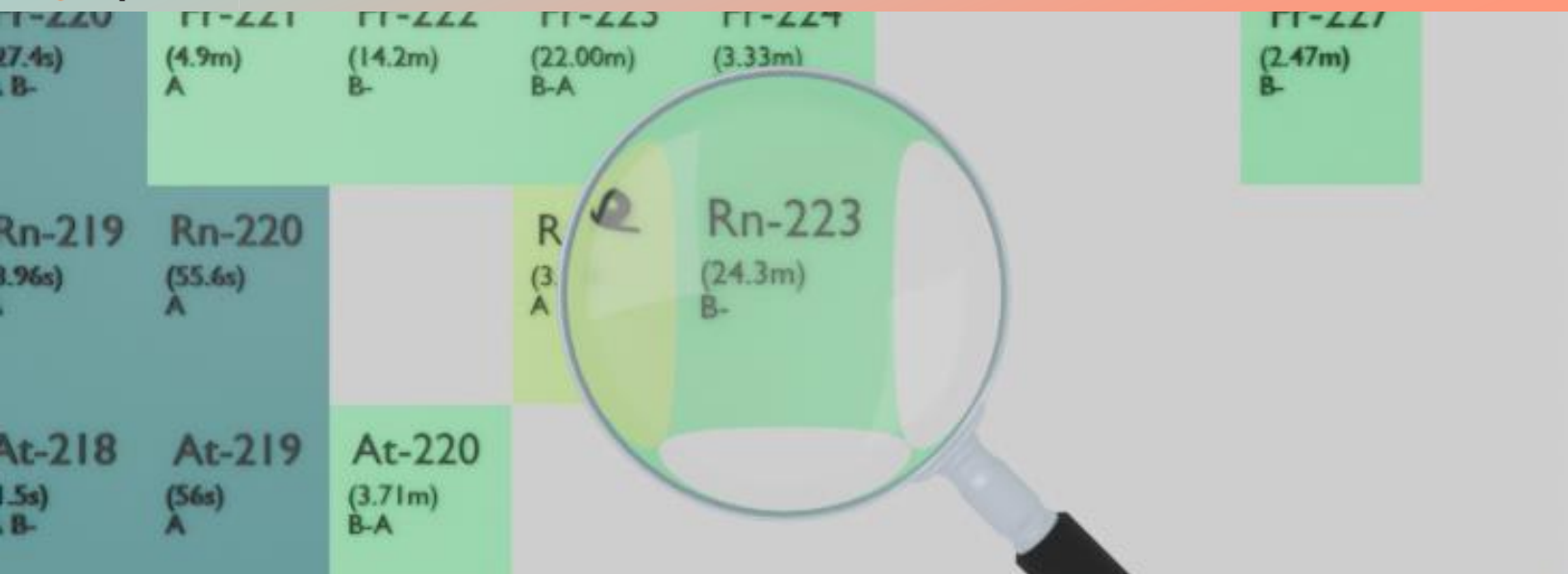




# RADON-223

## SUMMARY DATA

### GENERAL

#### CLASSIFICATION

Isotope: Rn-223  
Atomic number (Z): 86  
Mass number (A): 223  
Neutron number (N): 137

#### RADIOACTIVE DECAY

Decay modes:  $\beta^-$   
Half-life: 24.3 [m]  
Decay constant:  $4.7541 \times 10^{-4}$  [1/s]  
Daughters: Fr-223 (100.0%)  
Radioactive daughters: Fr-223

#### DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]  
Mean electron energy: 0.62824 [MeV]  
Mean photon energy: 0.34435 [MeV]  
Air kerma rate constant,  $\Gamma_{10}$ :  $2.290 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Air kerma coefficient,  $K_{\text{air}}$ :  $2.290 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Equilibrium dose constant for weakly-penetrating radiations ( $\alpha$  and/or electrons),  $\Delta_{\text{wp}}$ :  $1.007 \times 10^{-13}$  [Gy  $\cdot$  kg/Bq  $\cdot$  s]  
Equilibrium dose constant for alphas,  $\Delta_{\alpha}$ :  $0.000 \times 10^0$  [Gy  $\cdot$  kg/Bq  $\cdot$  s]

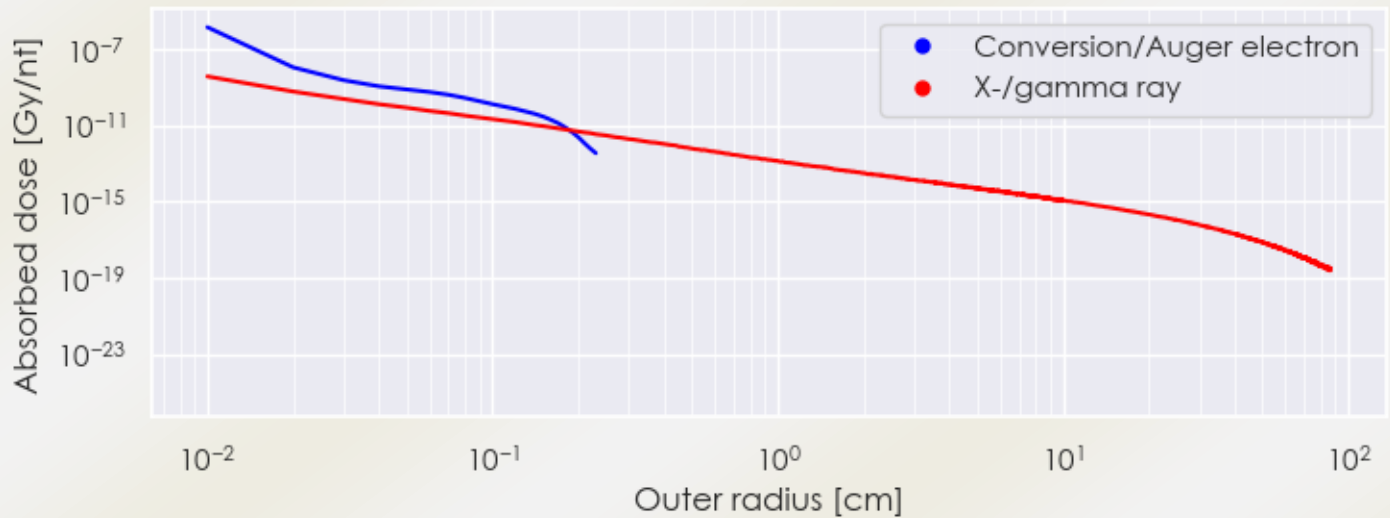
Equilibrium dose constant for betas/electrons,  $\Delta_{\beta, \beta+, e-}$ :  $1.007 \times 10^{-13}$  [Gy·kg/Bq·s]

Equilibrium dose constant for photons,  $\Delta_p$ :  $5.517 \times 10^{-14}$  [Gy·kg/Bq·s]

### DOSE POINT KERNELS (PLOT)

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

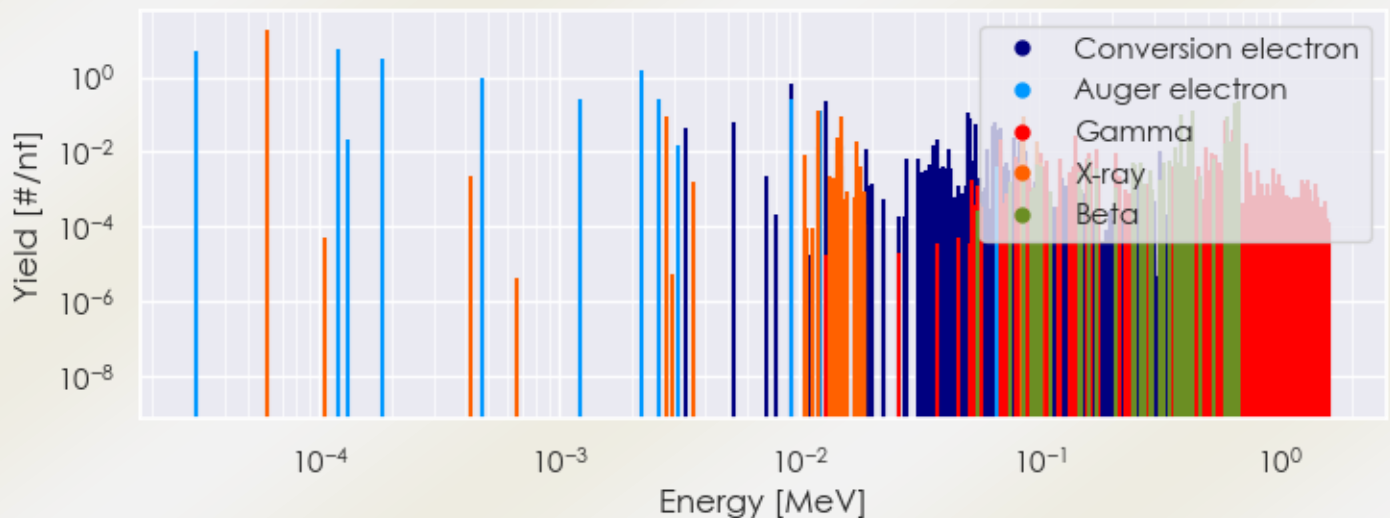
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: [www.mirdsoft.org/products/MIRDspecs/Rn-223 DPK.csv](http://www.mirdsoft.org/products/MIRDspecs/Rn-223 DPK.csv)

### SUMMARY SPECTRA (PLOT)

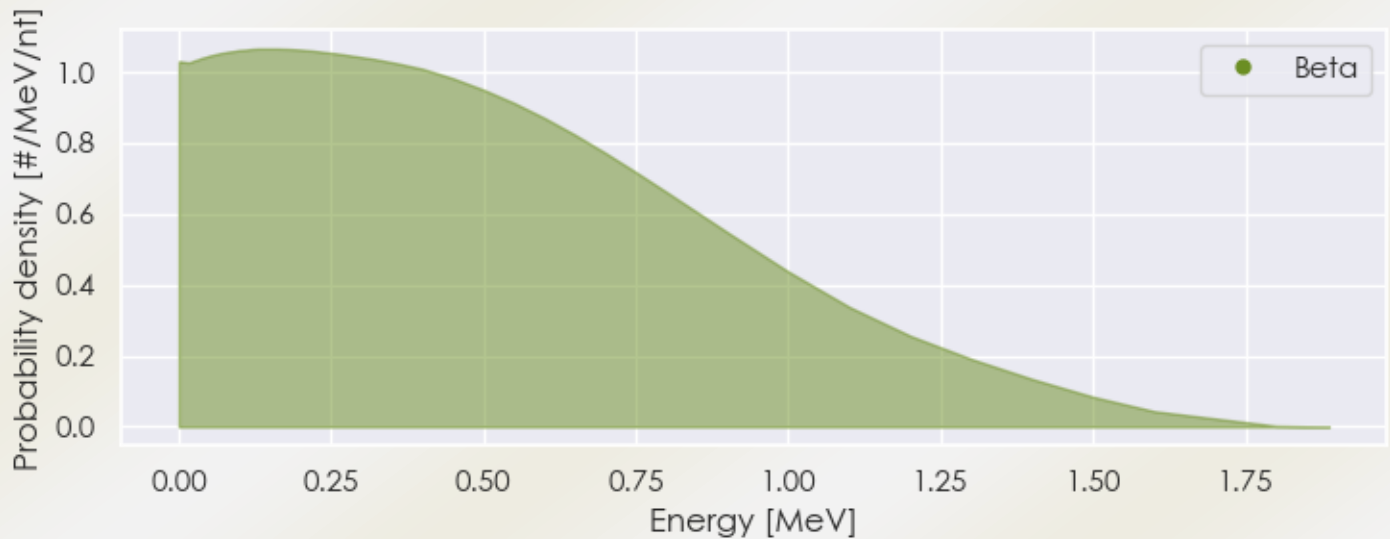
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Rn-223 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Rn-223 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/Rn-223 Beta Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Rn-223 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/Rn-223 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Rn-223 Summary Spectrum.csv)

| Energy [MeV] | Yield [# / nt] if > 0.01 | Radiation type |
|--------------|--------------------------|----------------|
| 6.06248e-05  | 1.904e+01                | X-ray          |
| 2.81360e-03  | 8.530e-02                | X-ray          |
| 1.18951e-02  | 1.401e-02                | X-ray          |
| 1.20348e-02  | 1.232e-01                | X-ray          |
| 1.43175e-02  | 1.360e-02                | X-ray          |
| 1.44681e-02  | 2.482e-02                | X-ray          |
| 1.48321e-02  | 8.483e-02                | X-ray          |
| 1.49855e-02  | 1.337e-02                | X-ray          |
| 1.73734e-02  | 1.828e-02                | X-ray          |
| 6.92100e-02  | 2.220e-02                | Gamma          |

|             |           |                     |
|-------------|-----------|---------------------|
| 8.35492e-02 | 5.496e-02 | X-ray               |
| 8.64861e-02 | 9.020e-02 | X-ray               |
| 9.72076e-02 | 1.024e-02 | X-ray               |
| 9.78757e-02 | 1.989e-02 | X-ray               |
| 1.40930e-01 | 2.568e-02 | Gamma               |
| 1.71950e-01 | 1.200e-02 | Gamma               |
| 4.16520e-01 | 4.260e-02 | Gamma               |
| 4.92210e-01 | 1.344e-02 | Gamma               |
| 5.92550e-01 | 6.660e-02 | Gamma               |
| 6.22250e-01 | 1.040e-02 | Gamma               |
| 6.35800e-01 | 3.840e-02 | Gamma               |
| 6.49730e-01 | 2.244e-02 | Gamma               |
| 6.54780e-01 | 3.036e-02 | Gamma               |
| 7.24000e-01 | 1.692e-02 | Gamma               |
| 3.69353e-01 | 1.317e-02 | Beta                |
| 3.86896e-01 | 1.035e-01 | Beta                |
| 4.20616e-01 | 4.423e-02 | Beta                |
| 4.21425e-01 | 2.541e-02 | Beta                |
| 4.37867e-01 | 1.317e-01 | Beta                |
| 5.90130e-01 | 1.600e-02 | Beta                |
| 6.04676e-01 | 8.469e-02 | Beta                |
| 6.10805e-01 | 1.882e-02 | Beta                |
| 6.39681e-01 | 1.882e-02 | Beta                |
| 6.40280e-01 | 1.976e-02 | Beta                |
| 6.47380e-01 | 1.976e-01 | Beta                |
| 6.75709e-01 | 2.258e-01 | Beta                |
| 3.07574e-05 | 5.192e+00 | Auger electron      |
| 1.18659e-04 | 5.405e+00 | Auger electron      |
| 1.30335e-04 | 2.066e-02 | Auger electron      |
| 1.83365e-04 | 3.057e+00 | Auger electron      |
| 4.77053e-04 | 9.809e-01 | Auger electron      |
| 1.22592e-03 | 2.603e-01 | Auger electron      |
| 2.19714e-03 | 1.567e+00 | Auger electron      |
| 2.56991e-03 | 2.498e-01 | Auger electron      |
| 3.08888e-03 | 1.404e-02 | Auger electron      |
| 3.35000e-03 | 4.552e-02 | Conversion electron |
| 5.28000e-03 | 6.162e-02 | Conversion electron |
| 9.23030e-03 | 2.661e-01 | Auger electron      |

|                    |           |                     |
|--------------------|-----------|---------------------|
| <b>9.25550e-03</b> | 6.543e-01 | Conversion electron |
| <b>1.20735e-02</b> | 1.273e-01 | Auger electron      |
| <b>1.29000e-02</b> | 2.154e-01 | Conversion electron |
| <b>1.49567e-02</b> | 1.446e-02 | Auger electron      |
| <b>1.88400e-02</b> | 1.143e-02 | Conversion electron |
| <b>3.63700e-02</b> | 1.430e-02 | Conversion electron |
| <b>3.71700e-02</b> | 2.225e-02 | Conversion electron |
| <b>4.21300e-02</b> | 1.233e-02 | Conversion electron |
| <b>5.05800e-02</b> | 1.152e-01 | Conversion electron |
| <b>5.12390e-02</b> | 7.873e-02 | Conversion electron |
| <b>5.41760e-02</b> | 5.721e-02 | Conversion electron |
| <b>6.09800e-02</b> | 1.197e-02 | Conversion electron |
| <b>6.41290e-02</b> | 4.751e-02 | Conversion electron |
| <b>6.55655e-02</b> | 6.400e-02 | Conversion electron |
| <b>6.70660e-02</b> | 3.775e-02 | Conversion electron |
| <b>6.74700e-02</b> | 1.824e-02 | Conversion electron |
| <b>6.80700e-02</b> | 1.080e-02 | Conversion electron |
| <b>6.92100e-02</b> | 2.159e-02 | Conversion electron |
| <b>6.93700e-02</b> | 4.093e-02 | Conversion electron |
| <b>7.84555e-02</b> | 2.360e-02 | Conversion electron |
| <b>8.23200e-02</b> | 1.819e-02 | Conversion electron |
| <b>8.43555e-02</b> | 1.085e-02 | Conversion electron |
| <b>8.81700e-02</b> | 1.016e-02 | Conversion 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/SNMML-MAIN/iCore/Store/StoreLayouts/Item\\_Detail.aspx?iProductCode=0-932004-80-6](https://sites.snmmi.org/SNMML-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6)