



	Nb-87 (3.75m) ECB+	Nb-89 (2.03h) ECB+	Nb-90 (14.60h) ECB+	Nb-91 (680y) ECB+
Zr-86 (7.86m) ECB+	Zr-87 (1.68h) ECB+	Zr-88 (83.4d) EC	Zr-89 (78.41h) ECB+	Zr-90 (STABLE)

NIOBIUM-87

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Nb-87
Atomic number (Z): 41
Mass number (A): 87
Neutron number (N): 46

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 3.75 [m]
Decay constant: 3.0807×10^{-3} [1/s]
Daughters: Zr-87 (100.0%)
Radioactive daughters: Zr-87

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 1.77093 [MeV]
Mean photon energy: 1.22021 [MeV]
Air kerma rate constant, Γ_{10} : 1.753×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 5.475×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 2.837×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000e+00 [Gy $\cdot$ kg/Bq $\cdot$ s]

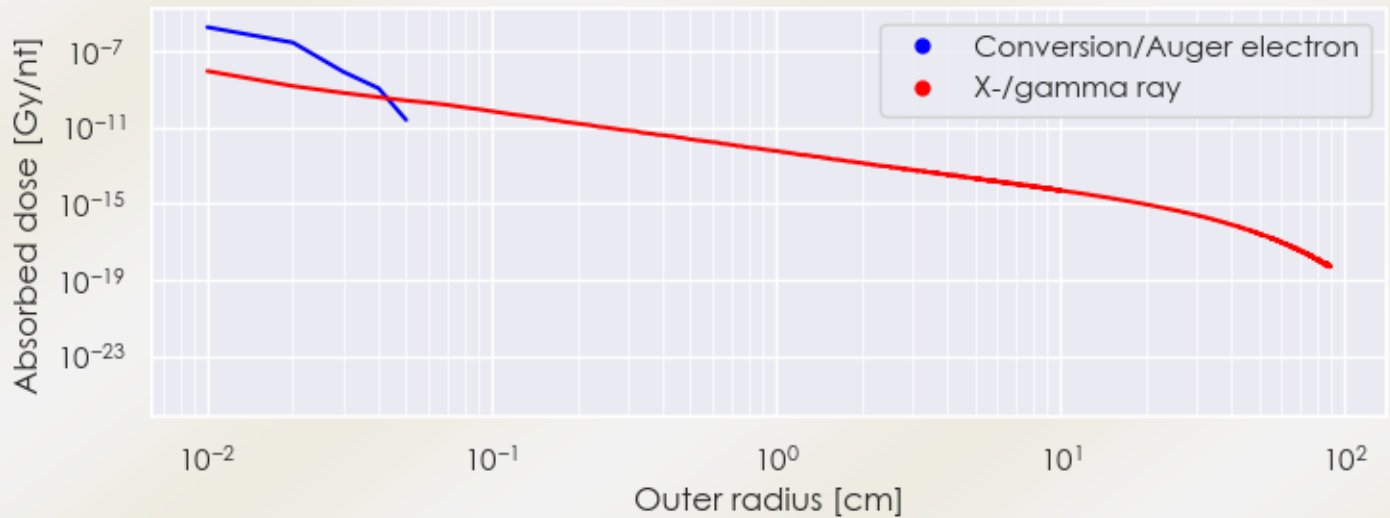
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-\beta^+,e^-}$: 2.837×10^{-13} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.955×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

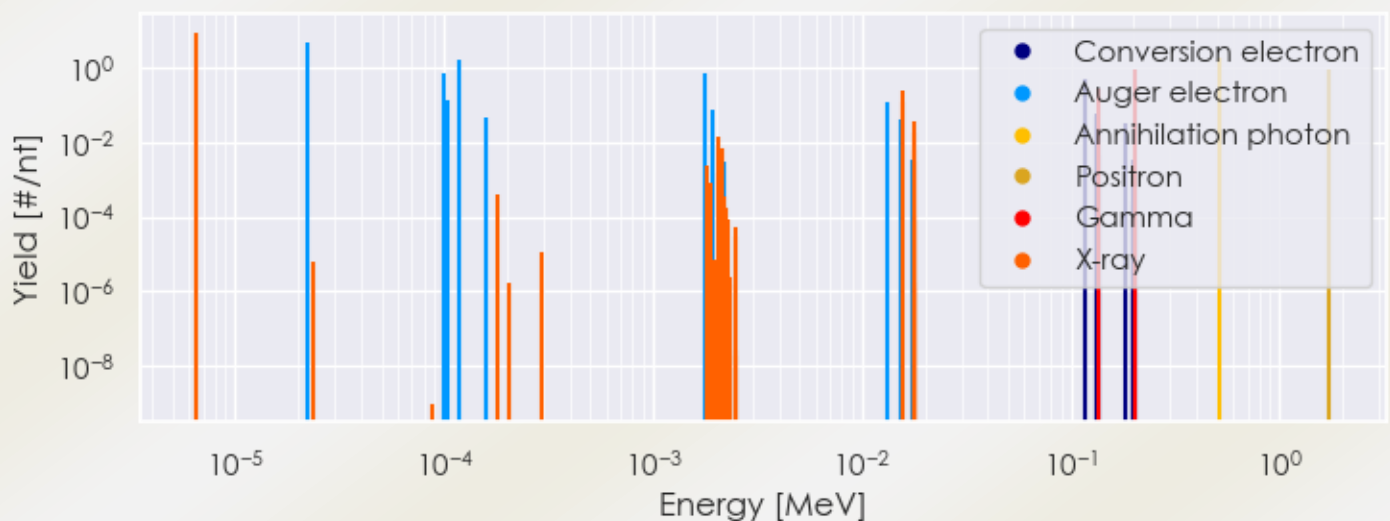
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Nb-87 DPK.csv

SUMMARY SPECTRA (PLOT)

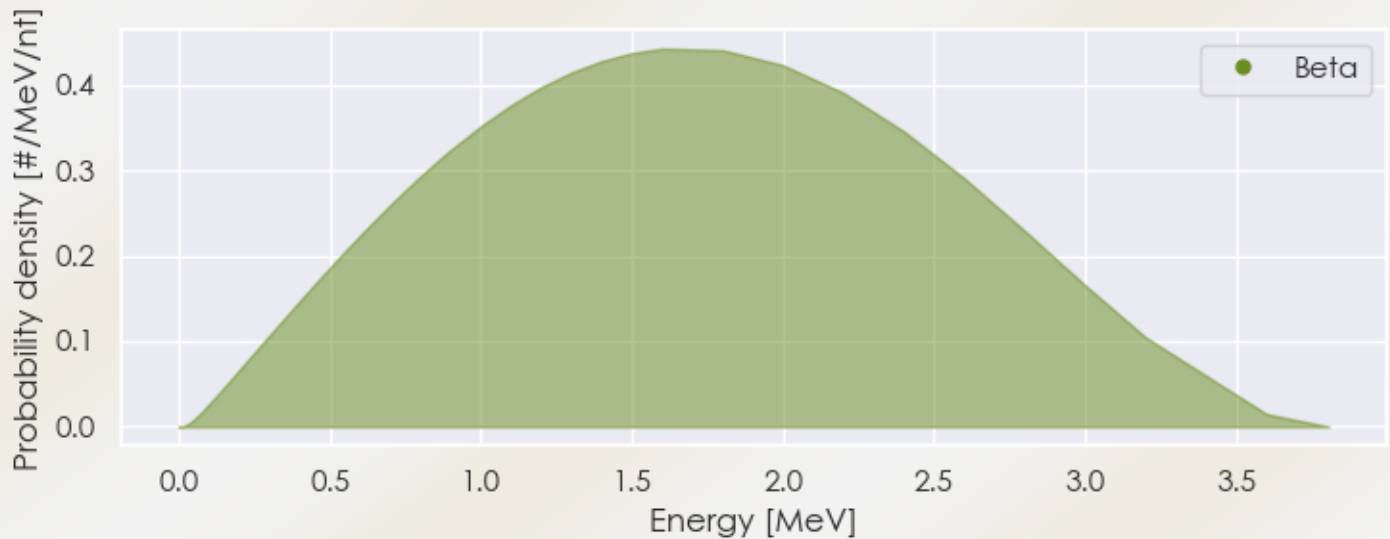
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Nb-87 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/Nb-87 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/Nb-87 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
6.52422e-06	9.299e+00	X-ray
2.03430e-03	1.380e-02	X-ray
1.56498e-02	1.275e-01	X-ray
1.57372e-02	2.440e-01	X-ray
1.76171e-02	1.924e-02	X-ray
1.76312e-02	3.747e-02	X-ray
1.35060e-01	2.720e-01	Gamma
2.01150e-01	9.640e-01	Gamma
5.11000e-01	1.923e+00	Annihilation photon
1.73910e+00	9.613e-01	Positron

2.22429e-05	4.928e+00	Auger electron
9.88463e-05	7.419e-01	Auger electron
1.02759e-04	1.335e-01	Auger electron
1.17827e-04	1.688e+00	Auger electron
1.57973e-04	4.979e-02	Auger electron
1.75436e-03	7.078e-01	Auger electron
1.94459e-03	7.927e-02	Auger electron
1.33271e-02	1.184e-01	Auger electron
1.53342e-02	4.217e-02	Auger electron
1.17098e-01	5.366e-01	Conversion electron
1.32545e-01	4.863e-02	Conversion electron
1.32748e-01	5.254e-02	Conversion electron
1.32835e-01	5.762e-02	Conversion electron
1.34729e-01	2.879e-02	Conversion electron
1.83188e-01	3.151e-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