



Da-133 (STABLE)	Da-136 (STABLE)	Da-137 (STABLE)	Da-138 (STABLE)	Da-139 (83.06m)	Da-140 (12.752d)	Da-141 (18.27m)	Da-142 (10.6m)
Cs-134 (2.0648y) EC	Cs-135 (2.3E+6y) B-	Cs-136 (13.16d) B-	Cs-137 (3.0E+7y) B-	Cs-138 (33.41m) B-	Cs-139 (9.4E+7y) B-	Cs-140 (63.7s) B-	
Xe-133 (5.243d) EC	Xe-134 (STABLE)	Xe-135 (9.14h) B-					

CESIUM-138

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Cs-138
Atomic number (Z): 55
Mass number (A): 138
Neutron number (N): 83

RADIOACTIVE DECAY

Decay modes: β^-
Half-life: 33.41 [m]
Decay constant: 3.4578×10^{-4} [1/s]
Daughters: Ba-138 (100.0%)
Radioactive daughters: None

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 1.24621 [MeV]
Mean photon energy: 2.36111 [MeV]
Air kerma rate constant, Γ_{10} : 7.738×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 7.738×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.997×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000e+00 [Gy $\cdot$ kg/Bq $\cdot$ s]

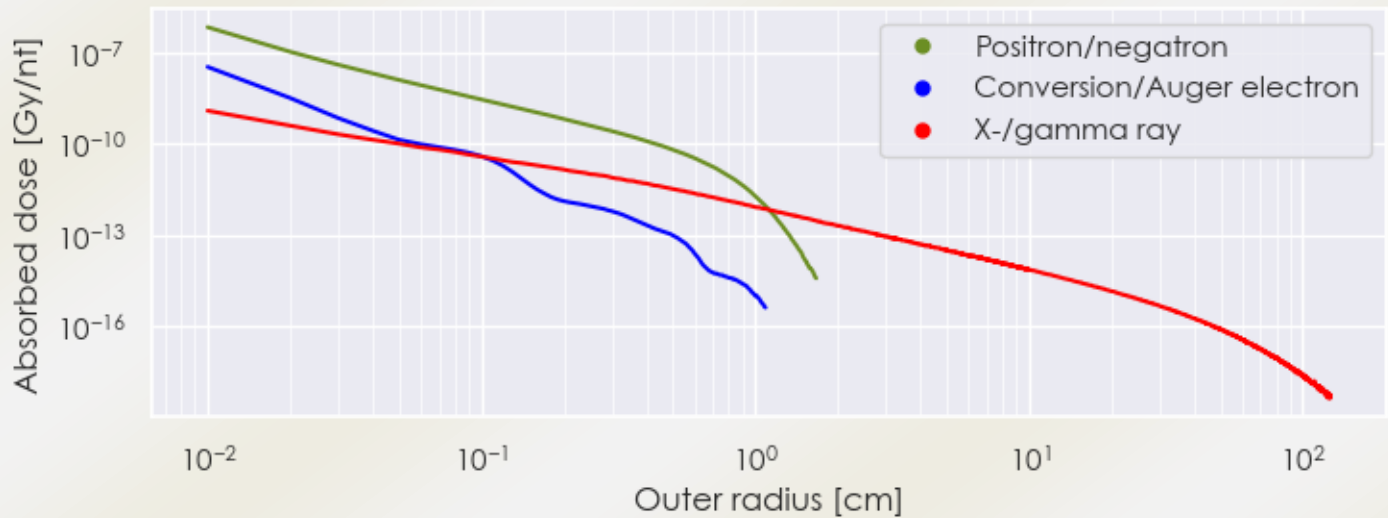
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-, \beta+, e-}$: 1.997×10^{-13} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 3.783×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

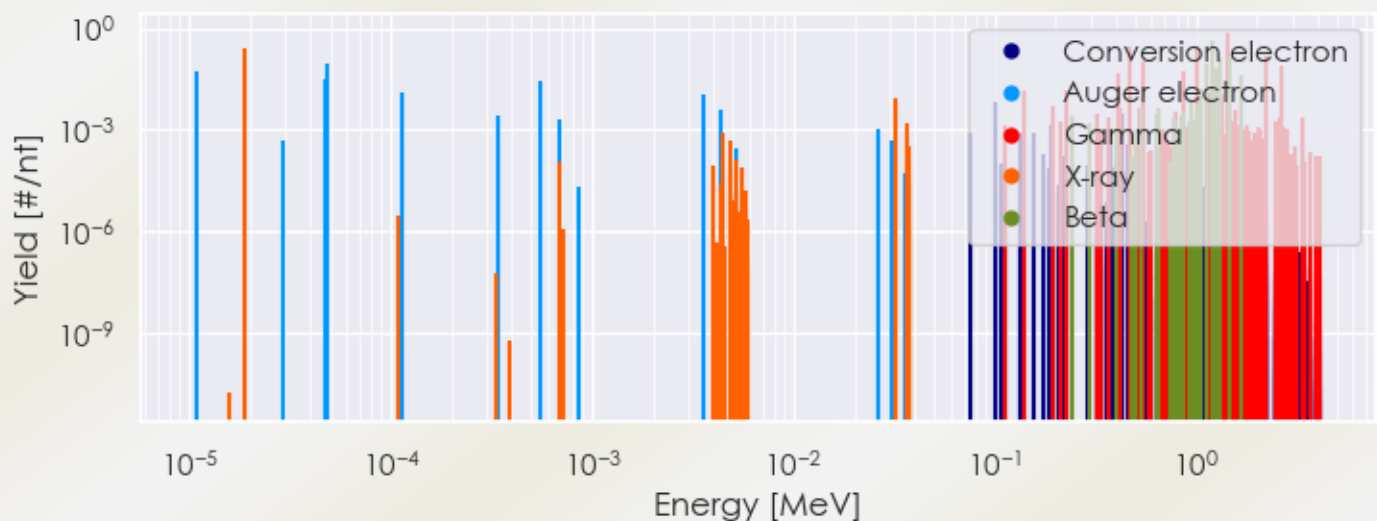
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



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

SUMMARY SPECTRA (PLOT)

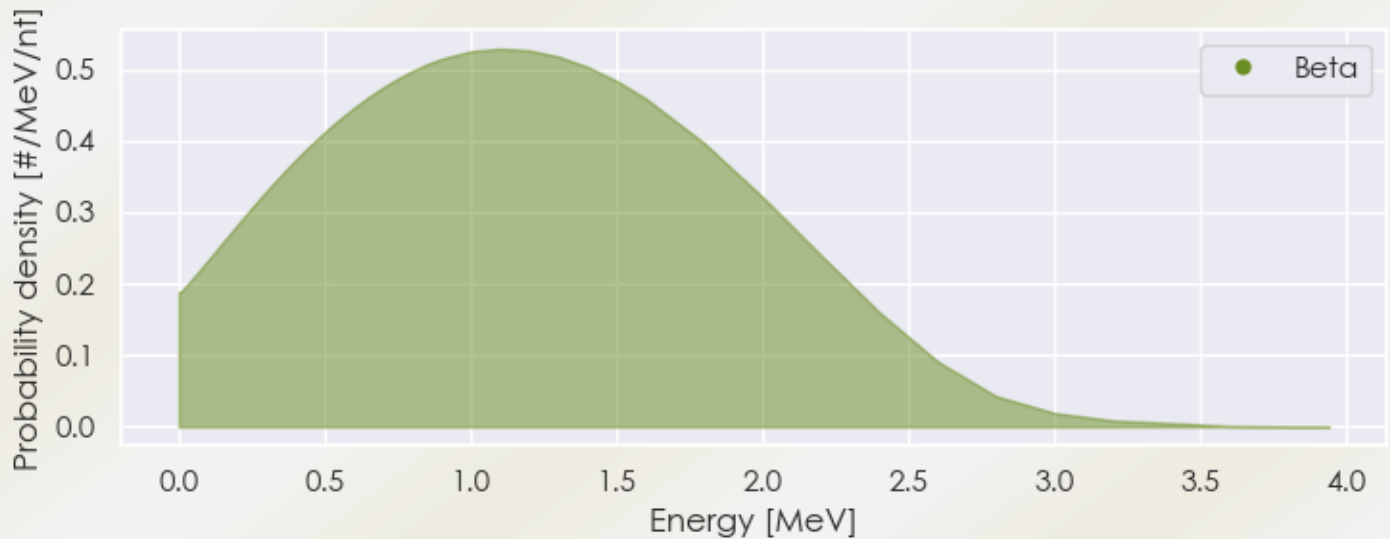
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



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

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.86005e-05	2.642e-01	X-ray
1.38100e-01	1.488e-02	Gamma
2.27760e-01	1.511e-02	Gamma
4.08980e-01	4.662e-02	Gamma
4.62796e-01	3.075e-01	Gamma
5.47001e-01	1.076e-01	Gamma
8.71800e-01	5.112e-02	Gamma
1.00978e+00	2.983e-01	Gamma
1.14722e+00	1.244e-02	Gamma
1.34359e+00	1.145e-02	Gamma

1.43586e+00	7.630e-01	Gamma
2.21800e+00	1.518e-01	Gamma
2.63959e+00	7.630e-02	Gamma
1.04672e+00	1.591e-02	Beta
1.11101e+00	8.808e-02	Beta
1.12518e+00	1.672e-02	Beta
1.20043e+00	4.404e-01	Beta
1.26431e+00	7.307e-02	Beta
1.30589e+00	1.301e-01	Beta
1.45431e+00	1.371e-01	Beta
1.67031e+00	4.304e-02	Beta
1.08630e-05	5.637e-02	Auger electron
4.69638e-05	3.265e-02	Auger electron
4.88068e-05	8.943e-02	Auger electron
1.14550e-04	1.286e-02	Auger electron
5.52135e-04	2.928e-02	Auger electron
3.56752e-03	1.149e-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/SNMMI-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6