



NEPTUNIUM-232

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Np-232
Atomic number (Z): 93
Mass number (A): 232
Neutron number (N): 139

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 14.7 [m]
Decay constant: 7.8588e-04 [1/s]
Daughters: U-232 (100.0%)
Radioactive daughters: U-232

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.10732 [MeV]
Mean photon energy: 1.19689 [MeV]
Air kerma rate constant, Γ_{10} : 6.185e-17 [Gy·m²/Bq·s]
Air kerma coefficient, K_{air} : 6.189e-17 [Gy·m²/Bq·s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.719e-14 [Gy·kg/Bq·s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000e+00 [Gy·kg/Bq·s]

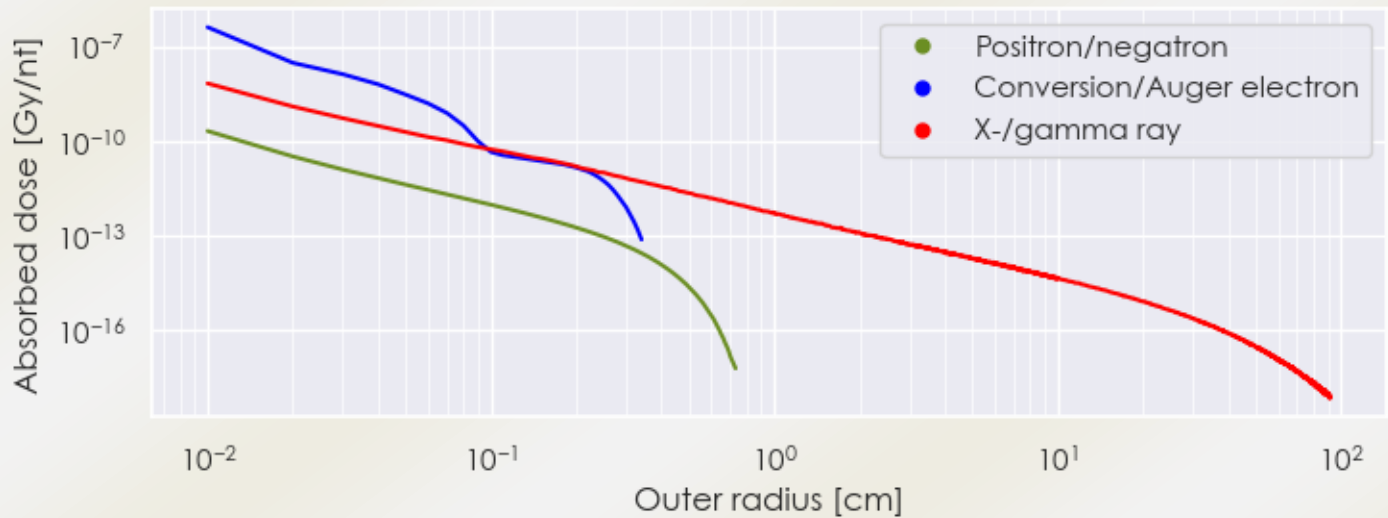
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-, \beta+, e-}$: 1.719×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.918×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

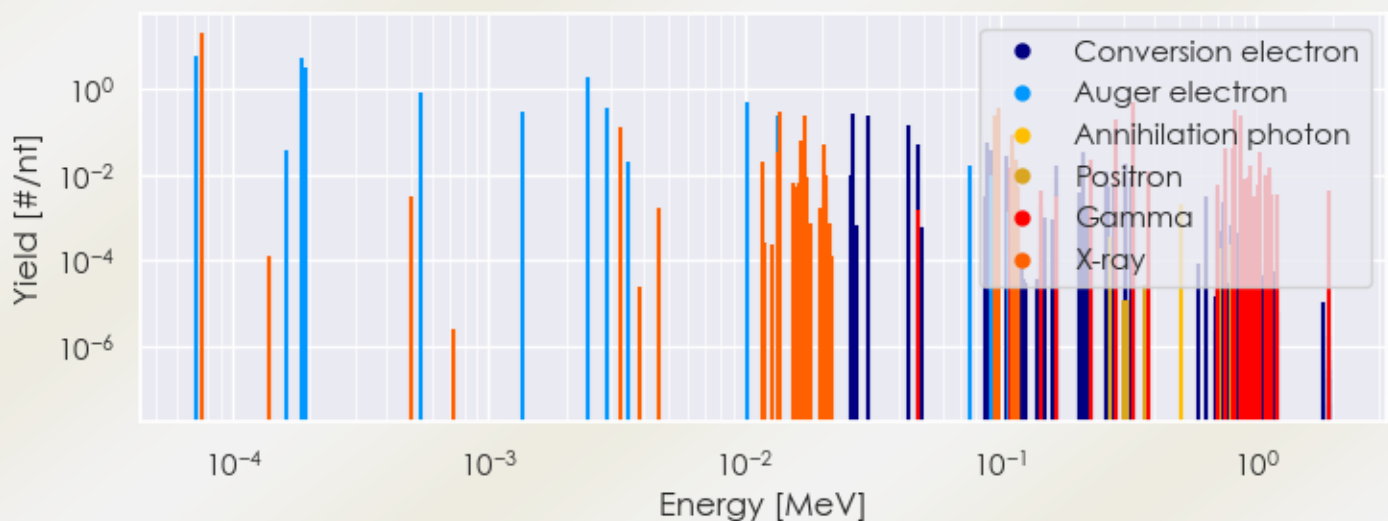
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



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

SUMMARY SPECTRA (PLOT)

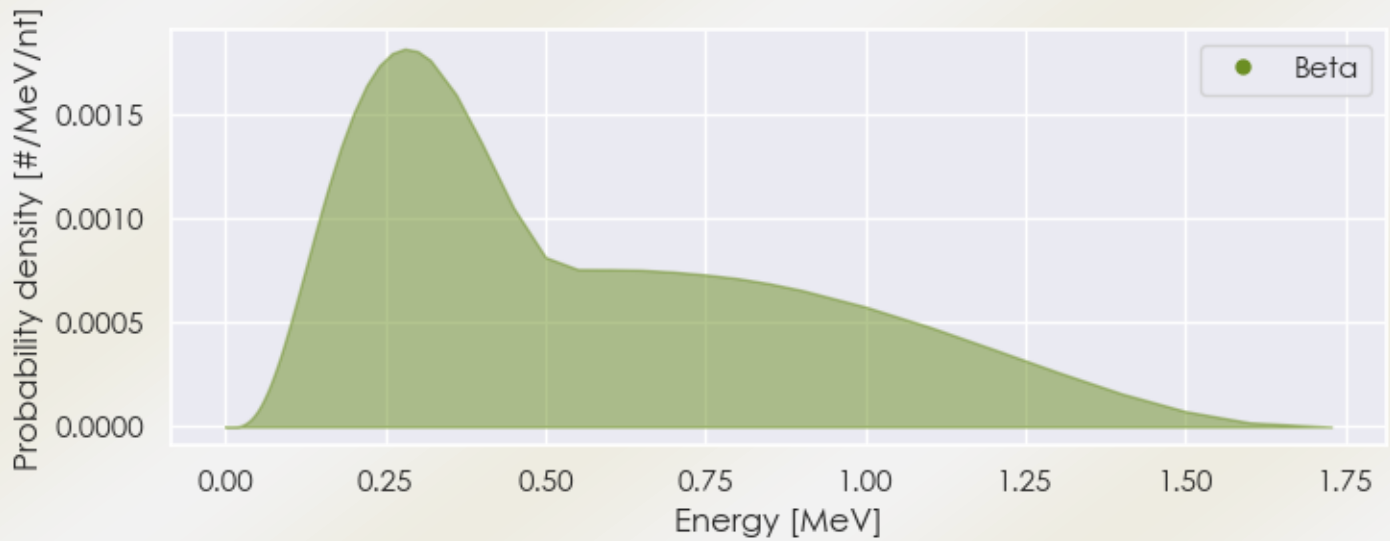
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



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

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
7.54888e-05	2.175e+01	X-ray
3.25416e-03	1.327e-01	X-ray
1.16607e-02	2.101e-02	X-ray
1.34452e-02	3.424e-02	X-ray
1.36268e-02	3.008e-01	X-ray
1.64468e-02	6.308e-02	X-ray
1.65865e-02	1.083e-02	X-ray
1.70780e-02	1.193e-02	X-ray
1.73072e-02	2.354e-01	X-ray
2.02658e-02	5.331e-02	X-ray

2.09317e-02	1.032e-02	X-ray
9.50660e-02	2.422e-01	X-ray
9.89281e-02	3.875e-01	X-ray
1.08997e-01	1.523e-02	Gamma
1.10929e-01	4.468e-02	X-ray
1.11820e-01	8.738e-02	X-ray
1.14846e-01	1.117e-02	X-ray
1.15080e-01	2.260e-02	X-ray
2.23600e-01	2.236e-02	Gamma
2.82000e-01	1.976e-01	Gamma
3.27300e-01	5.200e-01	Gamma
3.77000e-01	1.248e-02	Gamma
7.55000e-01	4.212e-02	Gamma
8.14800e-01	4.108e-02	Gamma
8.19500e-01	3.328e-01	Gamma
8.64300e-01	2.028e-01	Gamma
8.67200e-01	2.444e-01	Gamma
9.41600e-01	1.612e-02	Gamma
1.03740e+00	3.276e-02	Gamma
1.12600e+00	1.456e-02	Gamma
7.21936e-05	5.861e+00	Auger electron
1.63006e-04	3.738e-02	Auger electron
1.85791e-04	5.739e+00	Auger electron
1.92311e-04	3.275e+00	Auger electron
5.37822e-04	8.453e-01	Auger electron
1.35608e-03	2.901e-01	Auger electron
2.43638e-03	1.897e+00	Auger electron
2.90698e-03	3.560e-01	Auger electron
3.52401e-03	2.093e-02	Auger electron
1.01662e-02	4.815e-01	Auger electron
1.34915e-02	2.447e-01	Auger electron
1.68500e-02	2.928e-02	Auger electron
2.65300e-02	2.776e-01	Conversion electron
3.03920e-02	2.414e-01	Conversion electron
4.32844e-02	1.463e-01	Conversion electron
4.75740e-02	5.146e-02	Conversion electron
7.54320e-02	1.669e-02	Auger electron
8.79530e-02	5.900e-02	Conversion electron

9.18150e-02	3.883e-02	Conversion electron
1.04707e-01	2.821e-02	Conversion electron
1.65890e-01	1.676e-02	Conversion electron
2.11190e-01	3.344e-02	Conversion electron
2.60956e-01	1.261e-02	Conversion electron
3.06256e-01	1.814e-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/SNMML-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6