



ACTINIUM-225

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Ac-225
Atomic number (Z): 89
Mass number (A): 225
Neutron number (N): 136

RADIOACTIVE DECAY

Decay modes: α
Half-life: 10.0 [d]
Decay constant: 8.0225×10^{-7} [1/s]
Daughters: Fr-221 (100.0%)
Radioactive daughters: Fr-221

DOSIMETRIC CONSTANTS

Mean alpha energy: 5.8919 [MeV]
Mean electron energy: 0.02476 [MeV]
Mean photon energy: 0.01708 [MeV]
Air kerma rate constant, Γ_{10} : 6.777×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 6.777×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 9.480×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 9.440×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]

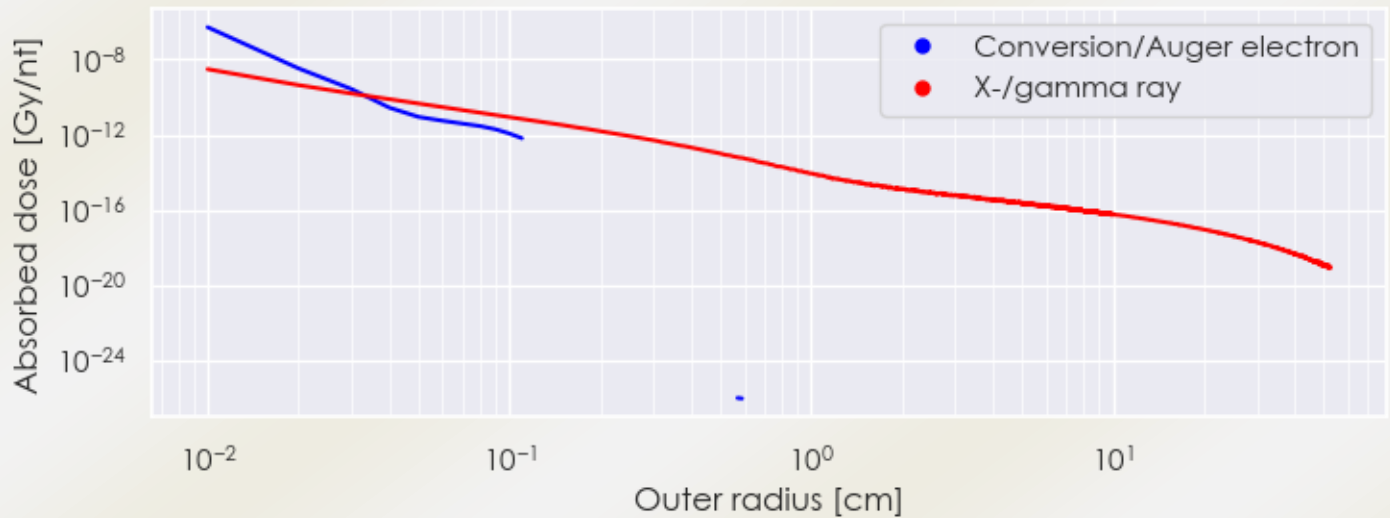
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-, \beta+, e-}$: 3.967×10^{-15} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 2.737×10^{-15} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

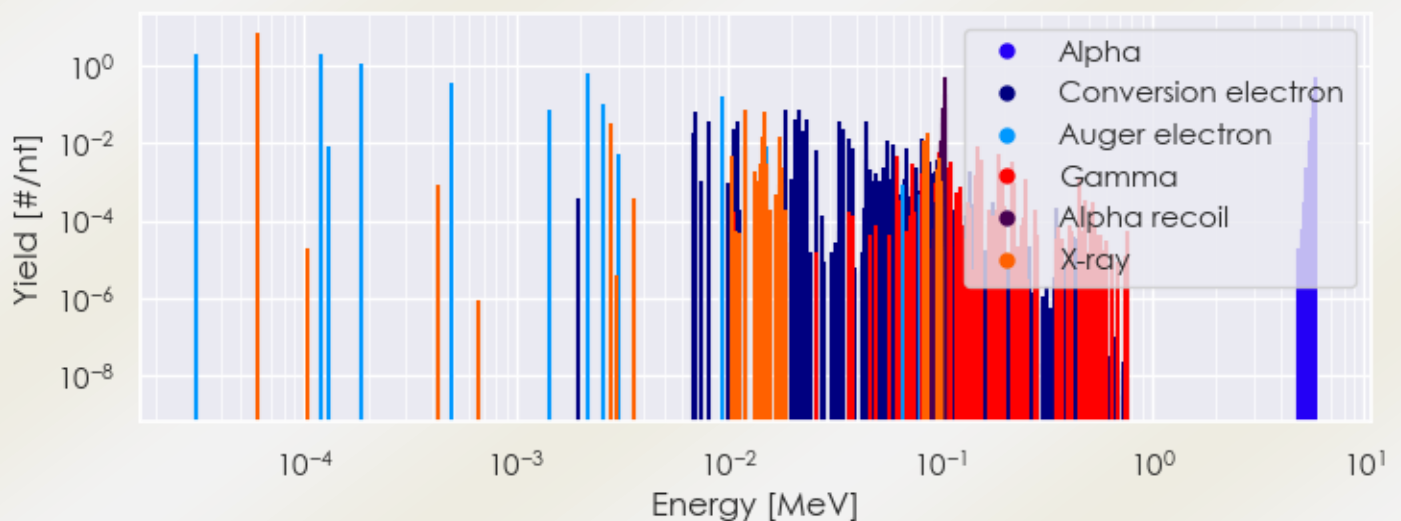
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Ac-225 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-225 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/Ac-225 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Ac-225%20Summary%20Spectrum.csv)

Energy [MeV]	Yield [#]/nt] if > 0.01	Radiation type
6.06221e-05	7.334e+00	X-ray
2.80803e-03	3.424e-02	X-ray
1.20348e-02	6.945e-02	X-ray
1.44681e-02	1.399e-02	X-ray
1.48321e-02	6.719e-02	X-ray
1.73734e-02	1.448e-02	X-ray
8.35492e-02	1.134e-02	X-ray
8.64861e-02	1.862e-02	X-ray
9.99100e-02	1.014e-02	Gamma
3.07386e-05	1.991e+00	Auger electron
1.18835e-04	2.090e+00	Auger electron
1.83343e-04	1.164e+00	Auger electron
4.89395e-04	3.484e-01	Auger electron
1.42574e-03	7.438e-02	Auger electron
2.18282e-03	6.216e-01	Auger electron
2.54383e-03	9.748e-02	Auger electron
6.89001e-03	1.946e-02	Conversion electron
6.95550e-03	6.894e-02	Conversion electron
8.02900e-03	3.548e-02	Conversion electron
9.25118e-03	1.542e-01	Auger electron
1.06000e-02	2.354e-02	Conversion electron
1.09660e-02	3.728e-02	Conversion electron
1.20897e-02	7.379e-02	Auger electron
1.86790e-02	7.180e-02	Conversion electron
2.05590e-02	4.235e-02	Conversion electron
2.16160e-02	7.091e-02	Conversion electron
2.23555e-02	1.970e-02	Conversion electron

2.34960e-02	4.138e-02	Conversion electron
3.30055e-02	3.888e-02	Conversion electron
3.48855e-02	2.283e-02	Conversion electron
3.66500e-02	1.288e-02	Conversion electron
4.43200e-02	3.528e-02	Conversion electron
5.57400e-02	1.179e-02	Conversion electron
8.10000e-02	1.246e-02	Conversion electron
5.58072e+00	1.202e-02	Alpha
5.60906e+00	1.102e-02	Alpha
5.63741e+00	4.408e-02	Alpha
5.68234e+00	1.302e-02	Alpha
5.72325e+00	3.106e-02	Alpha
5.73162e+00	1.322e-02	Alpha
5.73189e+00	8.015e-02	Alpha
5.79187e+00	8.616e-02	Alpha
5.79372e+00	1.813e-01	Alpha
5.82972e+00	5.079e-01	Alpha
1.01074e-01	1.202e-02	Alpha recoil
1.01587e-01	1.102e-02	Alpha recoil
1.02101e-01	4.408e-02	Alpha recoil
1.02915e-01	1.302e-02	Alpha recoil
1.03656e-01	3.106e-02	Alpha recoil
1.03807e-01	1.322e-02	Alpha recoil
1.03812e-01	8.015e-02	Alpha recoil
1.04898e-01	8.616e-02	Alpha recoil
1.04932e-01	1.813e-01	Alpha recoil
1.05584e-01	5.079e-01	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/SNMMI-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6