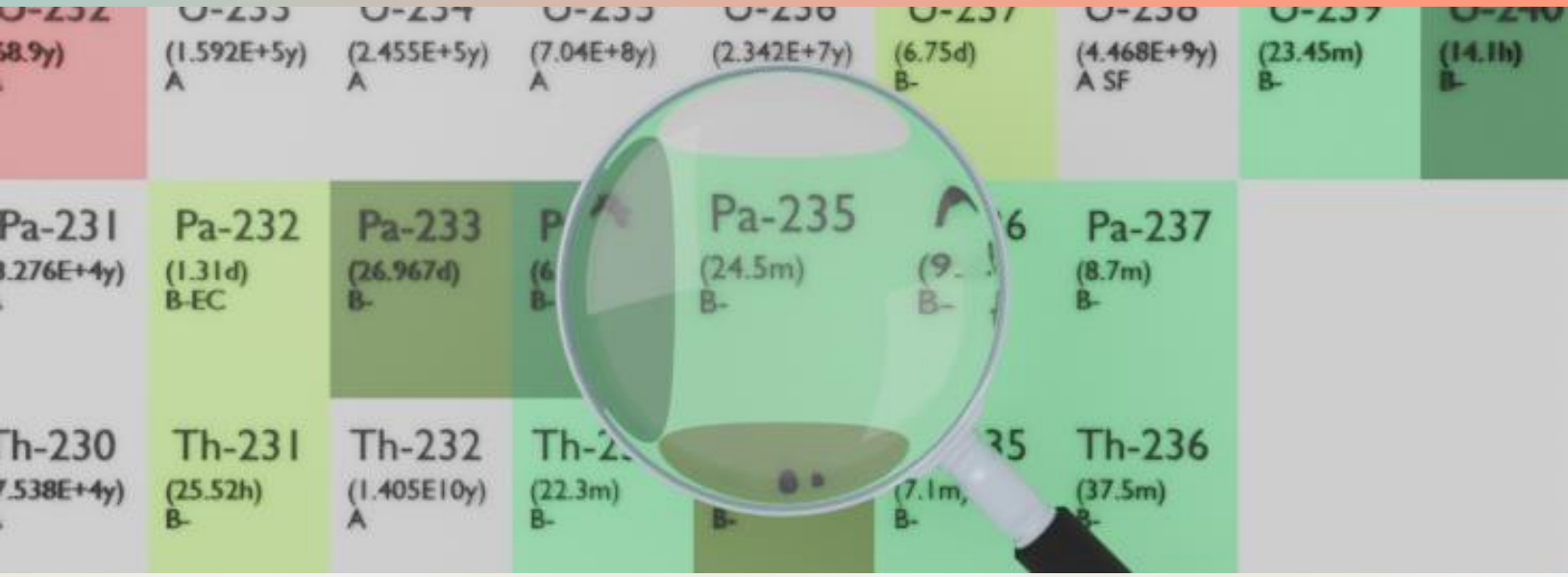


PROTACTINIUM-235

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Pa-235
Atomic number (Z): 91
Mass number (A): 235
Neutron number (N): 144

RADIOACTIVE DECAY

Decay modes: β-
Half-life: 24.5 [m]
Decay constant: 4.7153e-04 [1/s]
Daughters: U-235m (100.0%), U-235 (0.0101%)
Radioactive daughters: U-235m, U-235

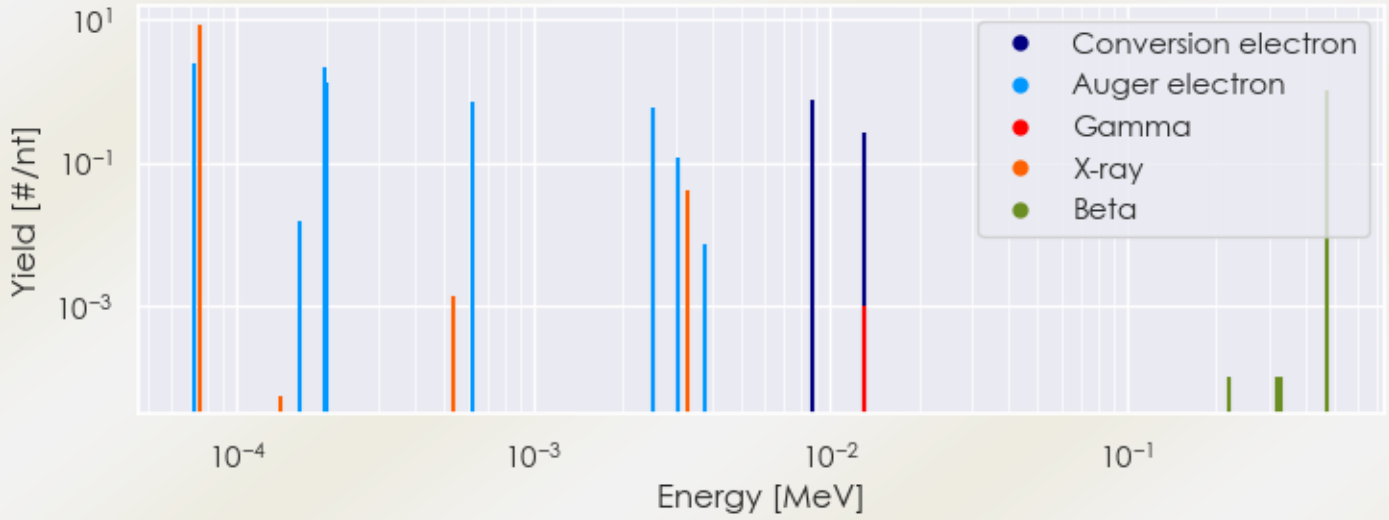
DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.48861 [MeV]
Mean photon energy: 0.00079 [MeV]
Air kerma rate constant, Γ_{10}*:* 3.475e-20 [Gy·m^2/Bq·s]
Air kerma coefficient, K_{air}*:* 3.475e-20 [Gy·m^2/Bq·s]
Equilibrium dose constant for weakly-penetrating radiations (a and/or electrons), Δ_{wp}*:* 7.828e-14 [Gy·kg/Bq·s]
Equilibrium dose constant for alphas, Δ_{a}*:* 0.000e+00 [Gy·kg/Bq·s]

Equilibrium dose constant for betas/electrons, $\Delta_{\beta^-,\beta^+,e^-}$: 7.828e-14 [Gy·kg/Bq·s]
Equilibrium dose constant for photons, Δ_p: 1.266e-16 [Gy·kg/Bq·s]

SUMMARY SPECTRA (PLOT)

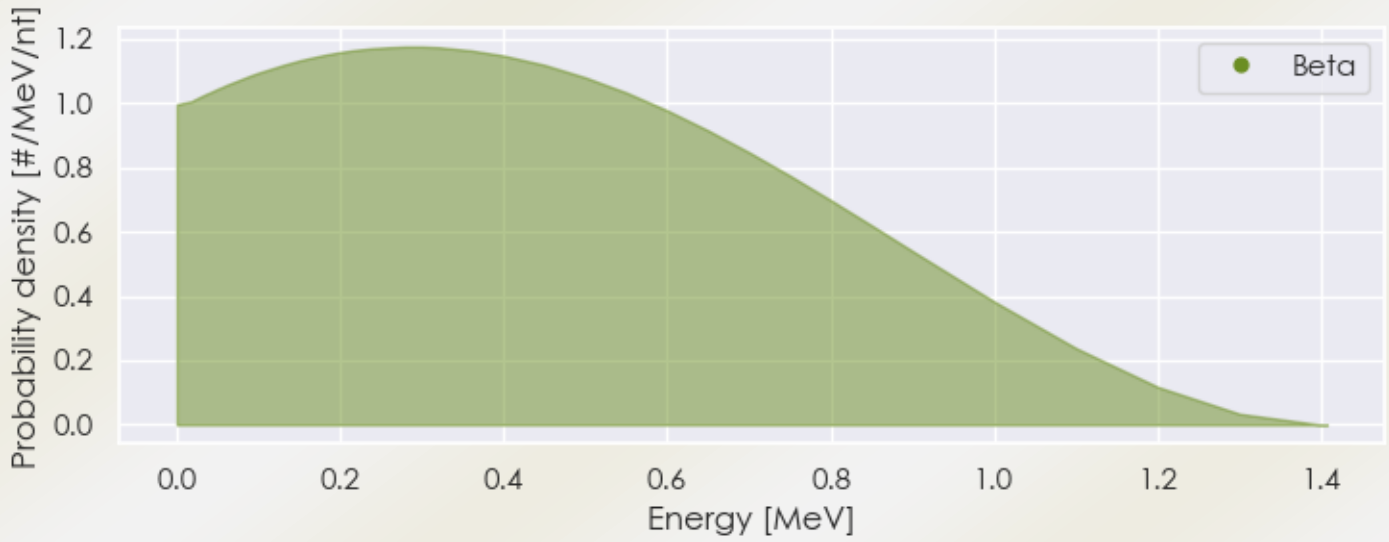
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Pa-235 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/Pa-235 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/Pa-235 Summary Spectrum.csv

Energy [MeV]	Yield [#/nt] if > 0.01	Radiation type
7.53759e-05	8.671e+00	X-ray
3.32315e-03	3.987e-02	X-ray
4.75706e-01	9.997e-01	Beta
7.19496e-05	2.421e+00	Auger electron
1.63711e-04	1.538e-02	Auger electron
1.98156e-04	2.229e+00	Auger electron
1.99368e-04	1.330e+00	Auger electron
6.17333e-04	7.233e-01	Auger electron
2.53604e-03	5.763e-01	Auger electron
3.07486e-03	1.156e-01	Auger electron
8.68540e-03	7.380e-01	Conversion electron
1.29750e-02	2.609e-01	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