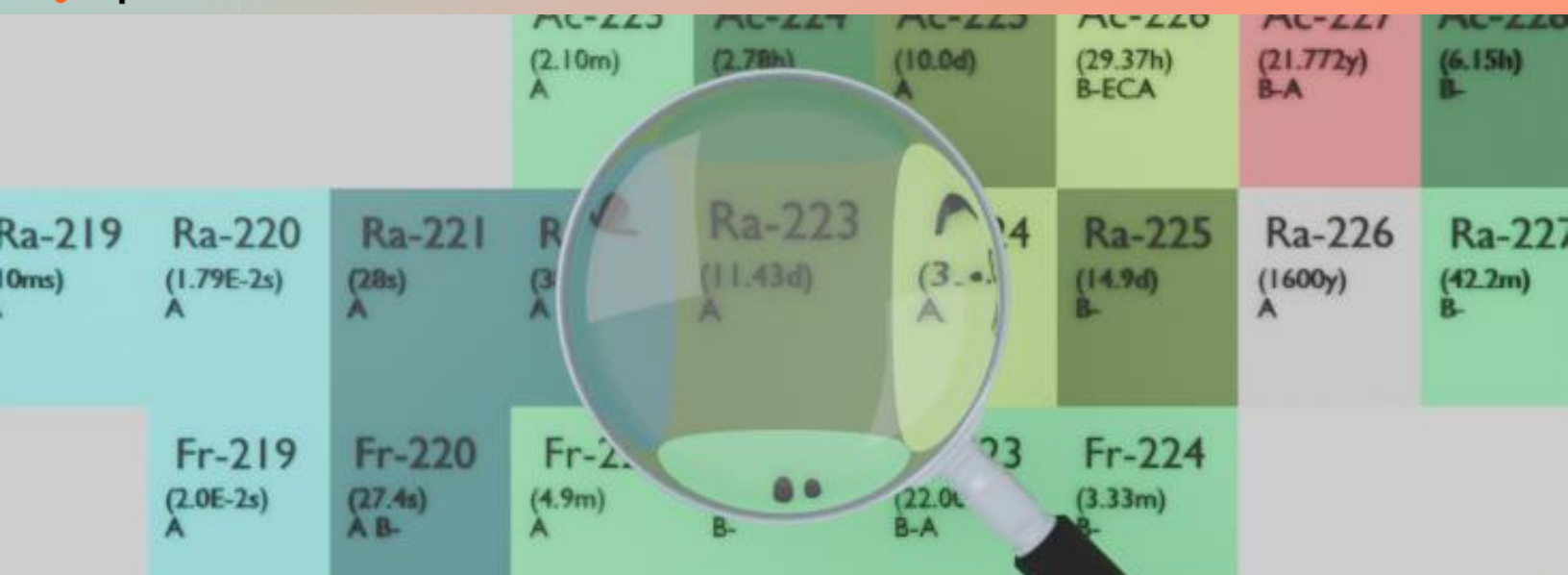




RADIUM-223

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Ra-223
Atomic number (Z): 88
Mass number (A): 223
Neutron number (N): 135

RADIOACTIVE DECAY

Decay modes: α
Half-life: 11.43 [d]
Decay constant: 7.0188×10^{-7} [1/s]
Daughters: Rn-219 (100.0%)
Radioactive daughters: Rn-219

DOSIMETRIC CONSTANTS

Mean alpha energy: 5.7701 [MeV]
Mean electron energy: 0.07809 [MeV]
Mean photon energy: 0.14126 [MeV]
Air kerma rate constant, Γ_{10} : 1.315×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 1.315×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 9.370×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 9.245×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]

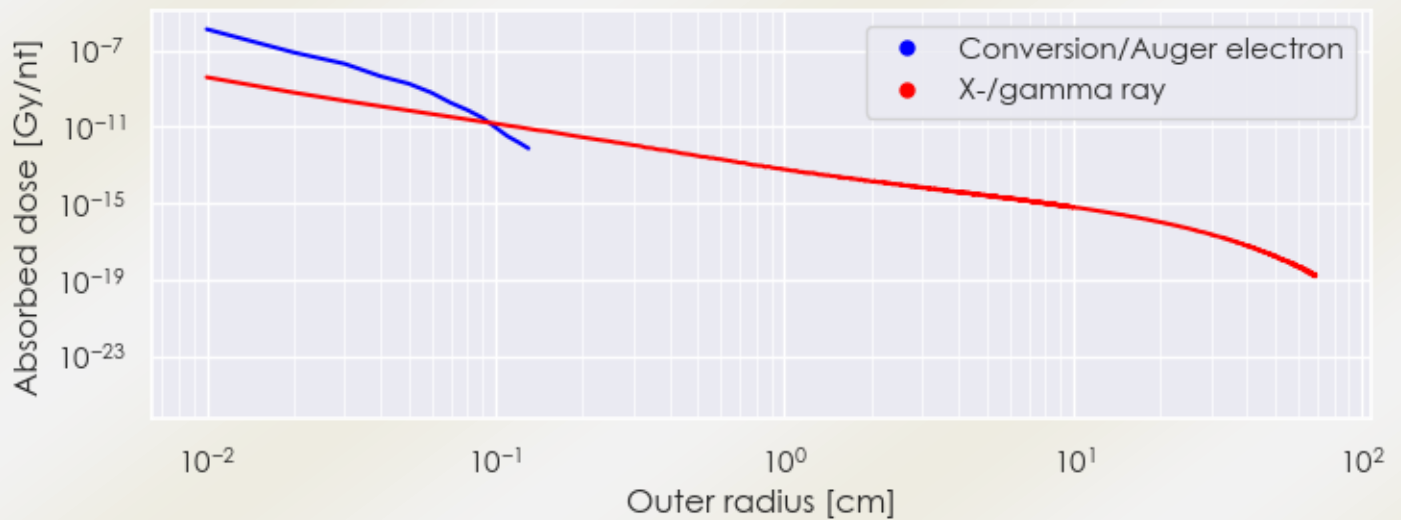
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta+, e-}$: 1.251×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 2.263×10^{-14} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

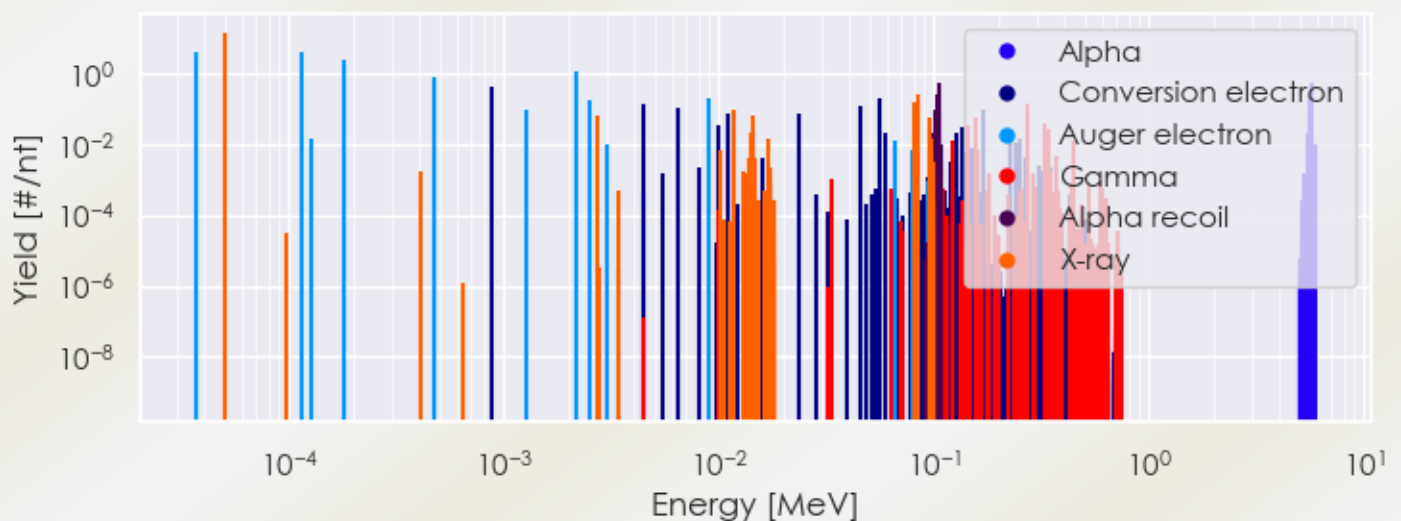
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Ra-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/Ra-223 Summary 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/Ra-223 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Ra-223%20Summary%20Spectrum.csv)

Energy [MeV]	Yield [# /nt] if > 0.01	Radiation type
5.00854e-05	1.474e+01	X-ray
2.72889e-03	6.209e-02	X-ray
1.15974e-02	1.125e-02	X-ray
1.17297e-02	9.899e-02	X-ray
1.40892e-02	1.976e-02	X-ray
1.43744e-02	6.573e-02	X-ray
1.68365e-02	1.402e-02	X-ray
8.13680e-02	1.573e-01	X-ray
8.41450e-02	2.594e-01	X-ray
9.46165e-02	2.933e-02	X-ray
9.52461e-02	5.699e-02	X-ray
9.79846e-02	1.418e-02	X-ray
1.22319e-01	1.209e-02	Gamma
1.44235e-01	3.266e-02	Gamma
1.54208e-01	5.699e-02	Gamma
2.69463e-01	1.390e-01	Gamma
3.23871e-01	3.989e-02	Gamma
3.38282e-01	2.836e-02	Gamma
4.45033e-01	1.293e-02	Gamma
3.68716e-05	3.861e+00	Auger electron
1.14978e-04	4.294e+00	Auger electron
1.27034e-04	1.379e-02	Auger electron
1.81646e-04	2.438e+00	Auger electron
4.70974e-04	8.035e-01	Auger electron
8.82101e-04	4.117e-01	Conversion electron
1.27071e-03	9.685e-02	Auger electron
2.15205e-03	1.207e+00	Auger electron

2.50810e-03	1.863e-01	Auger electron
3.00387e-03	1.033e-02	Auger electron
4.40000e-03	1.332e-01	Conversion electron
6.48210e-03	1.060e-01	Conversion electron
8.86813e-03	2.065e-01	Auger electron
1.00000e-02	3.520e-02	Conversion electron
1.08821e-02	7.061e-02	Conversion electron
1.16006e-02	9.720e-02	Auger electron
1.43617e-02	1.086e-02	Auger electron
1.44000e-02	2.324e-02	Conversion electron
2.35550e-02	7.603e-02	Conversion electron
4.54710e-02	1.288e-01	Conversion electron
5.54440e-02	1.886e-01	Conversion electron
5.98710e-02	2.061e-02	Conversion electron
6.51076e-02	1.225e-02	Auger electron
1.04277e-01	1.239e-02	Conversion electron
1.26193e-01	2.095e-02	Conversion electron
1.36166e-01	3.060e-02	Conversion electron
1.70699e-01	9.458e-02	Conversion electron
2.25107e-01	1.627e-02	Conversion electron
2.39518e-01	1.056e-02	Conversion electron
2.51421e-01	1.525e-02	Conversion electron
5.43494e+00	2.220e-02	Alpha
5.50247e+00	1.000e-02	Alpha
5.53978e+00	9.002e-02	Alpha
5.60734e+00	2.520e-01	Alpha
5.71619e+00	5.161e-01	Alpha
5.74748e+00	9.002e-02	Alpha
5.87198e+00	1.000e-02	Alpha
9.93328e-02	2.220e-02	Alpha recoil
1.00567e-01	1.000e-02	Alpha recoil
1.01249e-01	9.002e-02	Alpha recoil
1.02484e-01	2.520e-01	Alpha recoil
1.04473e-01	5.161e-01	Alpha recoil
1.05045e-01	9.002e-02	Alpha recoil
1.07320e-01	1.000e-02	Alpha recoil

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