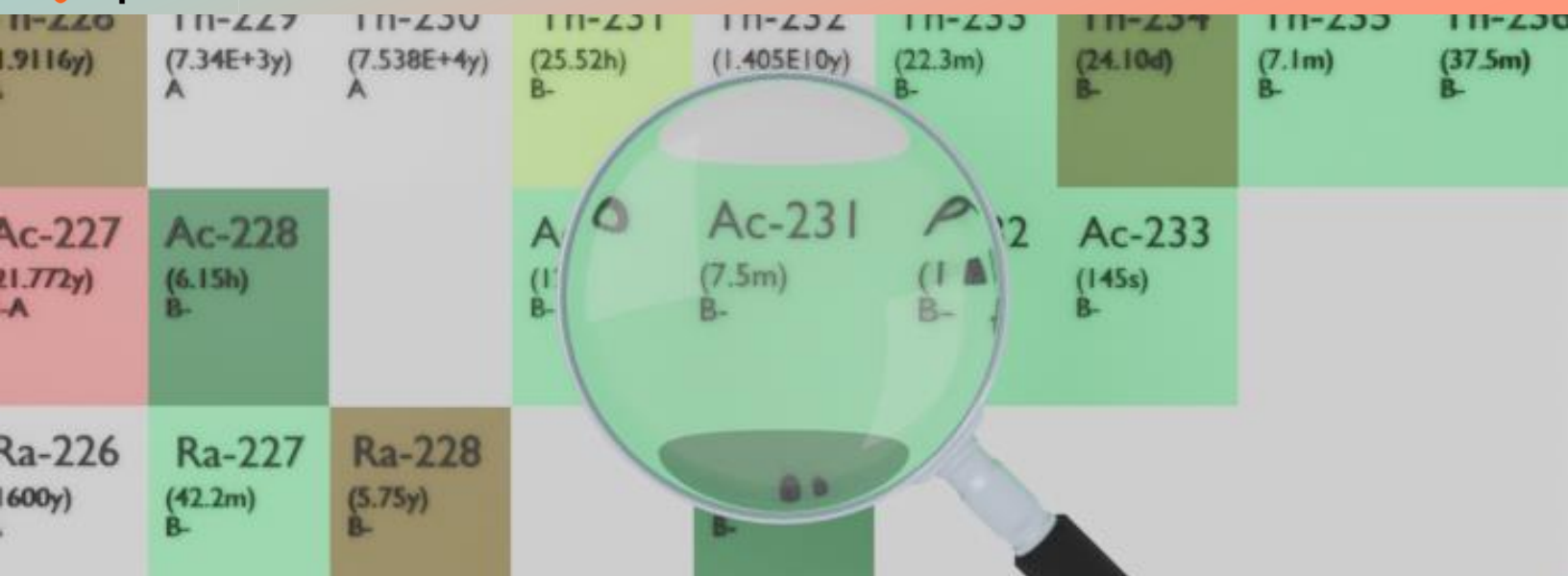




ACTINIUM-231

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Ac-231
Atomic number (Z): 89
Mass number (A): 231
Neutron number (N): 142

RADIOACTIVE DECAY

Decay modes: β^-
Half-life: 7.5 [m]
Decay constant: $1.5403\text{e-}03$ [1/s]
Daughters: Th-231 (100.0%)
Radioactive daughters: Th-231

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.63605 [MeV]
Mean photon energy: 0.41898 [MeV]
Air kerma rate constant, Γ_{10} : $2.239\text{e-}17$ [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : $2.239\text{e-}17$ [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $1.019\text{e-}13$ [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : $0.000\text{e+}00$ [Gy $\cdot$ kg/Bq $\cdot$ s]

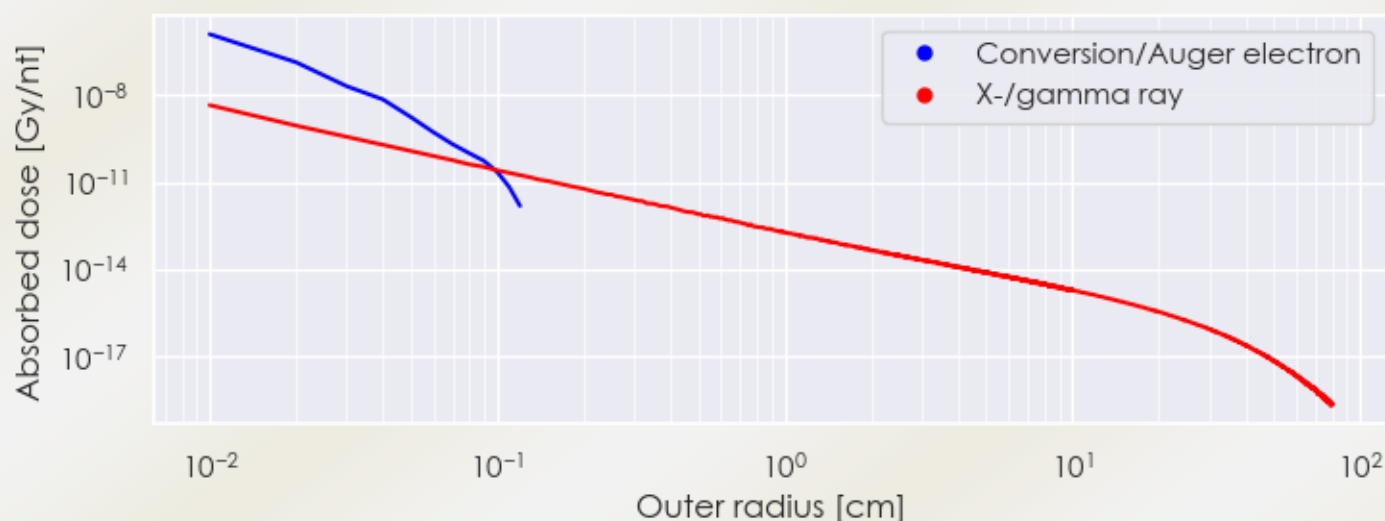
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 1.019×10^{-13} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 6.713×10^{-14} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

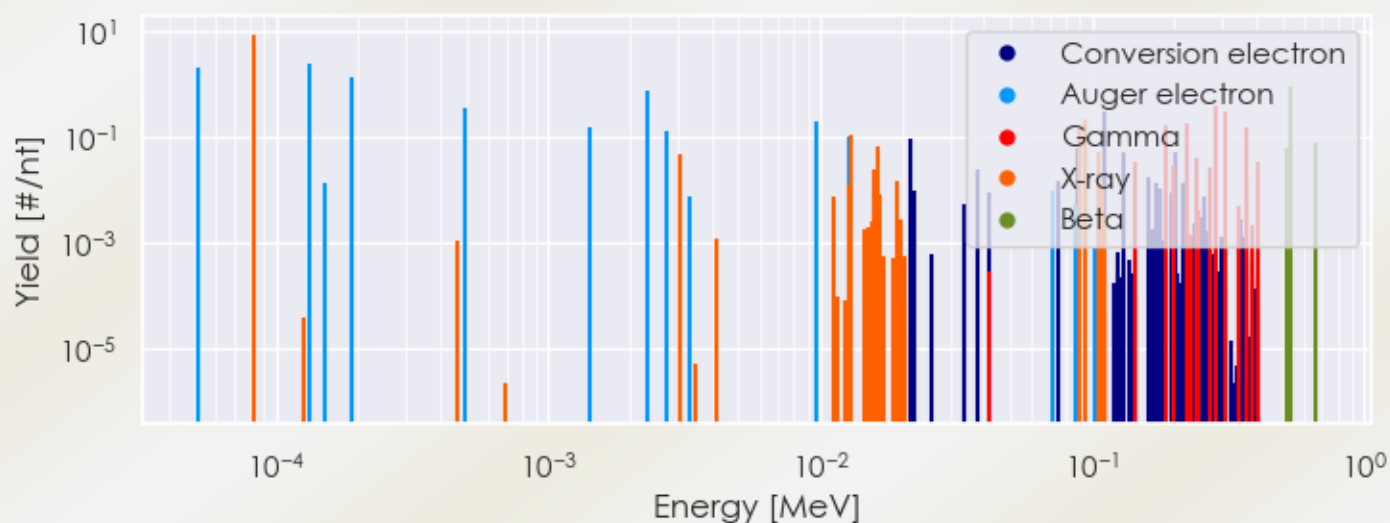
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Ac-231_DPK.csv

SUMMARY SPECTRA (PLOT)

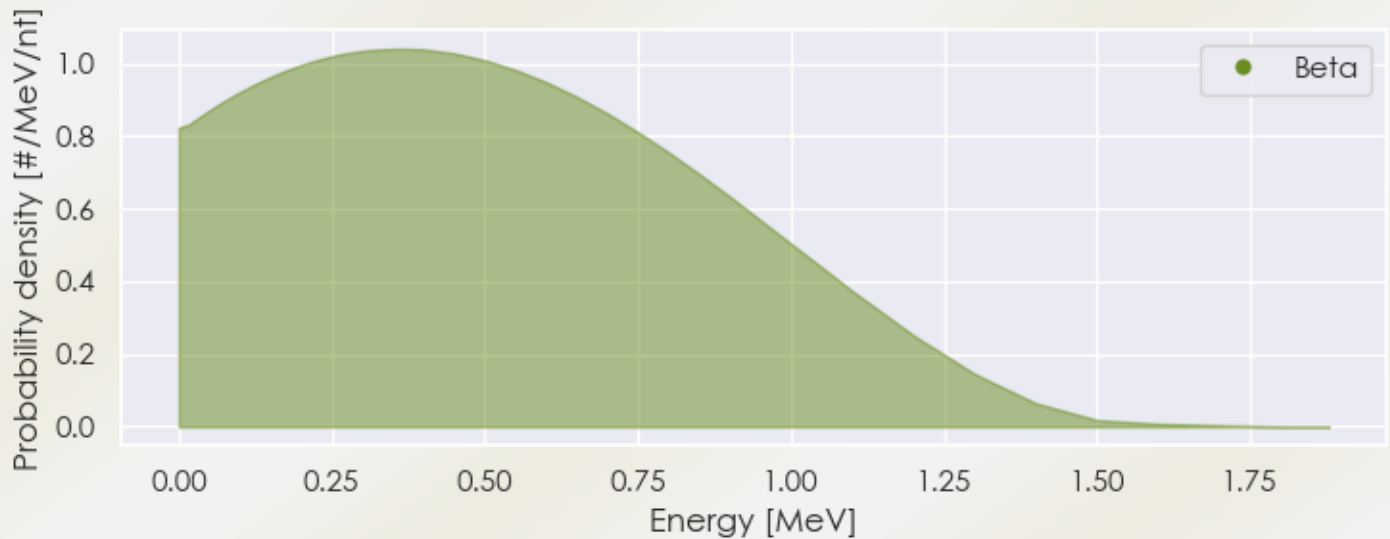
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Ac-231_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/Ac-231 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/Ac-231 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
8.22400e-05	8.567e+00	X-ray
3.06047e-03	4.752e-02	X-ray
1.28126e-02	1.270e-02	X-ray
1.29764e-02	1.117e-01	X-ray
1.56384e-02	2.307e-02	X-ray
1.62776e-02	6.607e-02	X-ray
1.90652e-02	1.468e-02	X-ray
9.03299e-02	1.355e-01	X-ray
9.37949e-02	2.190e-01	X-ray
1.05278e-01	2.510e-02	X-ray

1.06073e-01	4.895e-02	X-ray
1.09154e-01	1.251e-02	X-ray
1.43650e-01	3.230e-02	Gamma
1.85680e-01	1.577e-01	Gamma
1.98900e-01	2.736e-02	Gamma
2.21380e-01	1.721e-01	Gamma
2.40870e-01	3.990e-02	Gamma
2.71900e-01	2.508e-02	Gamma
2.82460e-01	3.800e-01	Gamma
3.07050e-01	2.983e-01	Gamma
3.68930e-01	1.490e-01	Gamma
3.72000e-01	1.520e-02	Gamma
4.07800e-01	3.230e-02	Gamma
5.17431e-01	6.188e-02	Beta
5.32817e-01	8.583e-01	Beta
6.66310e-01	7.984e-02	Beta
5.13369e-05	2.064e+00	Auger electron
1.32420e-04	2.282e+00	Auger electron
1.50396e-04	1.312e-02	Auger electron
1.88011e-04	1.289e+00	Auger electron
4.97008e-04	3.383e-01	Auger electron
1.41312e-03	1.546e-01	Auger electron
2.31241e-03	7.476e-01	Auger electron
2.72499e-03	1.281e-01	Auger electron
9.72089e-03	1.941e-01	Auger electron
1.28463e-02	9.652e-02	Auger electron
1.60058e-02	1.133e-02	Auger electron
2.15220e-02	9.256e-02	Conversion electron
3.79638e-02	2.484e-02	Conversion electron
7.55700e-02	1.411e-02	Conversion electron
8.87900e-02	6.225e-02	Conversion electron
1.11270e-01	2.910e-01	Conversion electron
1.30760e-01	4.928e-02	Conversion electron
1.61790e-01	1.762e-02	Conversion electron
1.72350e-01	1.309e-02	Conversion electron
1.78422e-01	1.054e-02	Conversion electron
2.00902e-01	4.905e-02	Conversion electron
2.17344e-01	1.314e-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/SNMMI-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6