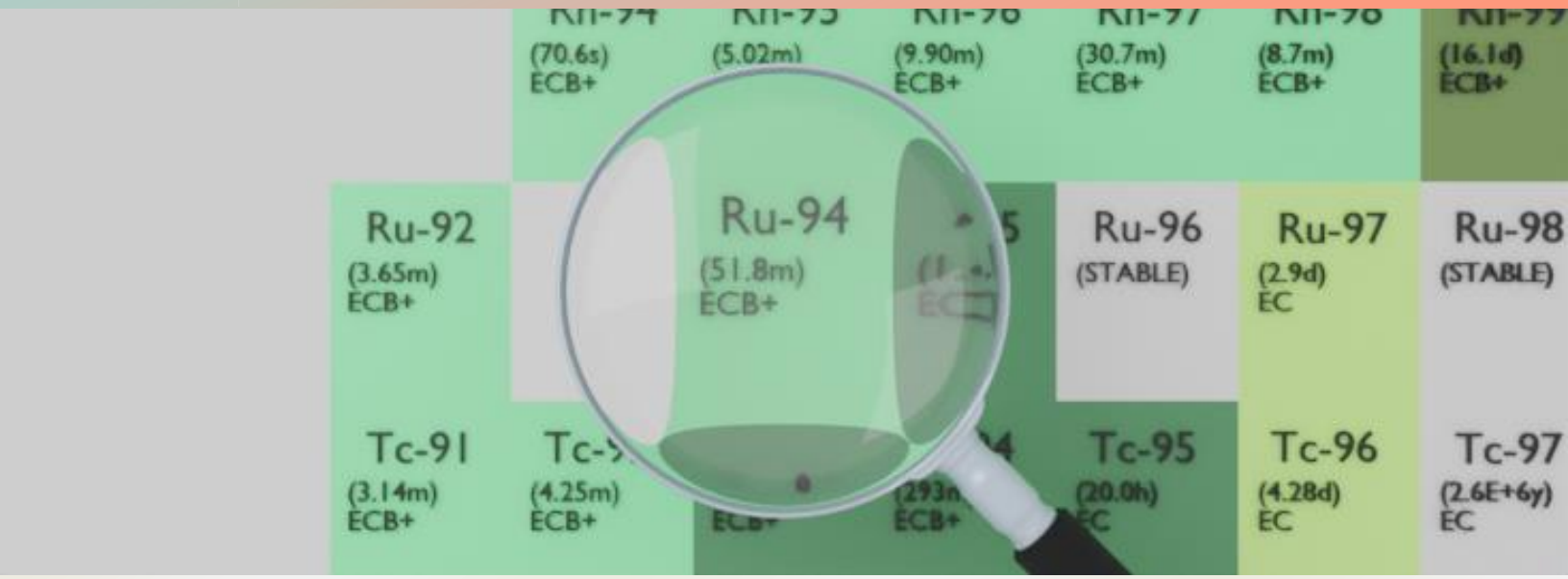



# RUTHENIUM-94

## SUMMARY DATA

### GENERAL

#### CLASSIFICATION

*Isotope:* Ru-94
*Atomic number (Z):* 44
*Mass number (A):* 94
*Neutron number (N):* 50

#### RADIOACTIVE DECAY

*Decay modes:* β+, Electron capture
*Half-life:* 51.8 [m]
*Decay constant:* 2.2302e-04 [1/s]
*Daughters:* Tc-94m (100.0%)
*Radioactive daughters:* Tc-94m

#### DOSIMETRIC CONSTANTS

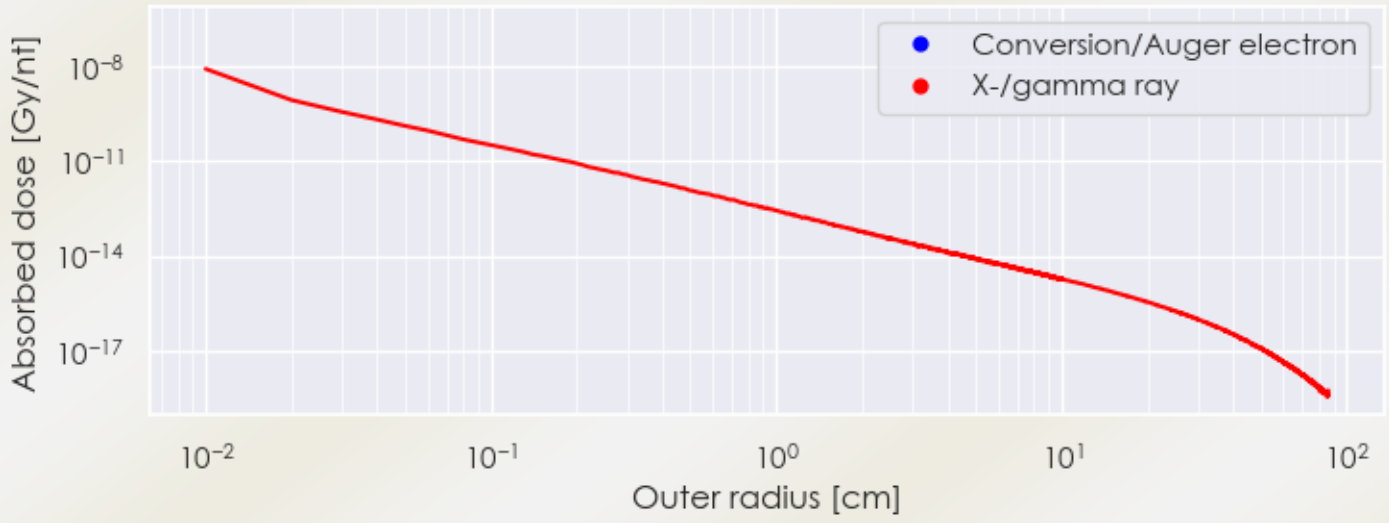
*Mean alpha energy:* 0.0 [MeV]
*Mean electron energy:* 0.00846 [MeV]
*Mean photon energy:* 0.51969 [MeV]
*Air kerma rate constant, $\Gamma_{10}$:* 2.963e-17 [Gy·m$^2$/Bq·s]
*Air kerma coefficient, $K_{air}$:* 2.963e-17 [Gy·m$^2$/Bq·s]
*Equilibrium dose constant for weakly-penetrating radiations (a and/or electrons), $\Delta_{wp}$:* 1.355e-15 [Gy·kg/Bq·s]
*Equilibrium dose constant for alphas, $\Delta_{a}$:* 0.000e+00 [Gy·kg/Bq·s]

*Equilibrium dose constant for betas/electrons, $\Delta_{\beta-,\beta+,e-}$:* 1.355e-15 [Gy·kg/Bq·s]
*Equilibrium dose constant for photons, $\Delta_{p}$:* 8.326e-14 [Gy·kg/Bq·s]

## DOSE POINT KERNELS (PLOT)

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

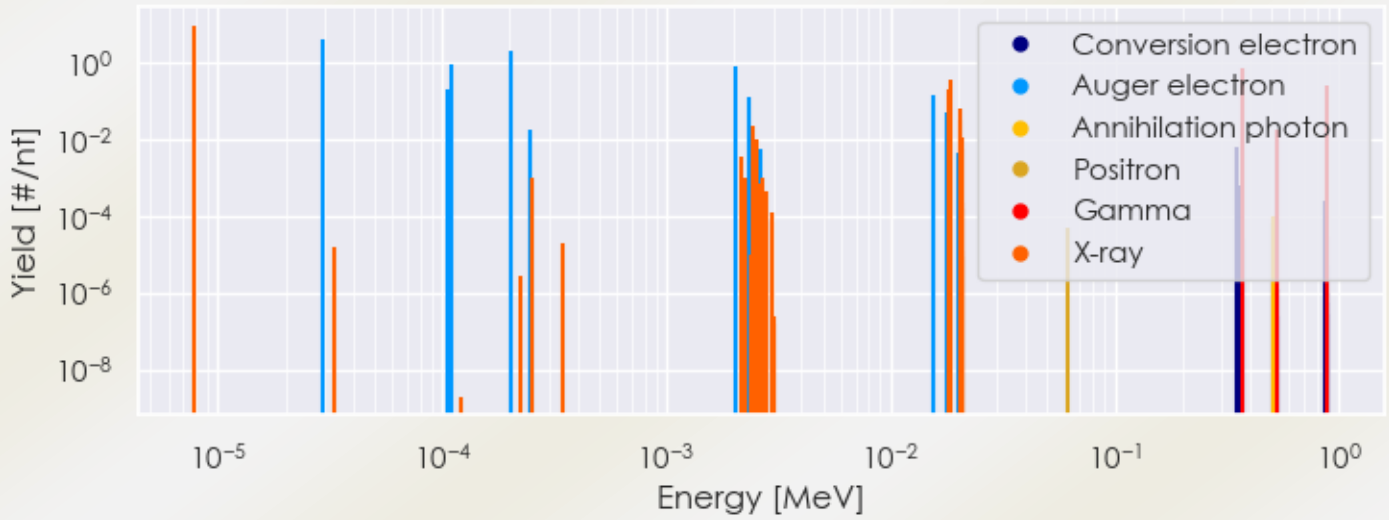
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.




*Download tabulated dose point kernel file here:* www.mirdsoft.org/products/MIRDspecs/Ru-94 DPK.csv

## SUMMARY SPECTRA (PLOT)

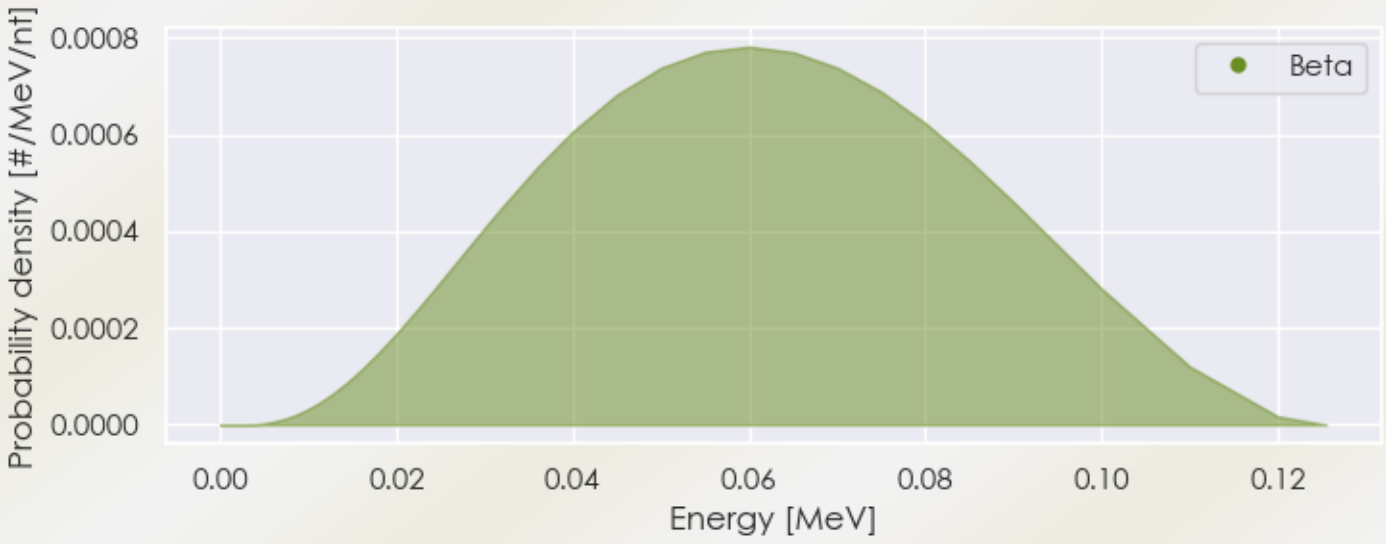
*Spectra source:* **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**




*Download tabulated summary spectra file here:* www.mirdsoft.org/products/MIRDspecs/Ru-94 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/Ru-94 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/Ru-94 Summary Spectrum.csv

| Energy [MeV] | Yield [#/nt] if > 0.01 | Radiation type |
|---|---|---|
| **7.87644e-06** | 9.492e+00 | X-ray |
| **2.41453e-03** | 2.242e-02 | X-ray |
| **2.53088e-03** | 1.041e-02 | X-ray |
| **1.82141e-02** | 1.967e-01 | X-ray |
| **1.83344e-02** | 3.740e-01 | X-ray |
| **2.05668e-02** | 3.093e-02 | X-ray |
| **2.05871e-02** | 6.020e-02 | X-ray |
| **2.09655e-02** | 1.147e-02 | X-ray |
| **3.67200e-01** | 7.520e-01 | Gamma |
| **5.25000e-01** | 1.805e-02 | Gamma |

| | | |
|---|---|---|
| **8.91200e-01** | 2.482e-01 | Gamma |
| **2.93992e-05** | 4.149e+00 | Auger electron |
| **1.06667e-04** | 1.974e-01 | Auger electron |
| **1.10209e-04** | 8.659e-01 | Auger electron |
| **2.03926e-04** | 2.100e+00 | Auger electron |
| **2.47567e-04** | 1.762e-02 | Auger electron |
| **2.05400e-03** | 8.271e-01 | Auger electron |
| **2.33288e-03** | 1.288e-01 | Auger electron |
| **1.54229e-02** | 1.363e-01 | Auger electron |
| **1.78238e-02** | 5.147e-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