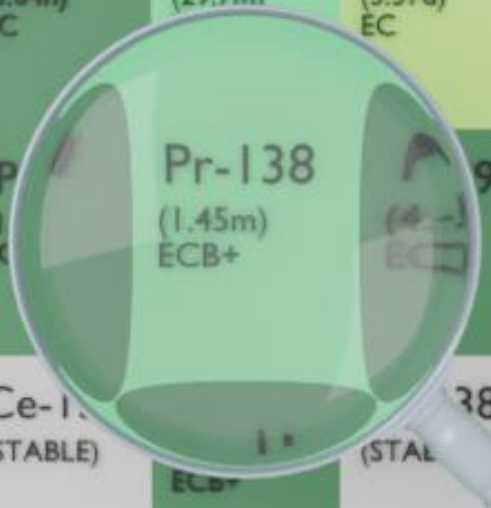




Pr-134 (11m) ECB+	Pr-135 (24m) ECB+	Pr-136 (13.1m) ECB+	Pr-138 (1.45m) ECB+	Pr-140 (3.39m) ECB+	Pr-141 (STABLE)	Pr-142 (19.12h) B-EC
Ce-133 (77m) CB+	Ce-134 (3.16d) EC	Ce-135 (17.7h) ECB+	Ce-138 (STABLE)	Ce-139 (137.641d) EC	Ce-140 (STABLE)	Ce-144 (32.508d) B-

PRASEODYMIUM-138

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Pr-138
Atomic number (Z): 59
Mass number (A): 138
Neutron number (N): 79

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 1.45 [m]
Decay constant: $7.9672\text{e-}03$ [1/s]
Daughters: Ce-138 (100.0%)
Radioactive daughters: None

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 1.16169 [MeV]
Mean photon energy: 0.81529 [MeV]
Air kerma rate constant, Γ_{10} : $2.285\text{e-}18$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Air kerma coefficient, K_{air} : $3.132\text{e-}17$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $1.861\text{e-}13$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for alphas, Δ_{α} : $0.000\text{e+}00$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]

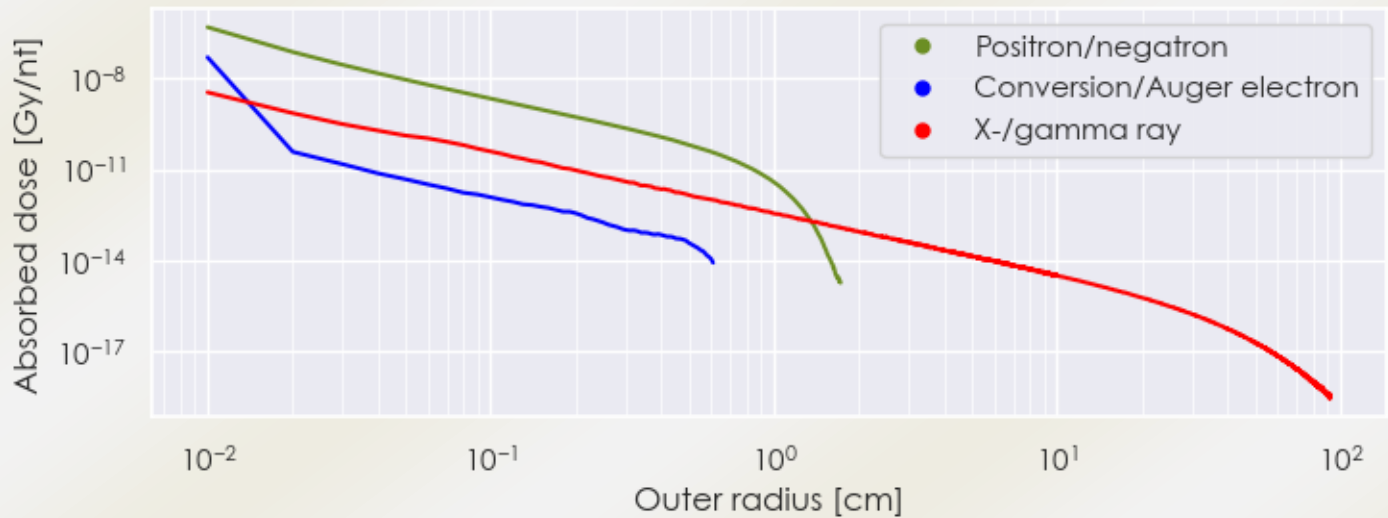
Equilibrium dose constant for betas/electrons, $\Delta_{\beta,\beta^+,e^-}$: 1.861×10^{-13} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.306×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

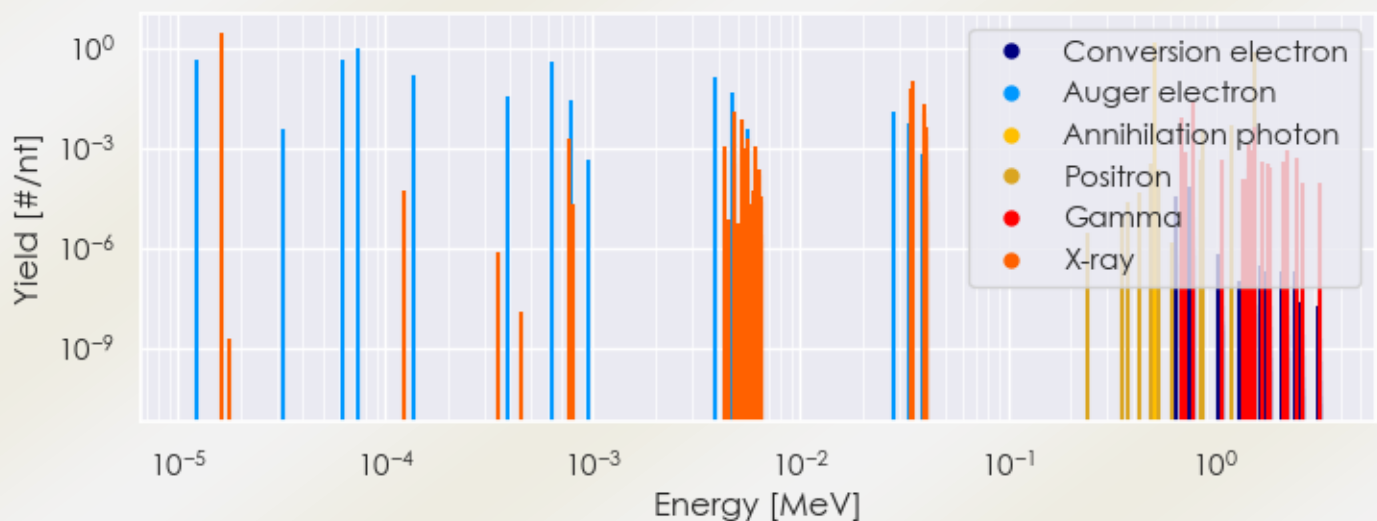
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Pr-138 DPK.csv

SUMMARY SPECTRA (PLOT)

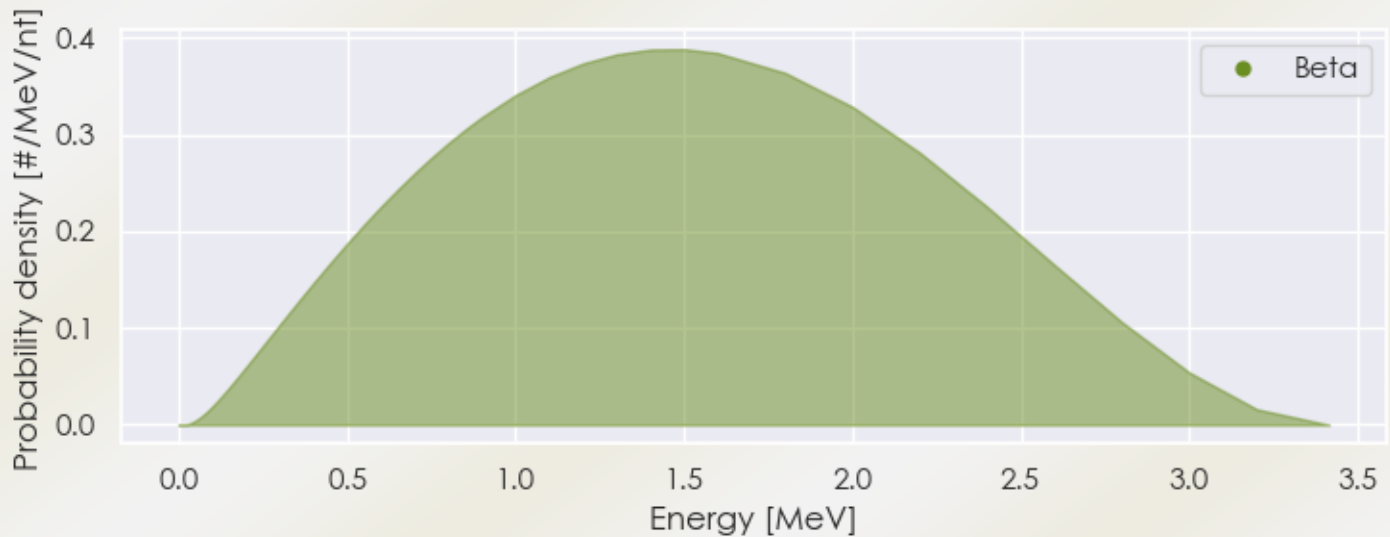
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Pr-138 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/Pr-138 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/Pr-138 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.61261e-05	2.934e+00	X-ray
4.82666e-03	1.174e-02	X-ray
3.42907e-02	5.569e-02	X-ray
3.47432e-02	1.020e-01	X-ray
3.92855e-02	1.921e-02	X-ray
5.11000e-01	1.500e+00	Annihilation photon
7.88700e-01	2.400e-02	Gamma
1.55223e+00	7.412e-01	Positron
1.22653e-05	4.169e-01	Auger electron
6.25444e-05	4.529e-01	Auger electron

7.40121e-05	9.856e-01	Auger electron
1.35104e-04	1.540e-01	Auger electron
3.89050e-04	3.287e-02	Auger electron
6.26809e-04	3.621e-01	Auger electron
7.79413e-04	2.625e-02	Auger electron
3.85066e-03	1.399e-01	Auger electron
4.70723e-03	4.607e-02	Auger electron
2.83188e-02	1.204e-02	Auger 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