

<sup>91</sup>Y β<sup>-</sup> decay [1975Ra08](#),[1955Ka12](#),[1954Bu38](#)

| Type            | Author          | History Citation     | Literature Cutoff Date |
|-----------------|-----------------|----------------------|------------------------|
| Full Evaluation | Coral M. Baglin | NDS 114, 1293 (2013) | 1-Sep-2013             |

Parent: <sup>91</sup>Y: E=0.0; J<sup>π</sup>=1/2<sup>-</sup>; T<sub>1/2</sub>=58.51 d 6; Q(β<sup>-</sup>)=1544.3 18; %β<sup>-</sup> decay=100.0

Others: [1972Ej01](#), [1970Ak05](#), [1965Si17](#), [1964La13](#), [1963Ma14](#), [1960Jo07](#), [1956He77](#).

[1975Ra08](#): low-distortion intermediate-image β spectrometer; carrier free <sup>91</sup>YCl<sub>3</sub> on aluminized mylar backing; shape-factor analysis of β spectrum; measured end-point energy.

[1955Ka12](#): <sup>91</sup>Y fission product separated on cation exchange column converted to nitrate and evaporated onto polystyrene; 4π counters and end-window counters (for β radiation); calibrated high-pressure ion chamber (for γ activity, corrected for contribution from bremsstrahlung); measured Eβ, Eγ, parent T<sub>1/2</sub>, βγ coin.

[1954Bu38](#): scintillation spectrometers; measured β and γ spectra using Pilot plastic scin-B<sup>4</sup> phosphor and NaI(Tl) detectors, respectively, and β end-point energy, parent T<sub>1/2</sub>, β branching.

<sup>91</sup>Zr Levels

| E(level) <sup>†</sup> | J <sup>π</sup> <sup>‡</sup> |
|-----------------------|-----------------------------|
| 0                     | 5/2 <sup>+</sup>            |
| 1204.81 13            | 1/2 <sup>+</sup>            |

<sup>†</sup> From Eγ.

<sup>‡</sup> From Adopted Levels.

β<sup>-</sup> radiations

β<sup>-</sup> spectra: [1975Ra08](#), [1964La13](#), [1960Jo07](#).

β<sup>-</sup>ν(θ): [1963Ma14](#).

| E(decay)   | E(level) | Iβ <sup>-</sup> <sup>†</sup> | Log ft                | Comments   |
|------------|----------|------------------------------|-----------------------|--|
| (339.5 18) | 1204.81  | 0.26 4                       | 8.91 7                | av Eβ=100.34 61<br>E(decay): from E(level) and Q(β <sup>-</sup> ). the weighted average of 319 10 ( <a href="#">1960Jo07</a> , 1205γ-β coin), 360 20 ( <a href="#">1955Ka12</a> ), 330 10 ( <a href="#">1954Bu38</a> ) is 328 9.<br>Iβ <sup>-</sup> : from unweighted average of Iγ(1205)/Iβ(total)=0.0030 5 ( <a href="#">1954Bu38</a> ) and 0.0022 1 ( <a href="#">1955Ka12</a> ). Other Iγ(1205)/Iβ(total):≈0.003 ( <a href="#">1960Jo07</a> ), 0.004 2 ( <a href="#">1956He77</a> ). |
| 1545 2     | 0        | 99.74 4                      | 9.583 <sup>1u</sup> 3 | av Eβ=604.31 79<br>E(decay): from <a href="#">1975Ra08</a> . Other: 1545 5 ( <a href="#">1964La13</a> ).<br>Spectrum has mainly unique-forbidden shape. Small deviations are reported by <a href="#">1975Ra08</a> and <a href="#">1964La13</a> .   |

<sup>†</sup> Absolute intensity per 100 decays.

γ(<sup>91</sup>Zr)

Iγ normalization: Based on measured Iγ(1205γ)/Iβ(total); see comment on Iβ(1205 level).

γ-spectra were measured by [1970Ak05](#), [1965Si17](#), [1960Jo07](#) (NaI), [1955Ka12](#), [1954Bu38](#).

No γ's (Iγ>4.5 relative to I(1205γ)=100) other than the 1205γ were found for 100 keV<Eγ<2000 keV by [1955Ka12](#). The assignment of a 1480γ to <sup>91</sup>Y decay ([1970Ak05](#)) appears to be erroneous; the resulting 1480 level is not adopted.

For discussion of the first-forbidden unique matrix element for decay to g.s., see [1972Ej01](#).

**$^{91}\text{Y} \beta^-$  decay 1975Ra08,1955Ka12,1954Bu38 (continued)**

$\gamma(^{91}\text{Zr})$  (continued)

| $E_\gamma$ | $I_\gamma^\ddagger$ | $E_i(\text{level})$ | $J_i^\pi$        | $E_f$ | $J_f^\pi$        | Mult. <sup>†</sup> | $\alpha^\#$ | Comments  |
|------------|---------------------|---------------------|------------------|-------|------------------|--------------------|-------------|---|
| 1204.80 13 | 100                 | 1204.81             | 1/2 <sup>+</sup> | 0     | 5/2 <sup>+</sup> | E2                 | 0.000452 7  | $\alpha(\text{K})=0.000392$ 6; $\alpha(\text{L})=4.32 \times 10^{-5}$ 6;<br>$\alpha(\text{M})=7.48 \times 10^{-6}$ 11; $\alpha(\text{N+..})=9.70 \times 10^{-6}$ 14<br>$\alpha(\text{N})=1.061 \times 10^{-6}$ 15; $\alpha(\text{O})=7.47 \times 10^{-8}$ 11;<br>$\alpha(\text{IPF})=8.57 \times 10^{-6}$ 13<br>$E_\gamma$ : from Adopted Gammas; there is no precise measurement available from $\beta^-$ decay. |

<sup>†</sup> From Adopted Gammas.

<sup>‡</sup> For absolute intensity per 100 decays, multiply by 0.0026 4.

<sup>#</sup> Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on  $\gamma$ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

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Decay Scheme

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

