



ACTINIUM-232

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Ac-232
Atomic number (Z): 89
Mass number (A): 232
Neutron number (N): 143

RADIOACTIVE DECAY

Decay modes: β^-
Half-life: 119.0 [s]
Decay constant: 5.8248×10^{-3} [1/s]
Daughters: Th-232 (100.0%)
Radioactive daughters: Th-232

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.97069 [MeV]
Mean photon energy: 1.15279 [MeV]
Air kerma rate constant, Γ_{10} : 4.356×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 4.356×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.555×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000×10^0 [Gy $\cdot$ kg/Bq $\cdot$ s]

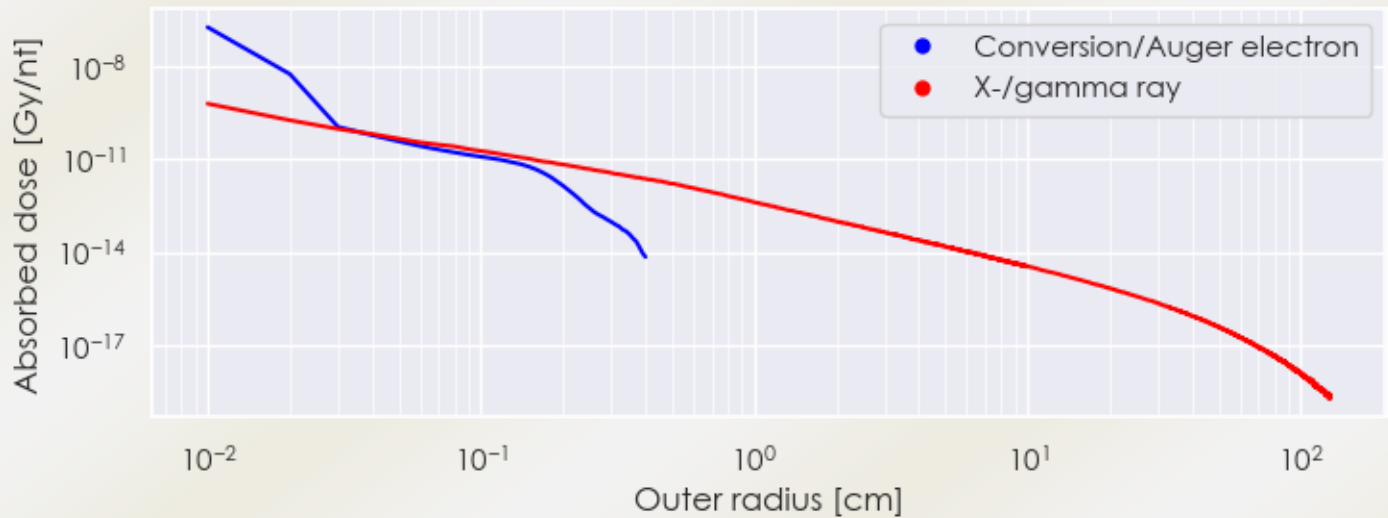
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-, \beta+, e-}$: 1.555×10^{-13} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.847×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

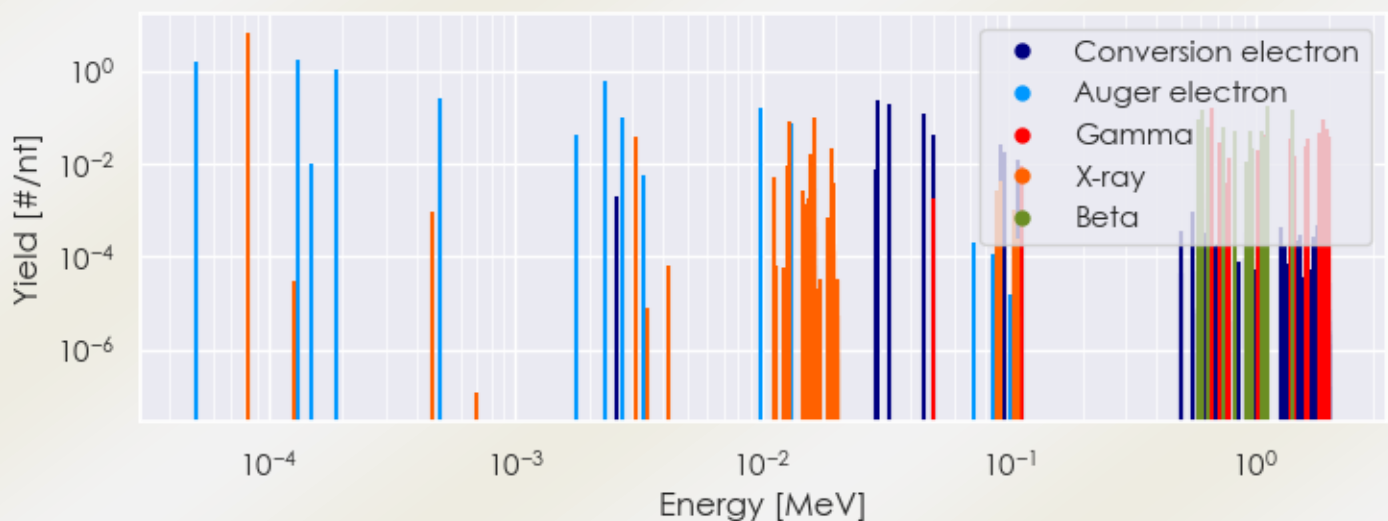
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Ac-232 DPK.csv

SUMMARY SPECTRA (PLOT)

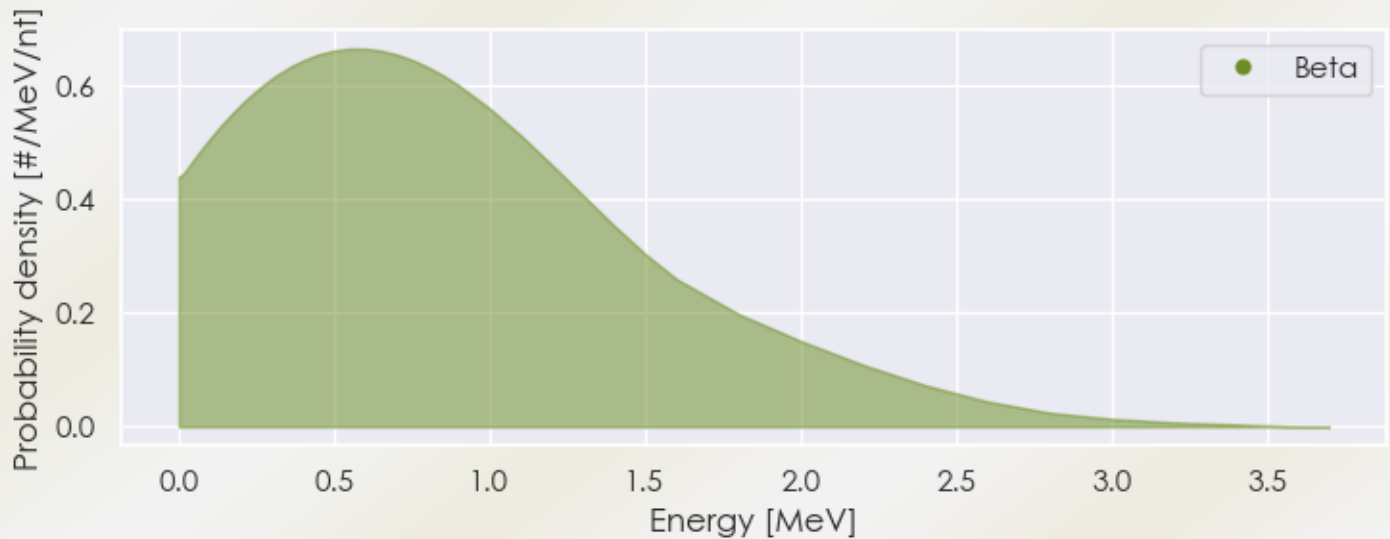
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Ac-232 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-232 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-232 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
8.23177e-05	6.749e+00	X-ray
3.07076e-03	3.736e-02	X-ray
1.29764e-02	7.802e-02	X-ray
1.56384e-02	1.612e-02	X-ray
1.62776e-02	9.526e-02	X-ray
1.90652e-02	2.117e-02	X-ray
6.12000e-01	5.049e-02	Gamma
6.65000e-01	1.530e-01	Gamma
7.14400e-01	2.754e-02	Gamma
7.35800e-01	2.448e-02	Gamma

7.85200e-01	1.377e-02	Gamma
1.02350e+00	1.989e-02	Gamma
1.02810e+00	1.224e-02	Gamma
1.05630e+00	1.071e-02	Gamma
1.07290e+00	4.284e-02	Gamma
1.07750e+00	2.142e-02	Gamma
1.38800e+00	3.366e-02	Gamma
1.43700e+00	1.530e-02	Gamma
1.59300e+00	2.448e-02	Gamma
1.64200e+00	3.519e-02	Gamma
1.81500e+00	1.989e-02	Gamma
1.83000e+00	4.590e-02	Gamma
1.88000e+00	1.377e-02	Gamma
1.89900e+00	8.874e-02	Gamma
1.94800e+00	5.202e-02	Gamma
1.95900e+00	5.355e-02	Gamma
1.97800e+00	3.825e-02	Gamma
2.00800e+00	3.672e-02	Gamma
5.91151e-01	8.946e-02	Beta
6.03172e-01	5.964e-02	Beta
6.15217e-01	1.392e-01	Beta
6.42603e-01	5.964e-02	Beta
7.39339e-01	5.964e-02	Beta
8.23340e-01	4.871e-02	Beta
9.20218e-01	1.093e-02	Beta
9.53328e-01	5.169e-02	Beta
9.71659e-01	1.193e-02	Beta
9.72158e-01	2.087e-02	Beta
9.74071e-01	1.988e-02	Beta
1.05536e+00	5.268e-02	Beta
1.09407e+00	3.877e-02	Beta
1.12373e+00	1.809e-01	Beta
1.42374e+00	1.491e-01	Beta
5.13379e-05	1.625e+00	Auger electron
1.33159e-04	1.798e+00	Auger electron
1.50551e-04	1.035e-02	Auger electron
1.88130e-04	1.031e+00	Auger electron
4.98039e-04	2.642e-01	Auger electron

1.76467e-03	4.332e-02	Auger electron
2.32671e-03	5.852e-01	Auger electron
2.74436e-03	1.009e-01	Auger electron
9.95391e-03	1.556e-01	Auger electron
1.30895e-02	7.761e-02	Auger electron
2.95890e-02	2.244e-01	Conversion electron
3.30540e-02	1.984e-01	Conversion electron
4.53328e-02	1.180e-01	Conversion electron
4.93690e-02	4.075e-02	Conversion electron
9.29200e-02	2.564e-02	Conversion electron
9.63850e-02	1.722e-02	Conversion electron
1.08664e-01	1.221e-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