



III-138 (107s) CB+		III-139 (4.15m) ECB+	III-140 (9.2s) ECB+	III-141 (20.90m) ECB+	III-142 (40.5s) ECB+	III-143 (265d) EC	III-144 (363d) EC
Nd-135 (12.4m) CB+	Nd-136 (50.65m) ECB+	Nd-137 (38.5m) ECB+	Nd-139m (5.50h) ECB+IT	Nd-140 (3.3h) ECB+	Nd-141 (2.49h) ECB+	Nd-142 (STABLE)	Nd-143 (STABLE)
Pr-134 (11m) CB+	Pr-135 (24m) ECB+	Pr-136 (13.1m) ECB+	Pr-137 (1.28h) ECB+	Pr-139 (4.41h) ECB+	Pr-140 (3.39m) ECB+	Pr-141 (STABLE)	Pr-142 (19.12h) B-EC

NEODYMIUM-139M

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Nd-139m
Atomic number (Z): 60
Mass number (A): 139
Neutron number (N): 79

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture, Internal transition
Half-life: 5.5 [h]
Decay constant: 3.5007×10^{-5} [1/s]
Daughters: Pr-139 (88.2%), Nd-139 (11.8%)
Radioactive daughters: Pr-139, Nd-139

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.0795 [MeV]
Mean photon energy: 1.58523 [MeV]
Air kerma rate constant, Γ_{10} : 5.887×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 5.941×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.274×10^{-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, $\Delta_{\beta,\beta^+,e^-}$: 1.274e-14 [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 2.540e-13 [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

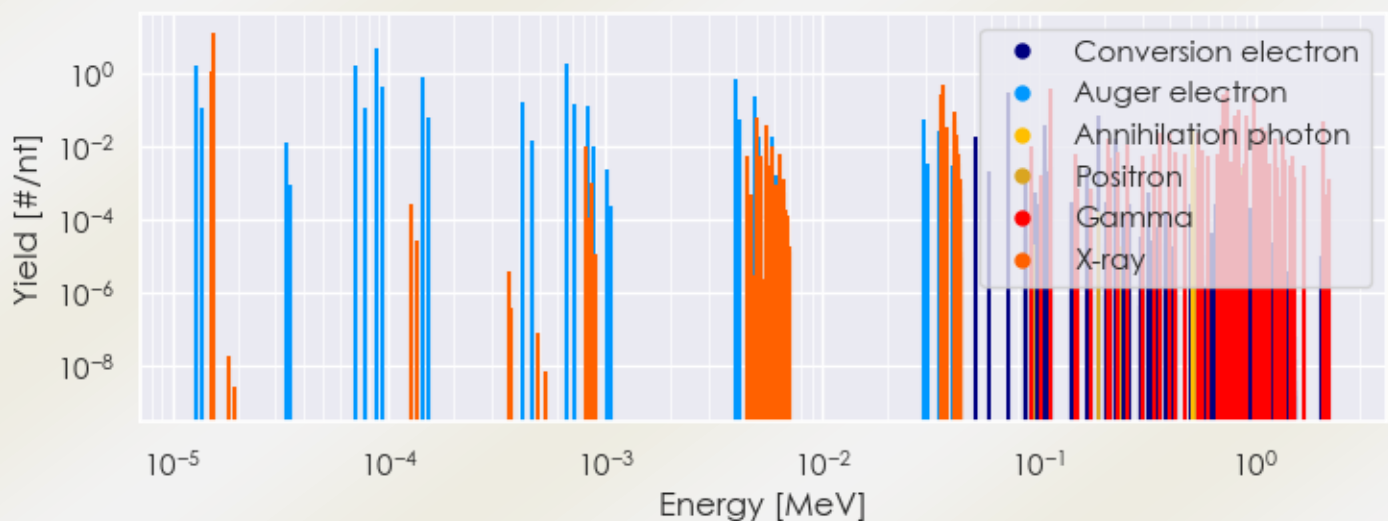
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Nd-139m DPK.csv

SUMMARY SPECTRA (PLOT)

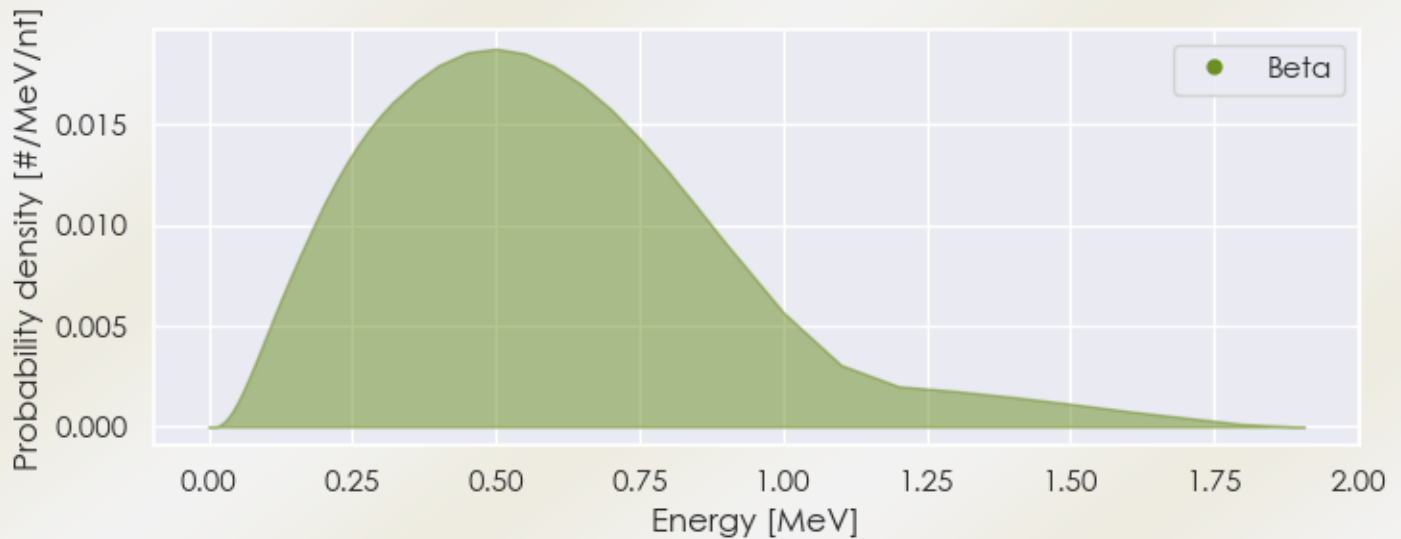
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Nd-139m 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-139m 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-139m Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.51905e-05	1.154e+00	X-ray
1.56197e-05	1.423e+01	X-ray
8.16946e-04	1.084e-02	X-ray
5.01953e-03	6.331e-02	X-ray
5.48692e-03	3.872e-02	X-ray
5.83581e-03	1.036e-02	X-ray
3.55671e-02	2.841e-01	X-ray
3.60557e-02	5.188e-01	X-ray
3.68696e-02	1.869e-02	X-ray

3.73962e-02	3.404e-02	X-ray
4.06843e-02	5.084e-02	X-ray
4.07816e-02	9.844e-02	X-ray
4.17693e-02	1.087e-02	X-ray
4.17904e-02	2.114e-02	X-ray
9.29100e-02	1.023e-02	Gamma
1.13870e-01	3.987e-01	Gamma
2.09650e-01	1.799e-02	Gamma
2.54600e-01	1.200e-02	Gamma
3.62420e-01	2.328e-02	Gamma
4.03750e-01	2.399e-02	Gamma
5.11000e-01	2.789e-02	Annihilation photon
5.47650e-01	2.364e-02	Gamma
7.01200e-01	4.163e-02	Gamma
7.08100e-01	2.639e-01	Gamma
7.38200e-01	3.528e-01	Gamma
7.96500e-01	4.198e-02	Gamma
8.02000e-01	6.985e-02	Gamma
8.09600e-01	6.350e-02	Gamma
8.22100e-01	1.729e-02	Gamma
8.27800e-01	1.034e-01	Gamma
9.10100e-01	7.620e-02	Gamma
9.82200e-01	2.639e-01	Gamma
1.00620e+00	3.210e-02	Gamma
1.01230e+00	2.752e-02	Gamma
1.02490e+00	1.517e-02	Gamma
1.07520e+00	3.493e-02	Gamma
1.10530e+00	2.717e-02	Gamma
1.21960e+00	1.658e-02	Gamma
1.22670e+00	1.341e-02	Gamma
1.32230e+00	1.870e-02	Gamma
2.06090e+00	4.798e-02	Gamma
1.29601e-05	1.663e+00	Auger electron
1.36628e-05	1.158e-01	Auger electron
3.35201e-05	1.350e-02	Auger electron
7.04634e-05	1.777e+00	Auger electron
7.83128e-05	1.170e-01	Auger electron
8.71964e-05	4.999e+00	Auger electron

9.39393e-05	4.387e-01	Auger electron
1.42897e-04	7.906e-01	Auger electron
1.50770e-04	6.826e-02	Auger electron
4.15468e-04	1.675e-01	Auger electron
4.53432e-04	1.519e-02	Auger electron
6.67631e-04	1.840e+00	Auger electron
7.11163e-04	1.537e-01	Auger electron
8.25811e-04	1.301e-01	Auger electron
8.74710e-04	1.058e-02	Auger electron
3.99723e-03	7.045e-01	Auger electron
4.14827e-03	5.800e-02	Auger electron
4.90056e-03	2.346e-01	Auger electron
5.09992e-03	1.950e-02	Auger electron
5.83721e-03	1.923e-02	Auger electron
2.93378e-02	5.789e-02	Auger electron
3.45832e-02	2.753e-02	Auger electron
5.09000e-02	1.914e-02	Conversion electron
7.18600e-02	3.113e-01	Conversion electron
1.07070e-01	3.918e-02	Conversion electron
1.87553e-01	7.077e-02	Conversion electron
2.24057e-01	1.614e-02	Conversion electron
2.24949e-01	1.057e-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