

	Pr-135 (107s) ECB+		Pr-136 (4.15m) ECB+	Pr-137 (9.2s) ECB+	
N (8) EC	Nd-135 (12.4m) ECB+	Nd-136 (50d) ECB+	Nd-137 (38.5m) ECB+	Nd-138 (5.04h) EC	Nd-139 (29.7m) ECB+
	Pr-135 (24m) ECB+	Pr-136 (13.1m) ECB+	Pr-137 (1.28h) ECB+	Pr-138 (1.45m) ECB+	

NEODYMIUM-135

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Nd-135
Atomic number (Z): 60
Mass number (A): 135
Neutron number (N): 75

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 12.4 [m]
Decay constant: $9.3165\text{e-}04$ [1/s]
Daughters: Pr-135 (100.0%)
Radioactive daughters: Pr-135

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 1.05508 [MeV]
Mean photon energy: 1.26172 [MeV]
Air kerma rate constant, Γ_{10} : $2.290\text{e-}17$ [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : $4.872\text{e-}17$ [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $1.690\text{e-}13$ [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : $0.000\text{e+}00$ [Gy $\cdot$ kg/Bq $\cdot$ s]

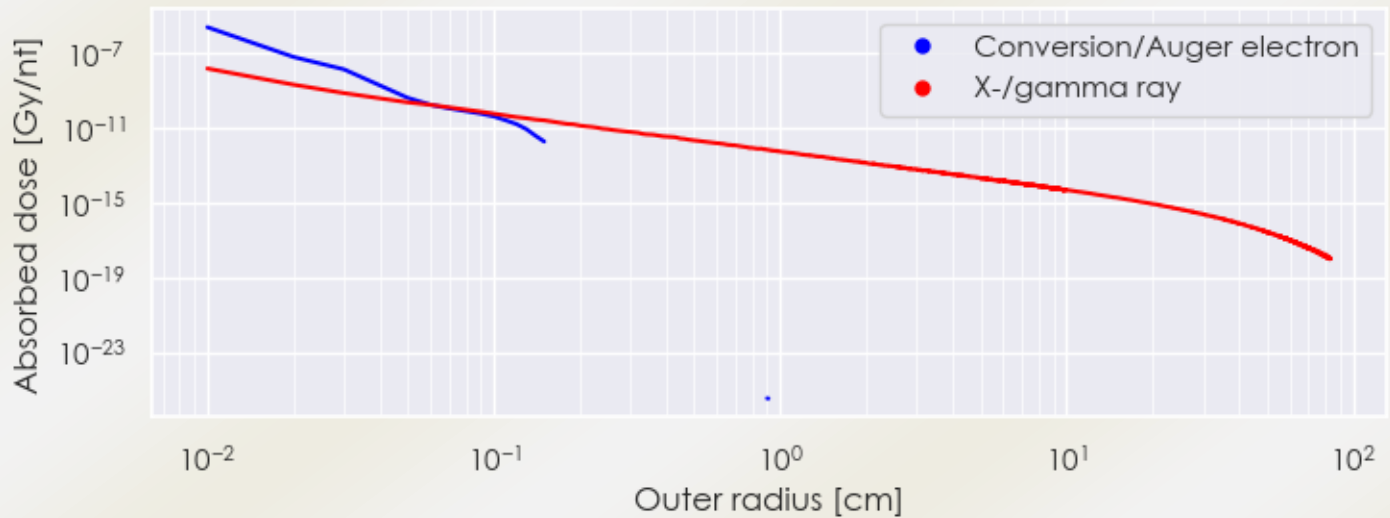
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-, \beta+, e-}$: 1.690×10^{-13} [Gy · kg/Bq · s]

Equilibrium dose constant for photons, Δ_p : 2.022×10^{-13} [Gy · kg/Bq · s]

DOSE POINT KERNELS (PLOT)

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

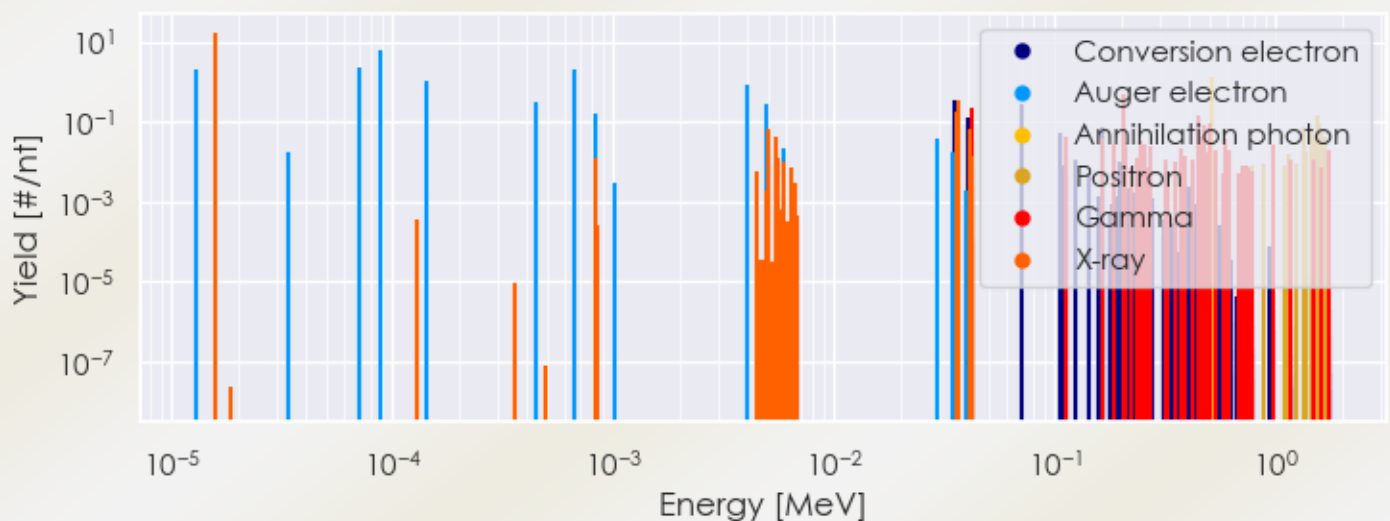
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Nd-135 DPK.csv

SUMMARY SPECTRA (PLOT)

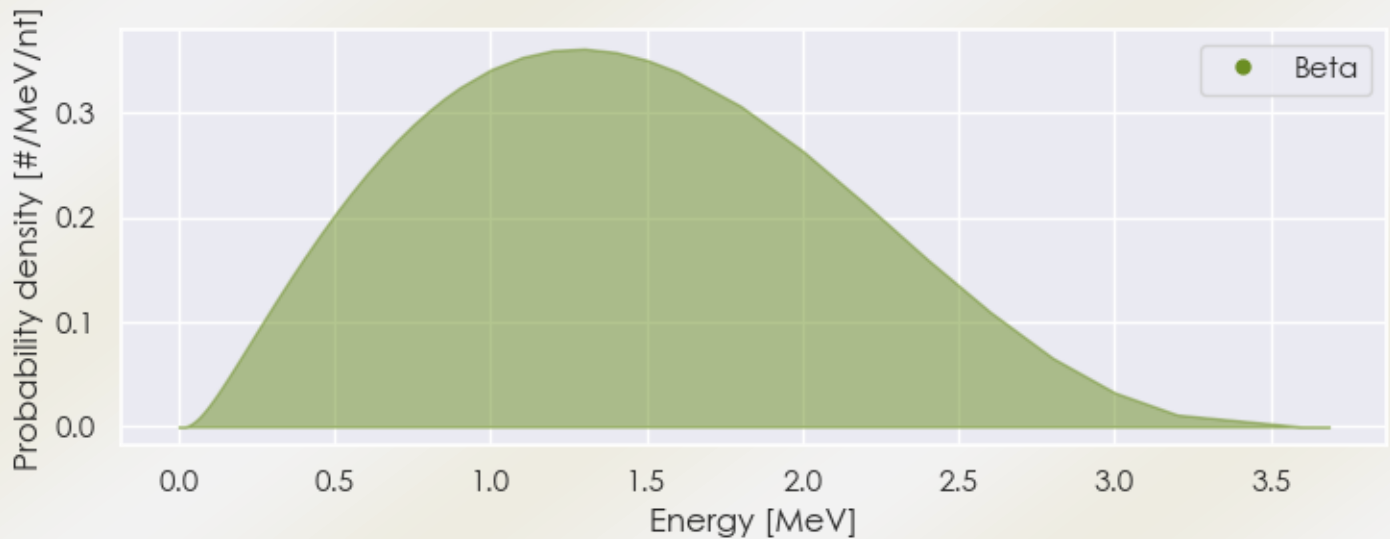
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Nd-135 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/Nd-135 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/Nd-135 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.56414e-05	1.735e+01	X-ray
8.20379e-04	1.273e-02	X-ray
5.01954e-03	6.411e-02	X-ray
5.48691e-03	4.399e-02	X-ray
5.57140e-03	1.310e-02	X-ray
5.83581e-03	1.049e-02	X-ray
3.55671e-02	1.812e-01	X-ray
3.60557e-02	3.308e-01	X-ray
4.06843e-02	3.242e-02	X-ray
4.07816e-02	6.277e-02	X-ray

4.14800e-02	2.232e-01	Gamma
4.17904e-02	1.348e-02	X-ray
1.12620e-01	4.464e-02	Gamma
1.64700e-01	3.968e-02	Gamma
1.85070e-01	2.728e-02	Gamma
2.04090e-01	4.960e-01	Gamma
2.06000e-01	2.976e-02	Gamma
2.33400e-01	1.240e-02	Gamma
2.45400e-01	3.373e-02	Gamma
2.56100e-01	2.629e-02	Gamma
2.71900e-01	2.430e-02	Gamma
3.16700e-01	1.091e-02	Gamma
3.72800e-01	2.232e-02	Gamma
3.85900e-01	1.438e-02	Gamma
4.15000e-01	1.091e-02	Gamma
4.41100e-01	1.428e-01	Gamma
4.51900e-01	4.216e-02	Gamma
4.75800e-01	8.184e-02	Gamma
4.82600e-01	1.686e-02	Gamma
4.93400e-01	1.438e-02	Gamma
5.01600e-01	9.622e-02	Gamma
5.11000e-01	1.334e+00	Annihilation photon
5.31900e-01	1.934e-02	Gamma
5.93700e-01	3.770e-02	Gamma
6.16500e-01	1.885e-02	Gamma
9.66600e-01	2.579e-02	Gamma
1.17210e+00	1.091e-02	Gamma
1.48070e+00	1.141e-02	Gamma
1.75200e+00	1.984e-02	Gamma
1.14826e+00	1.618e-02	Positron
1.15992e+00	1.112e-02	Positron
1.32603e+00	7.482e-02	Positron
1.33616e+00	1.820e-02	Positron
1.37723e+00	1.820e-02	Positron
1.44470e+00	4.448e-02	Positron
1.45669e+00	6.471e-02	Positron
1.46785e+00	4.347e-02	Positron
1.53080e+00	1.415e-01	Positron

1.58333e+00	9.099e-02	Positron
1.60171e+00	5.055e-02	Positron
1.66827e+00	4.044e-02	Positron
1.29601e-05	2.041e+00	Auger electron
3.35201e-05	1.657e-02	Auger electron
7.10453e-05	2.170e+00	Auger electron
8.70561e-05	6.105e+00	Auger electron
1.42931e-04	1.023e+00	Auger electron
4.41119e-04	3.280e-01	Auger electron
6.69828e-04	2.148e+00	Auger electron
8.31102e-04	1.530e-01	Auger electron
4.05100e-03	8.175e-01	Auger electron
4.96052e-03	2.733e-01	Auger electron
5.90762e-03	2.258e-02	Auger electron
2.93378e-02	3.691e-02	Auger electron
3.45832e-02	1.756e-02	Auger electron
3.46802e-02	3.401e-01	Conversion electron
3.50371e-02	1.088e-01	Conversion electron
3.55256e-02	1.110e-01	Conversion electron
4.02516e-02	1.213e-01	Conversion electron
4.14800e-02	3.303e-02	Conversion electron
7.06100e-02	2.929e-01	Conversion electron
1.05820e-01	5.077e-02	Conversion electron
1.11392e-01	1.440e-02	Conversion electron
1.22690e-01	1.089e-02	Conversion electron
1.62080e-01	7.604e-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