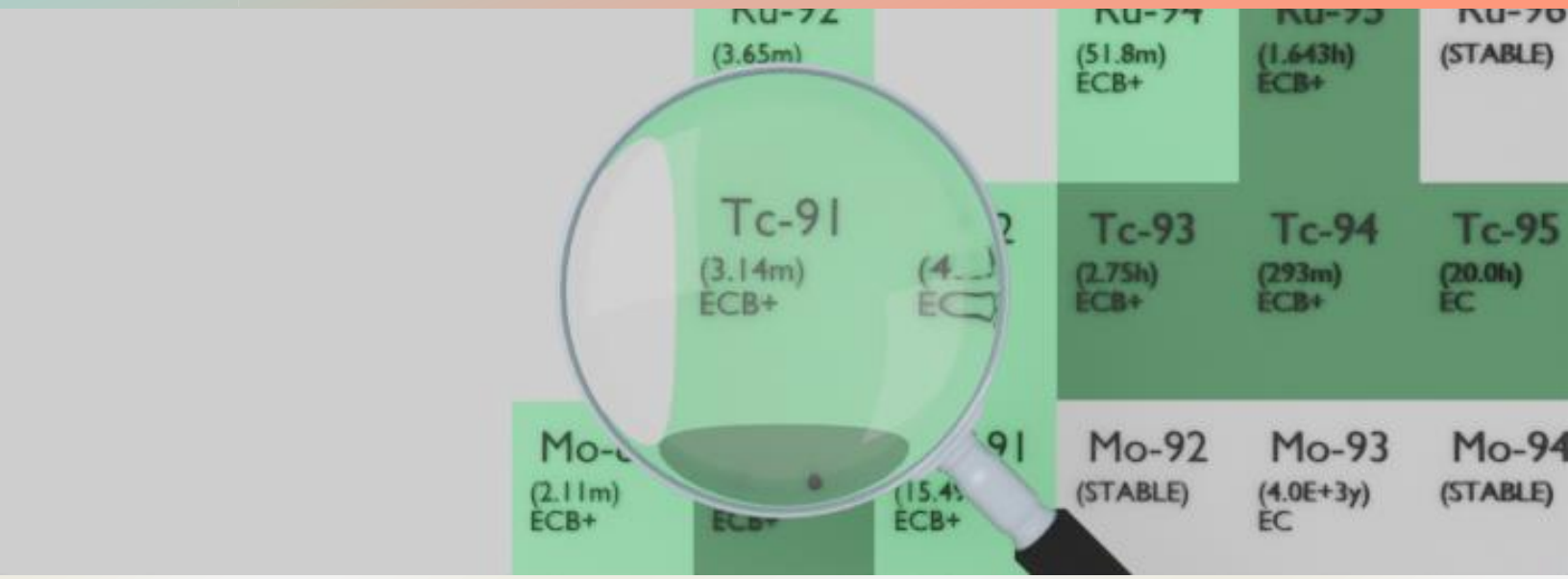



# TECHNETIUM-91

## SUMMARY DATA

### GENERAL

#### CLASSIFICATION

*Isotope:* Tc-91
*Atomic number (Z):* 43
*Mass number (A):* 91
*Neutron number (N):* 48

#### RADIOACTIVE DECAY

*Decay modes:* β+, Electron capture
*Half-life:* 3.14 [m]
*Decay constant:* 3.6791e-03 [1/s]
*Daughters:* Mo-91 (99.3%), Mo-91m (0.698%)
*Radioactive daughters:* Mo-91, Mo-91m

#### DOSIMETRIC CONSTANTS

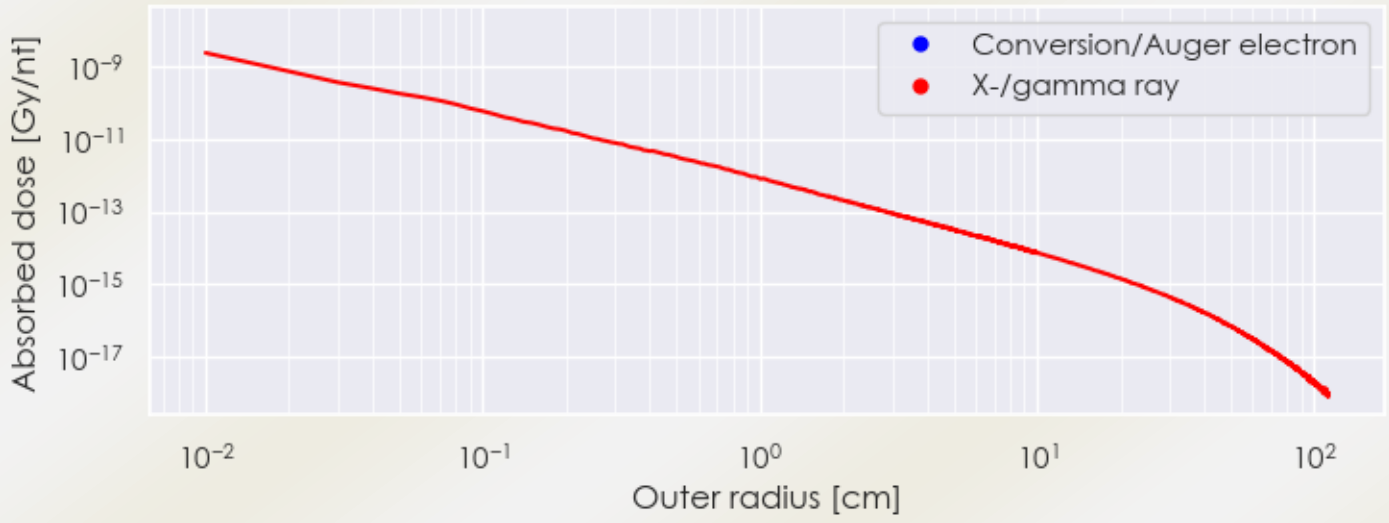
*Mean alpha energy:* 0.0 [MeV]
*Mean electron energy:* 1.6985 [MeV]
*Mean photon energy:* 2.48465 [MeV]
*Air kerma rate constant, $\Gamma_{10}$:* 4.750e-17 [Gy·m$^2$/Bq·s]
*Air kerma coefficient, $K_{air}$:* 8.346e-17 [Gy·m$^2$/Bq·s]
*Equilibrium dose constant for weakly-penetrating radiations (a and/or electrons), $\Delta_{wp}$:* 2.721e-13 [Gy·kg/Bq·s]
*Equilibrium dose constant for alphas, $\Delta_{a}$:* 0.000e+00 [Gy·kg/Bq·s]

*Equilibrium dose constant for betas/electrons, $\Delta_{\beta-,\beta+,e-}$:* 2.721e-13 [Gy·kg/Bq·s]
*Equilibrium dose constant for photons, $\Delta_{p}$:* 3.981e-13 [Gy·kg/Bq·s]

## DOSE POINT KERNELS (PLOT)

*Dose point kernel source:* **Graves, et al. Medical Physics. 2019 Nov.; 46(11):5284-5293.**

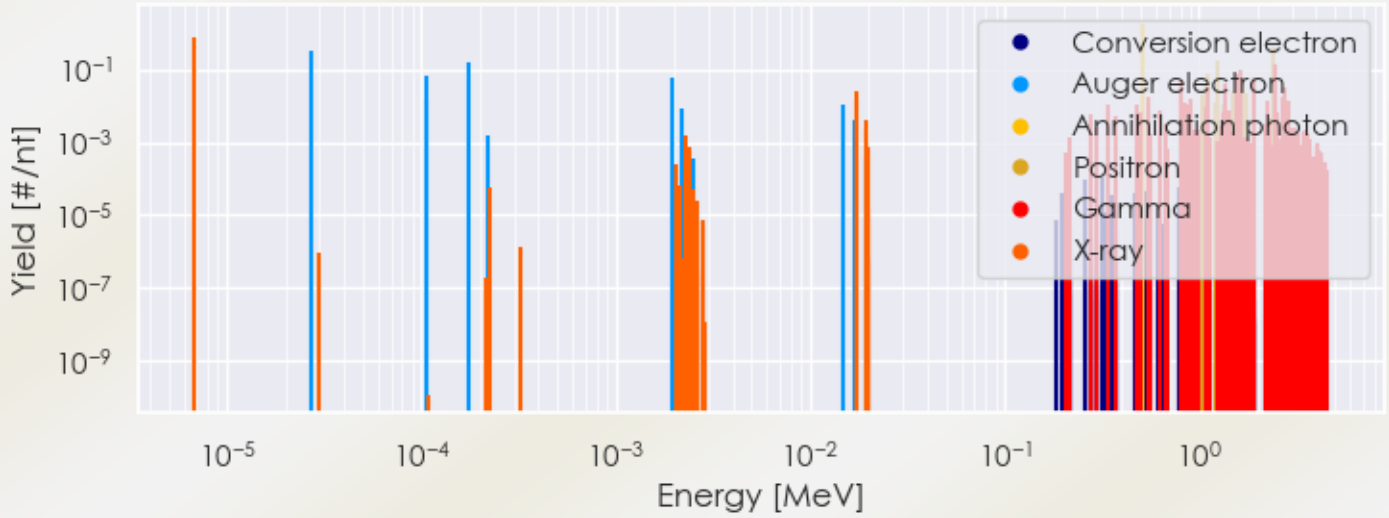
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.




*Download tabulated dose point kernel file here:* www.mirdsoft.org/products/MIRDspecs/Tc-91 DPK.csv

## SUMMARY SPECTRA (PLOT)

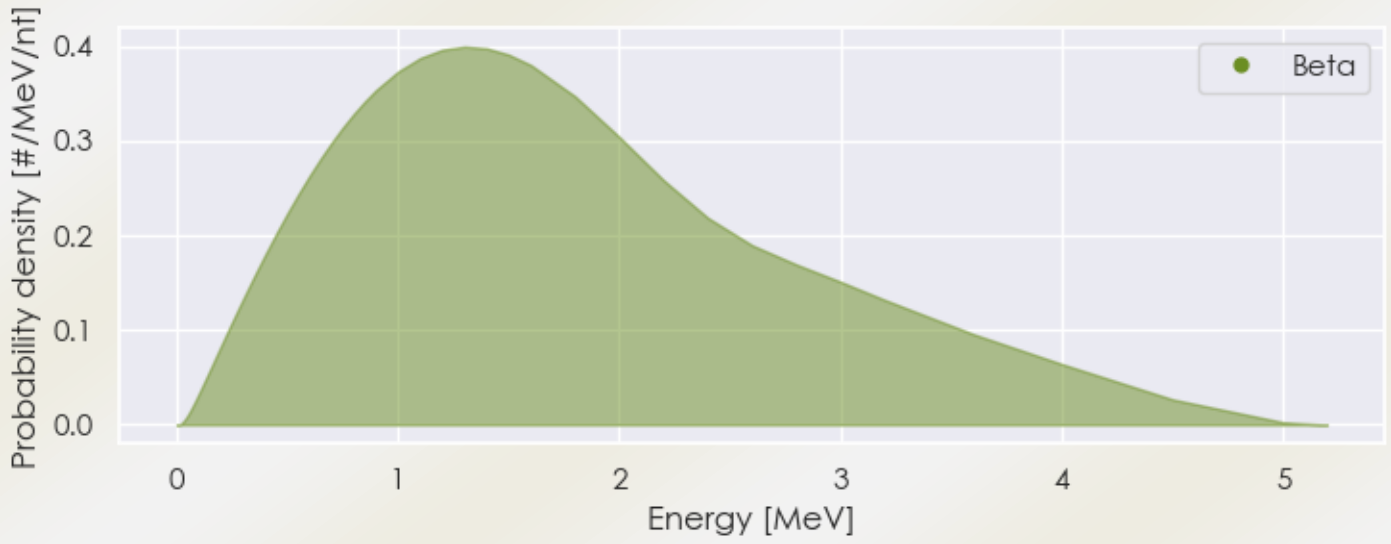
*Spectra source:* **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**




*Download tabulated summary spectra file here:* www.mirdsoft.org/products/MIRDspecs/Tc-91 Summary Spectrum.csv

## BETA SPECTRA (PLOT)

*Spectra source:* **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**




*Download tabulated beta spectra file here:* www.mirdsoft.org/products/MIRDspecs/Tc-91 Beta Spectrum.csv

# TABULATED DATA

## SUMMARY SPECTRA (TABLE)

*Spectra source:* **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**

Note: Radiations with yield < 0.01 are excluded from the table, but are available in the linked *.csv data.

*Download tabulated summary spectra file here:* www.mirdsoft.org/products/MIRDspecs/Tc-91 Summary Spectrum.csv

| Energy [MeV] | Yield [#/nt] if > 0.01 | Radiation type |
|---|---|---|
| **6.84801e-06** | 7.252e-01 | X-ray |
| **1.73355e-02** | 1.385e-02 | X-ray |
| **1.74440e-02** | 2.639e-02 | X-ray |
| **3.37500e-01** | 1.138e-02 | Gamma |
| **4.83200e-01** | 1.074e-02 | Gamma |
| **5.11000e-01** | 1.858e+00 | Annihilation photon |
| **5.48700e-01** | 1.659e-02 | Gamma |
| **8.11000e-01** | 5.056e-02 | Gamma |
| **8.13900e-01** | 1.738e-02 | Gamma |
| **8.44900e-01** | 1.201e-02 | Gamma |

| | | |
|---|---|---|
| **8.78400e-01** | 1.090e-02 | Gamma |
| **9.02800e-01** | 1.596e-02 | Gamma |
| **1.11110e+00** | 3.144e-02 | Gamma |
| **1.36200e+00** | 4.313e-02 | Gamma |
| **1.56490e+00** | 6.920e-02 | Gamma |
| **1.60520e+00** | 7.821e-02 | Gamma |
| **1.63990e+00** | 9.211e-02 | Gamma |
| **1.90230e+00** | 6.004e-02 | Gamma |
| **2.23380e+00** | 1.318e-02 | Gamma |
| **2.45090e+00** | 1.364e-01 | Gamma |
| **2.71640e+00** | 1.849e-02 | Gamma |
| **2.78130e+00** | 3.176e-02 | Gamma |
| **2.88780e+00** | 1.390e-02 | Gamma |
| **1.03459e+00** | 1.959e-02 | Positron |
| **1.08396e+00** | 3.527e-02 | Positron |
| **1.11403e+00** | 7.935e-02 | Positron |
| **1.21866e+00** | 1.274e-02 | Positron |
| **1.23793e+00** | 1.861e-01 | Positron |
| **1.33989e+00** | 1.078e-02 | Positron |
| **1.49612e+00** | 2.449e-02 | Positron |
| **1.62058e+00** | 2.743e-02 | Positron |
| **1.63704e+00** | 2.351e-02 | Positron |
| **1.65624e+00** | 4.409e-02 | Positron |
| **1.75835e+00** | 2.253e-02 | Positron |
| **2.40739e+00** | 4.311e-01 | Positron |
| **2.73606e-05** | 3.359e-01 | Auger electron |
| **1.06677e-04** | 6.389e-02 | Auger electron |
| **1.06753e-04** | 1.414e-02 | Auger electron |
| **1.76242e-04** | 1.531e-01 | Auger electron |
| **1.95193e-03** | 6.099e-02 | Auger electron |
| **1.47064e-02** | 1.056e-02 | Auger electron |

## USEFUL LINKS

Isotope decay characteristics are periodically updated as better measurements can be made - changes that may not be reflected on this page. Please see useful links:

*National Nuclear Data Center (NNDC):* https://www.nndc.bnl.gov/nudat3/mird/

*International Atomic Energy Agency (IAEA) Livechart:* https://www-nds.iaea.org/relnsd/vcharthtml/VChartHTML.html

## REFERENCE LINKS

*ICRP Report 107:* https://www.icrp.org/publication.asp?id=ICRP%20Publication%20107

*Graves et al. Dose Point Kernels:* https://doi.org/10.1002/mp.13789

*MIRD Decay Schemes 2nd Edition:* https://sites.snmmi.org/SNMMI-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6