4 keV at 1333 keV) and NaI(Tl) detectors; β particles and conversion electrons were detected by a β detector. Measured Eγ, Iγ, Eβ, $\beta\gamma$-coin, $\gamma\gamma$-coin, $\beta\gamma$(t). Deduced levels, J, π, half-life, decay branching, conversion coefficient, γ-ray multipolarity. Systematics of neighboring isotones.

1978Au08: source of ^{138}Cs was produced via the spontaneous fission of ^{252}Cf. γ rays were detected with a Ge(Li) detector (FWHM=2 keV at 1333 keV). Measured Eγ, Iγ. Deduced levels, decay branching.

Additional information 1.

Other: 1997Gr09.

^{138}Cs Levels

E(level)	J$^{\pi\dagger}$	T$_{1/2}$†	Comments
0.0	3$^-$	32.5 min *2*	
79.9 *3*	6$^-$	2.91 min *10*	%IT=81 *3*
			%IT is the weighted average of 81.5 +*25−30* (at 68.3% confidence level) from 1978Au08 and 75 *8* from 1971Ca21, deduced from growth curves of 463γ, 1436γ, and 1010γ. Other: %IT=81.5 +*50−140* from 1978Au08 at 99.7% confidence level. The 1010γ is not fed in β^- decay of 2.9-min ^{138}Cs, but follows the β^- decay of the ^{138}Cs ground state (1978Au08,1971Ca21).

† From Adopted Levels.

$\gamma(^{138}$Cs)

Iγ normalization: from %I(γ+ce)(79.9γ)=81 *3* per 100 parent decays and α(total)=213 (from BrIcc).

E$_\gamma$	I$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.	$\alpha$$^\#$	I$_{(\gamma+ce)}$‡	Comments
79.9 *3*	100	79.9	6$^-$	0.0	3$^-$	(M3)	213	81 *3*	ce(K)/(γ+ce)=0.558; ce(L)/(γ+ce)=0.337; ce(M)/(γ+ce)=0.0780; ce(N)/(γ+ce)=0.0222
									E$_\gamma$: 1971Ca21 assign 79.9γ as the isomeric transition on the basis that it is the only γ seen in ^{138}Cs (2.91 min) decay and not seen in the decay of ^{138}Cs g.s.
									I$_\gamma$: 1971Ca21 measure Iγ(79.9γ)/Iγ(1436γ in ^{138}Ba)=0.020 *5*.
									Mult.: T$_{1/2}$=2.91 min requires Mult=M3 or E3 if the 79.9γ is the isomeric transition; M3 (α(K)=119, calculated using the BrIcc program) would account for observed K x-ray intensity whereas E3 (α(K)=12.5 from BrIcc) would not (1971Ca21).

† For absolute intensity per 100 decays, multiply by 0.00378 *14*.

‡ 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.

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Decay Scheme

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

%IT=81 *3*

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                              ⁷⁹·⁹ (M3) 81
        6⁻  ────────────────────────────  79.9     2.91 min 10
                                      │
                                      │
                                      │
                                      ▼
        3⁻  ════════════════════════════  0.0      32.5 min 2

                      ¹³⁸₅₅Cs₈₃
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