

⁷⁸Rb IT decay (5.74 min) 1975BaWR,1991McZZ,1972De54

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Ameenah R. Farhan, Balraj Singh		NDS 110, 1917 (2009)	30-Jun-2009

Parent: ⁷⁸Rb: E=111.2 2; J^π=4⁽⁻⁾; T_{1/2}=5.74 min 5; %IT decay=9 2

⁷⁸Rb-%IT decay: 1975BaWR estimate IT=10% 2 (based on I_γ of 103γ). They also used measured α(exp)=0.25 5 for 103γ, but theoretical α=0.1324. The revised α(exp) lowers %IT by 10%.

1991McZZ: ⁷⁸Rb produced in Fe(²⁸Si,X) reaction at 110 MeV beam energy. The Fe target was coated with Gold. The ⁷⁸Rb fragments were mass separated. Measured γ, ce, γ(ce) coin.

The level scheme is from 1991McZZ.

1993A103: Measured total γ-ray absorption.

Others: 1981Ba40, 1974Sa32, 1973Ba03, 1973Br32, 1972LiZL, 1972Ar10, 1972No14, 1971Do01, 1969Ch18, and 1968To05.

Total decay energy of 10 keV 2 calculated (by RADLIST code) from level scheme agrees with the expected value of 9 keV 2.

⁷⁸Rb Levels

E(level)	J ^π †	T _{1/2}	Comments
0.0	0 ⁽⁺⁾		
47.10 10	1 ⁽⁻⁾		
103.30 10	1 ⁽⁺⁾		
111.2 2	4 ⁽⁻⁾	5.74 min 5	T _{1/2} : from multispectrum studies. E(level): from 1991McZZ. Earlier estimate (103+x, x<15 keV) was quite close to this energy.

† From 'Adopted Levels'.

γ(⁷⁸Rb)

I_γ normalization: from Ti(103.3γ+47.1γ)=100.

E _γ	I _γ ‡	E _i (level)	J _i ^π	E _f	J _f ^π	Mult.	α [#]	I _(γ+ce) ‡	Comments
8.6		111.2	4 ⁽⁻⁾	103.30	1 ⁽⁺⁾	[E3]	4.88×10 ⁶	13.8 CA	α(L)=4.06×10 ⁶ 6; α(M)=7.59×10 ⁵ 11; α(N+..)=6.39×10 ⁴ 9 α(N)=6.39×10 ⁴ 9; α(O)=6.78 10 I _(γ+ce) : from relative I(γ+ce) of 113.3γ. E _γ : L+M conversion line seen in coin with 103.3γ (1991McZZ).
47.10 10	1.6 4	47.10	1 ⁽⁻⁾	0.0	0 ⁽⁺⁾	(E1)	0.866		α(K)=0.764 12; α(L)=0.0870 14; α(M)=0.01415 22; α(N+..)=0.001584 25 α(N)=0.001528 24; α(O)=5.59×10 ⁻⁵ 9 Placement based on study by 1991McZZ. E _γ ,I _γ : E _γ from 1972LiZL, with I _γ /I _γ (103γ)=0.13 3. 1981Ba40 reported E _γ =46.8 and noted the absence of coincidences with any of the ⁷⁸ Kr transitions. Placement of the transition in cascade with the 103γ would lead to too many x rays (see comment on the 103γ). The placement of the 47γ in parallel with the 103γ is consistent with the I _γ and I(x ray) data.

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⁷⁸Rb IT decay (5.74 min) **1975BaWR,1991McZZ,1972De54 (continued)**

γ(⁷⁸Rb) (continued)

<u>E_γ</u>	<u>I_γ[‡]</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.</u>	<u>α[#]</u>	<u>I_(γ+ce)[‡]</u>	<u>Comments</u>
64.4 [†]		111.2	4 ⁽⁻⁾	47.10	1 ⁽⁻⁾	(M3) [†]	105.4	3.0 CA	Mult.: from α(K)exp=0.76 11 (1991McZZ). α(K)=79.4 12; α(L)=21.8 3; α(M)=3.81 6; α(N+..)=0.408 6 α(N)=0.397 6; α(O)=0.01151 17 Mult.: from (α(L)exp+α(M)exp)/α(K)exp=0.37 3 (1991McZZ). I _(γ+ce) : from relative I(γ+ce) of 47.1γ. α(K)=0.1167 17; α(L)=0.01320 19; α(M)=0.00218 4; α(N+..)=0.000257 4 α(N)=0.000246 4; α(O)=1.043×10 ⁻⁵ 15 E _γ : unweighted average of 103.23 10 (1975BaWR) and 103.36 10 (1972De54). I _γ : from 1975BaWR relative to I _γ (455γ)=100. Mult.: from α(K)exp=0.10 2 (1991McZZ). But α(K)exp=0.0070 10 (1995Gi13) suggests E2. M1 is supported in other considerations: using the experimental determination that %IT≈10, and that about 75% of the IT decay is accounted for by I _γ (103γ), 1975BaWR deduced that α(exp)≈0.3. They also quoted α(exp)=0.25 5, based on a measurement of the K-α x rays and corrected for higher-shell conversion and fluorescence yield (the authors actually quoted I(x ray)/I _γ (103γ)=0.25 5, but stated that the fluorescence yield had been corrected for, so presumably the quoted value is actually α(exp)).
103.30 10	12.2 6	103.30	1 ⁽⁺⁾	0.0	0 ⁽⁺⁾	(M1)	0.1324		

[†] From 1991McZZ.

[‡] For absolute intensity per 100 decays, multiply by 0.54 13.

[#] 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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