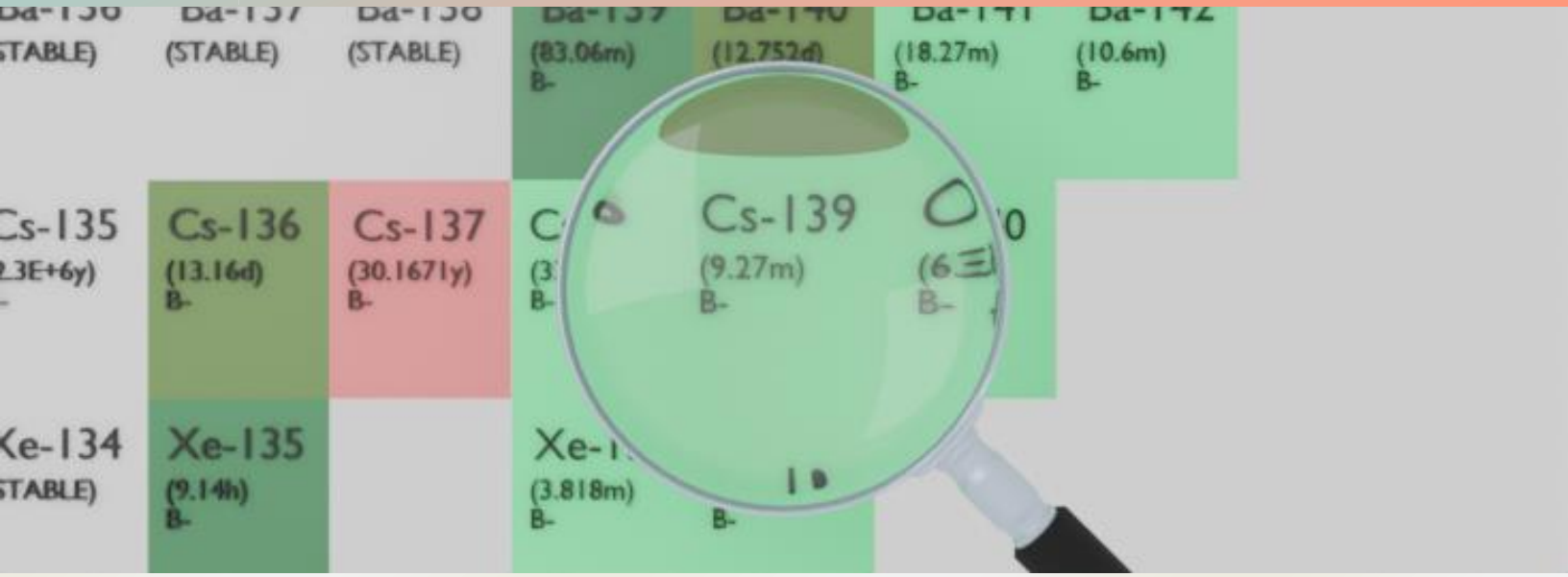


CESIUM-139

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Cs-139
Atomic number (Z): 55
Mass number (A): 139
Neutron number (N): 84

RADIOACTIVE DECAY

Decay modes: β-
Half-life: 9.27 [m]
Decay constant: 1.2462e-03 [1/s]
Daughters: Ba-139 (100.0%)
Radioactive daughters: Ba-139

DOSIMETRIC CONSTANTS

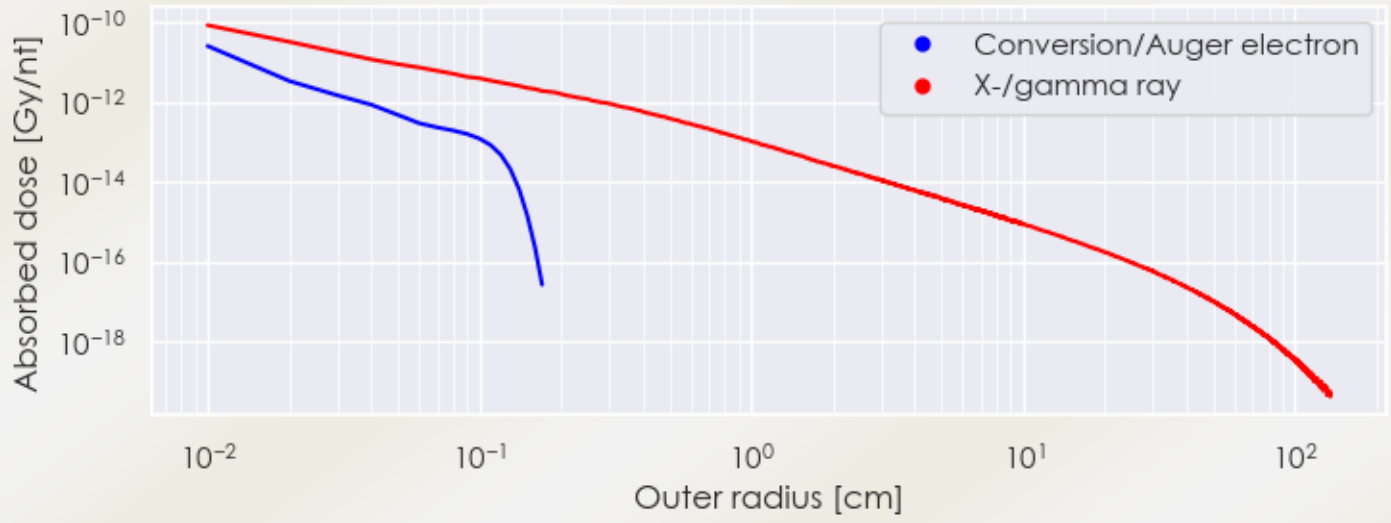
Mean alpha energy: 0.0 [MeV]
Mean electron energy: 1.65982 [MeV]
Mean photon energy: 0.30302 [MeV]
Air kerma rate constant, Γ_{10}*:* 9.576e-18 [Gy·m^2/Bq·s]
Air kerma coefficient, K_{air}*:* 9.576e-18 [Gy·m^2/Bq·s]
Equilibrium dose constant for weakly-penetrating radiations (a and/or electrons), Δ_{wp}*:* 2.659e-13 [Gy·kg/Bq·s]
Equilibrium dose constant for alphas, Δ_{a}*:* 0.000e+00 [Gy·kg/Bq·s]

Equilibrium dose constant for betas/electrons, $\Delta_{\beta-,\beta+,e-}$: 2.659e-13 [Gy·kg/Bq·s]
Equilibrium dose constant for photons, Δ_{p}: 4.855e-14 [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

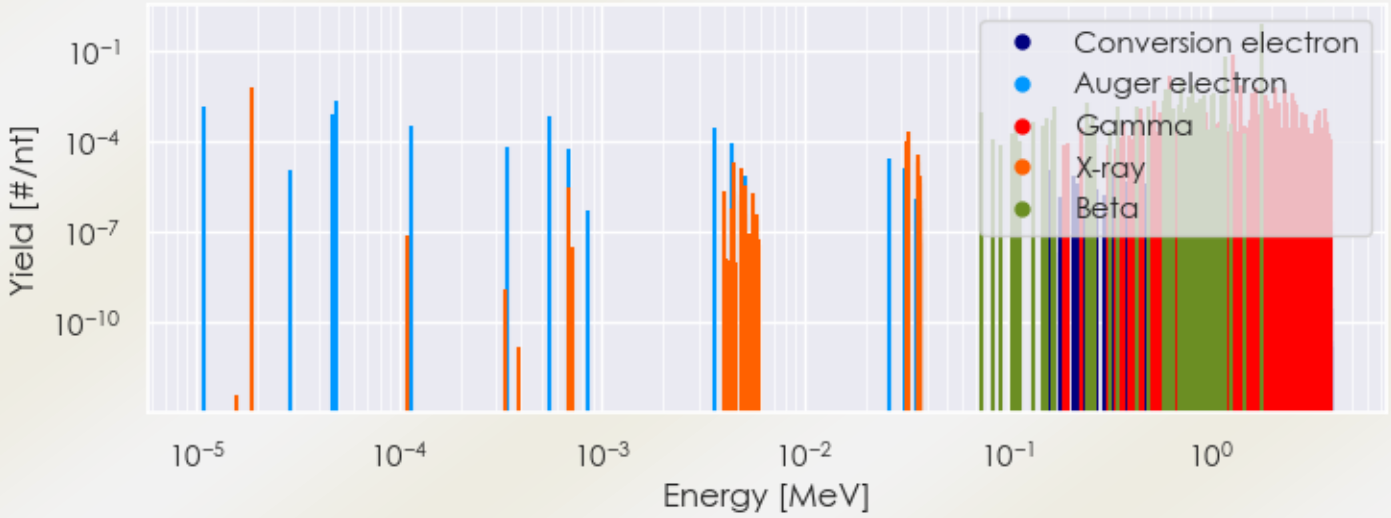
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



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

SUMMARY SPECTRA (PLOT)

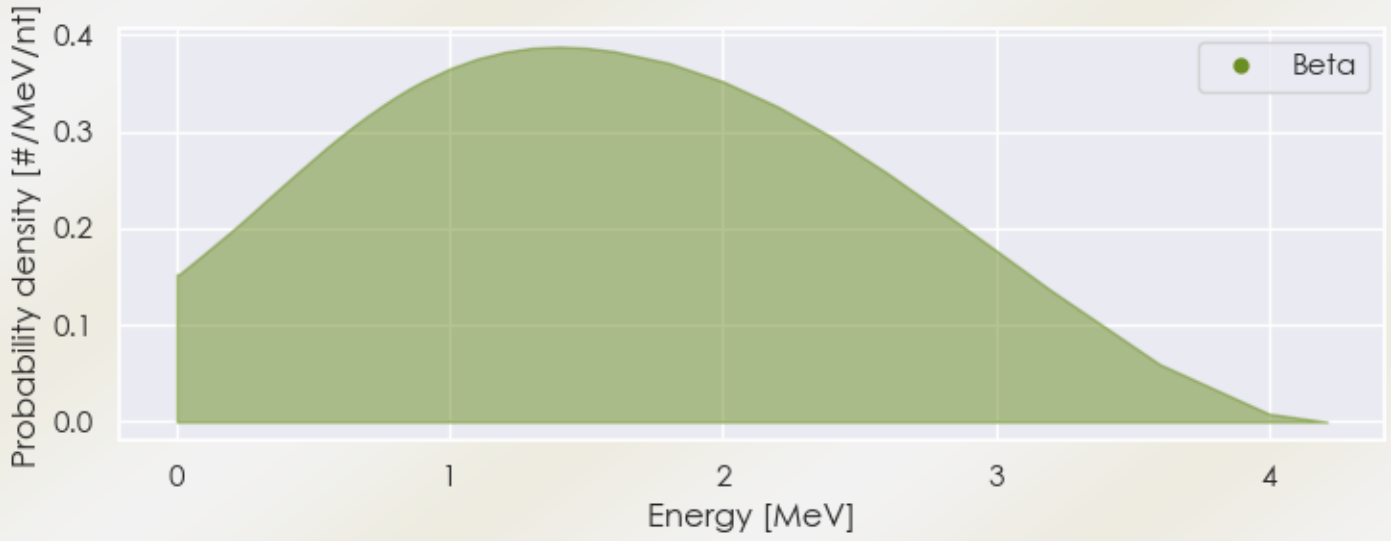
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



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

Energy [MeV]	Yield [#/nt] if > 0.01	Radiation type
6.27240e-01	1.519e-02	Gamma
1.28323e+00	7.100e-02	Gamma
7.14134e-01	1.206e-02	Beta
1.19967e+00	6.180e-02	Beta
1.79751e+00	8.423e-01	Beta

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