

PU-234 (8.8h) ECA	PU-235 (25.3m) ECA	PU-236 (2.858y) A SF	PU-237 (45.2d)	PU-238 (87.7y) A SF	PU-239 (2.411E+4y) A	PU-240 (6564y) A SF	PU-241 (14.35y) B-A	
Np-232 (14.7m) CB+	Np-233 (36.2m) ECA	Np-234 (4.4d) ECB+	Np-235 (3.95y) EC	Np-236m (22.5h) ECB-	Np-237 (2.14y) A	Np-238 (2.117d) B-	Np-239 (2.3565d) B-	Np-240 (61.9m) B-
U-231 (4.2d) CA	U-232 (68.9y) A	U-233 (1.592E+5y) A	U-234 (2.455E+5y) A	U-235 (7.04E+8y) A	U-236 (2.34E+7y) A	U-237 (6.75d) B-	U-238 (4.468E+9y) A SF	U-239 (23.45m) B-

NEPTUNIUM-236M

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Np-236m

Atomic number (Z): 93

Mass number (A): 236

Neutron number (N): 143

RADIOACTIVE DECAY

Decay modes: β^- , Electron capture

Half-life: 22.5 [h]

Decay constant: 8.5574×10^{-6} [1/s]

Daughters: U-236 (52.0%), Pu-236 (48.0%)

Radioactive daughters: U-236, Pu-236

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]

Mean electron energy: 0.08802 [MeV]

Mean photon energy: 0.05066 [MeV]

Air kerma rate constant, Γ_{10} : 7.967×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]

Air kerma coefficient, K_{air} : 7.967×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]

Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.410×10^{-14} [Gy $\cdot$ kg/Bq $\cdot$ s]

Equilibrium dose constant for alphas, Δ_{α} : 0.000×10^0 [Gy $\cdot$ kg/Bq $\cdot$ s]

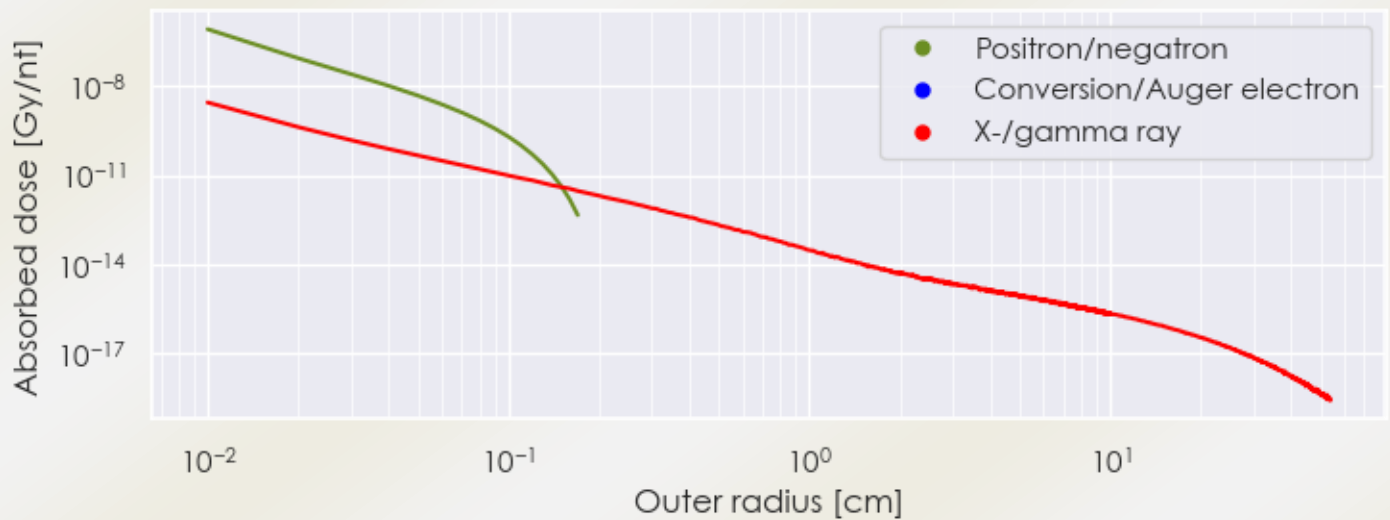
Equilibrium dose constant for betas/electrons, $\Delta_{\beta,\beta^+,e^-}$: 1.410×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 8.117×10^{-15} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

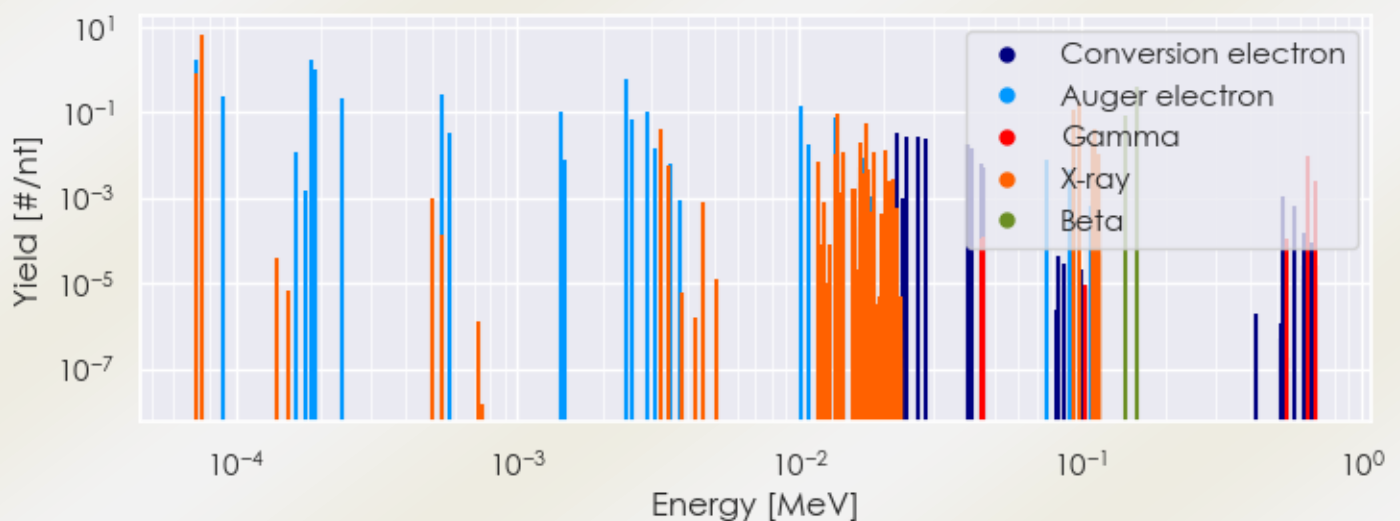
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Np-236m DPK.csv

SUMMARY SPECTRA (PLOT)

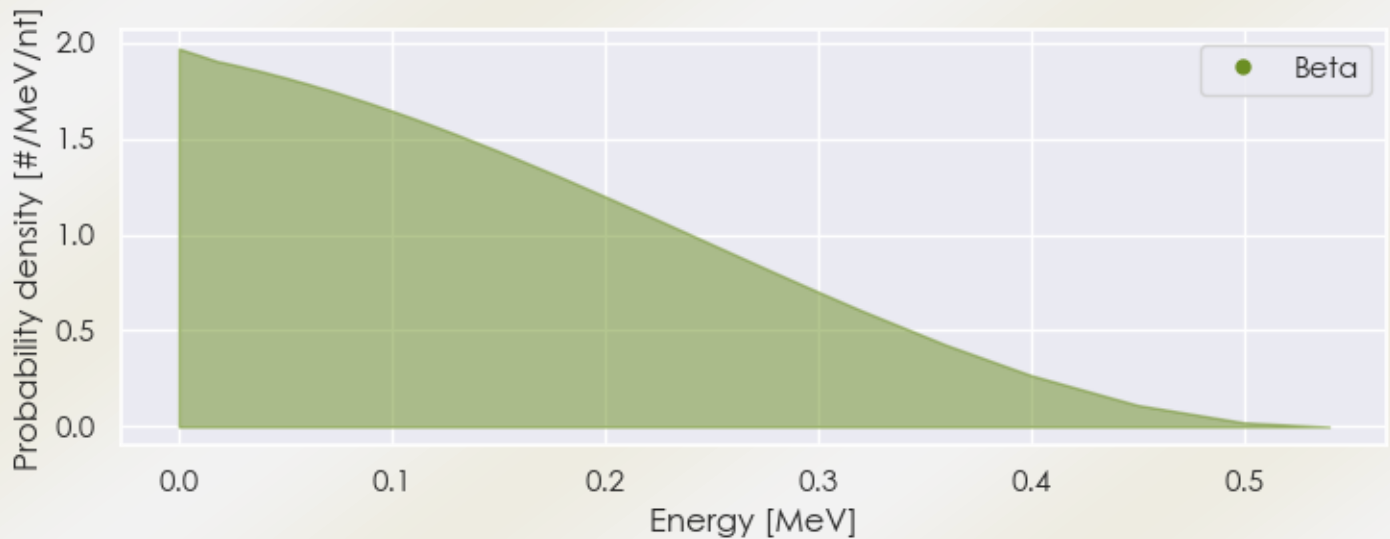
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Np-236m 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-236m 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-236m Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
7.20459e-05	8.275e-01	X-ray
7.54646e-05	6.620e+00	X-ray
3.24997e-03	4.033e-02	X-ray
1.34452e-02	1.093e-02	X-ray
1.36268e-02	9.599e-02	X-ray
1.42941e-02	1.115e-02	X-ray
1.64468e-02	2.013e-02	X-ray
1.73072e-02	5.779e-02	X-ray
1.83932e-02	1.198e-02	X-ray

2.02658e-02	1.309e-02	X-ray
9.50660e-02	1.131e-01	X-ray
9.89281e-02	1.809e-01	X-ray
1.10929e-01	2.087e-02	X-ray
1.11820e-01	4.081e-02	X-ray
1.15080e-01	1.056e-02	X-ray
1.44405e-01	8.300e-02	Beta
1.59016e-01	3.970e-01	Beta
7.22012e-05	1.785e+00	Auger electron
8.91208e-05	2.265e-01	Auger electron
1.62919e-04	1.138e-02	Auger electron
1.85399e-04	1.746e+00	Auger electron
1.91649e-04	1.292e-01	Auger electron
1.92204e-04	9.923e-01	Auger electron
2.36973e-04	2.171e-01	Auger electron
5.35973e-04	2.582e-01	Auger electron
5.73608e-04	3.351e-02	Auger electron
1.42537e-03	1.046e-01	Auger electron
2.43117e-03	5.778e-01	Auger electron
2.56520e-03	7.105e-02	Auger electron
2.90043e-03	1.083e-01	Auger electron
3.09862e-03	1.459e-02	Auger electron
1.00799e-02	1.475e-01	Auger electron
1.07769e-02	1.758e-02	Auger electron
1.34002e-02	7.488e-02	Auger electron
2.22590e-02	3.197e-02	Conversion electron
2.42360e-02	2.762e-02	Conversion electron
2.65590e-02	2.736e-02	Conversion electron
2.80980e-02	2.433e-02	Conversion electron
4.00801e-02	1.691e-02	Conversion electron
4.09904e-02	1.463e-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