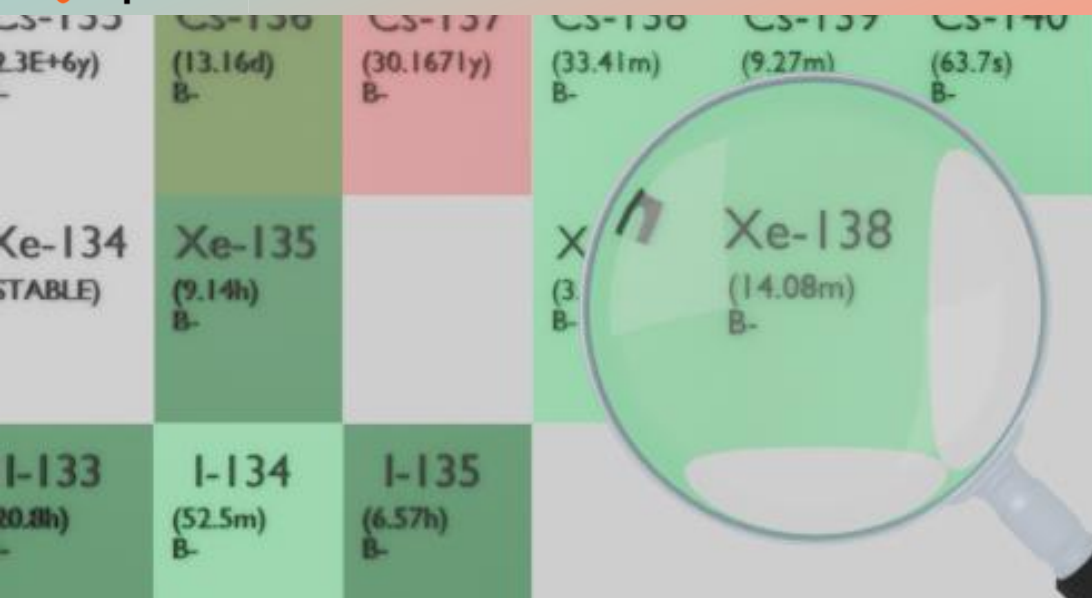




XENON-138

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Xe-138
Atomic number (Z): 54
Mass number (A): 138
Neutron number (N): 84

RADIOACTIVE DECAY

Decay modes: β^-
Half-life: 14.08 [m]
Decay constant: 8.2049×10^{-4} [1/s]
Daughters: Cs-138 (100.0%)
Radioactive daughters: Cs-138

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.65964 [MeV]
Mean photon energy: 1.12218 [MeV]
Air kerma rate constant, Γ_{10} : 3.646×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 3.646×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.057×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000×10^0 [Gy $\cdot$ kg/Bq $\cdot$ s]

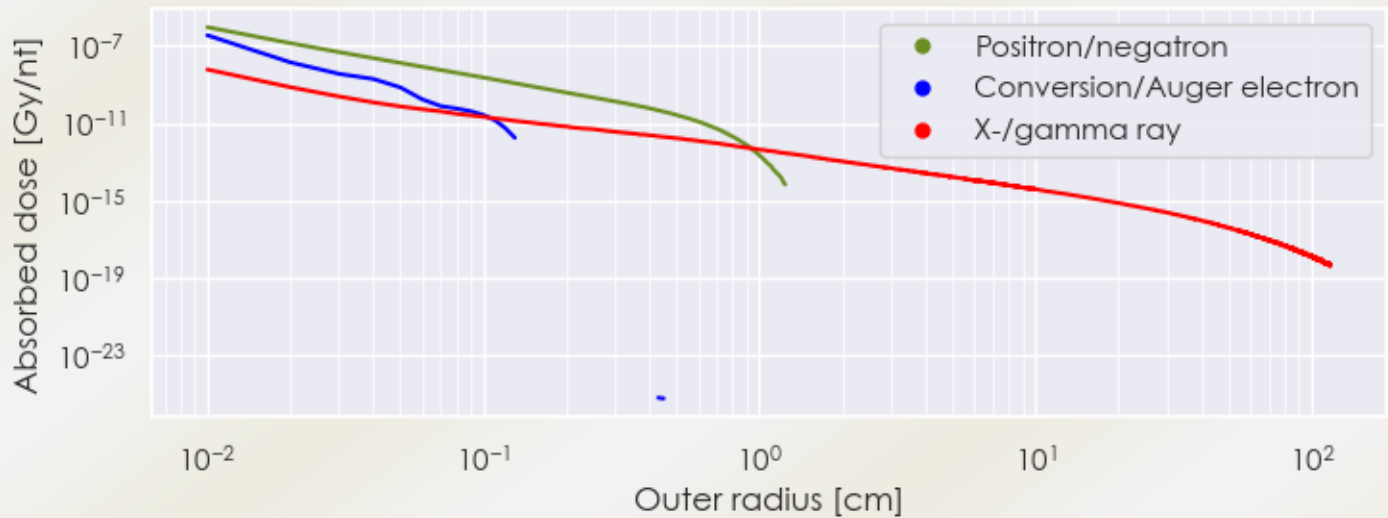
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 1.057×10^{-13} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.798×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

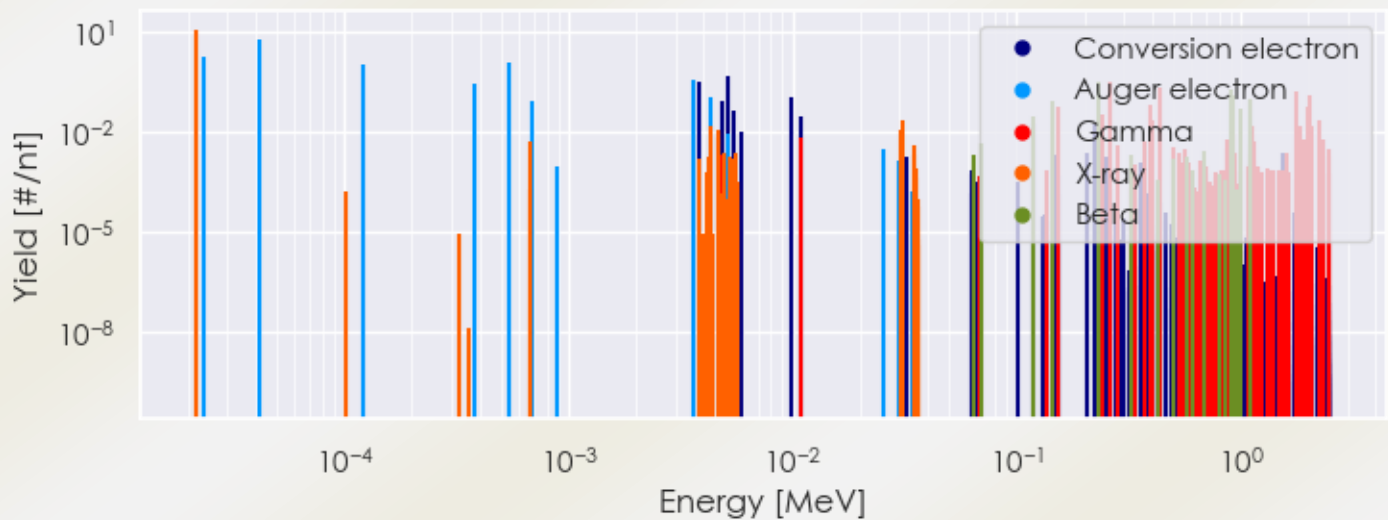
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



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

SUMMARY SPECTRA (PLOT)

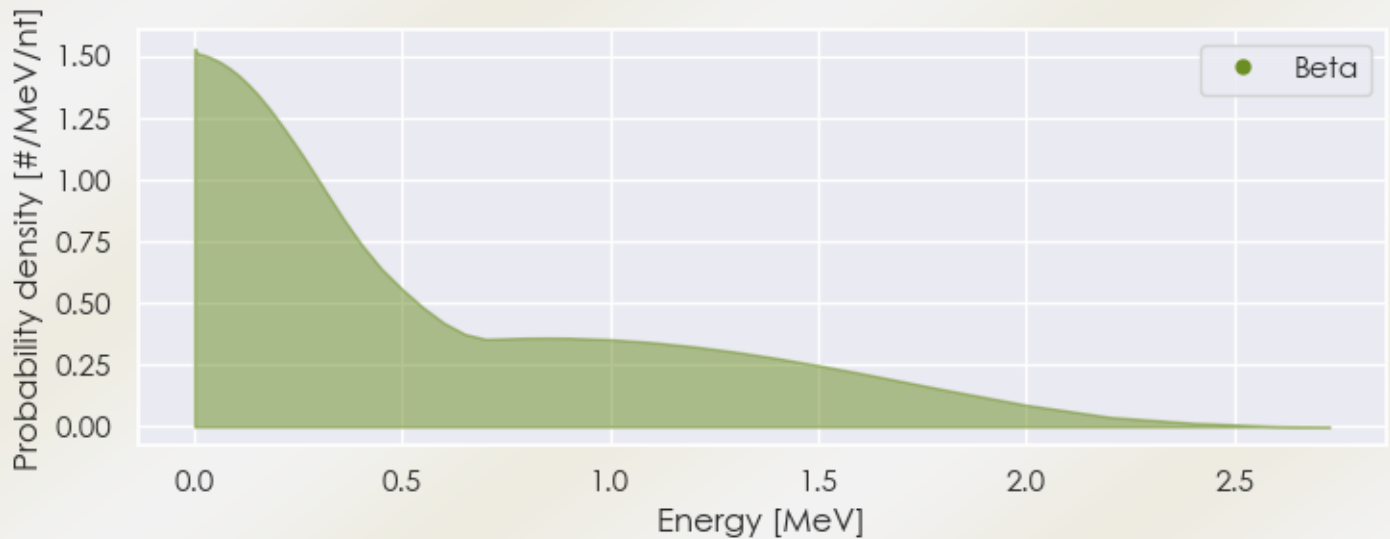
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



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

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
2.18892e-05	1.199e+01	X-ray
4.27313e-03	1.537e-02	X-ray
4.61551e-03	1.221e-02	X-ray
4.69420e-03	1.079e-02	X-ray
3.06218e-02	1.210e-02	X-ray
3.09789e-02	2.235e-02	X-ray
1.53858e-01	5.953e-02	Gamma
2.42560e-01	3.497e-02	Gamma
2.58411e-01	3.150e-01	Gamma
3.96513e-01	6.300e-02	Gamma

4.01360e-01	2.174e-02	Gamma
4.34562e-01	2.032e-01	Gamma
1.11429e+00	1.474e-02	Gamma
1.76826e+00	1.673e-01	Gamma
1.85086e+00	1.424e-02	Gamma
2.00475e+00	5.355e-02	Gamma
2.01582e+00	1.225e-01	Gamma
2.07917e+00	1.443e-02	Gamma
2.25226e+00	2.287e-02	Gamma
1.19221e-01	2.926e-02	Beta
1.44821e-01	9.054e-02	Beta
2.31293e-01	3.116e-01	Beta
9.07824e-01	1.916e-01	Beta
9.25163e-01	1.277e-01	Beta
9.95407e-01	4.860e-02	Beta
1.09881e+00	9.530e-02	Beta
1.10693e+00	8.577e-02	Beta
2.33143e-05	1.810e+00	Auger electron
4.19656e-05	5.616e+00	Auger electron
1.21035e-04	1.036e+00	Auger electron
3.80800e-04	2.772e-01	Auger electron
5.43515e-04	1.281e+00	Auger electron
6.87953e-04	8.924e-02	Auger electron
3.58614e-03	3.787e-01	Auger electron
3.85932e-03	3.356e-01	Conversion electron
4.32351e-03	1.183e-01	Auger electron
4.85000e-03	8.768e-02	Conversion electron
5.16510e-03	4.624e-01	Conversion electron
5.48680e-03	4.220e-02	Conversion electron
9.85932e-03	1.059e-01	Conversion electron
1.08500e-02	2.758e-02	Conversion electron
1.17873e-01	1.734e-02	Conversion electron
2.22426e-01	1.799e-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