



CERIUM-133

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Ce-133
Atomic number (Z): 58
Mass number (A): 133
Neutron number (N): 75

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 97.0 [m]
Decay constant: 1.1910×10^{-4} [1/s]
Daughters: La-133 (100.0%)
Radioactive daughters: La-133

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.38169 [MeV]
Mean photon energy: 0.543 [MeV]
Air kerma rate constant, Γ_{10} : 9.728×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 2.405×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 6.115×10^{-14} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000×10^0 [Gy $\cdot$ kg/Bq $\cdot$ s]

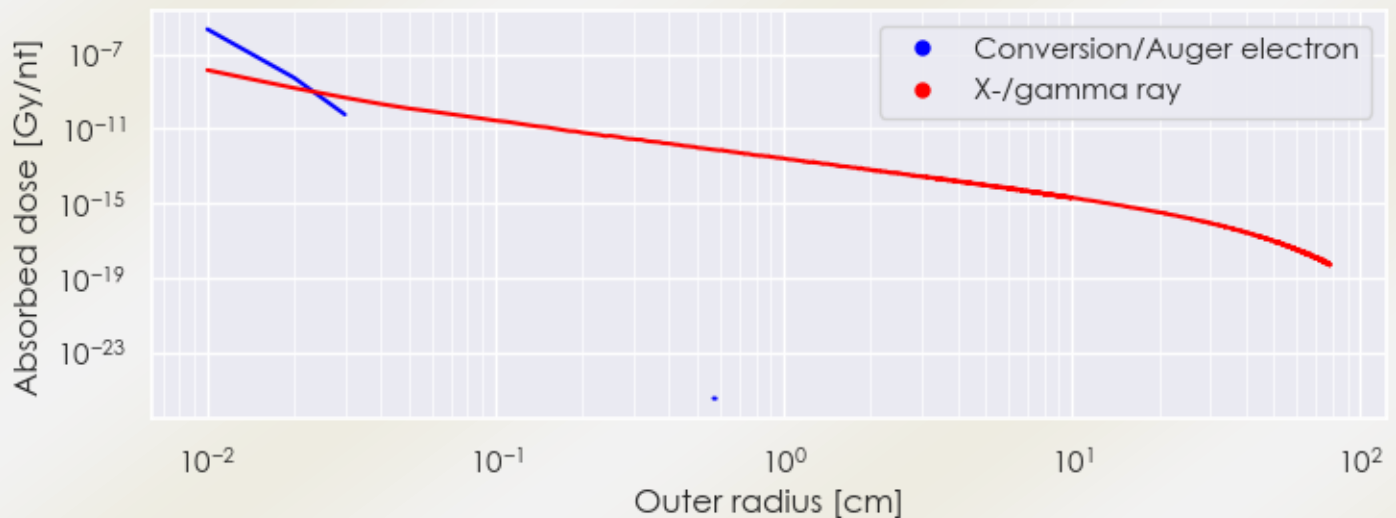
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-\beta+,e-}$: 6.115e-14 [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 8.700e-14 [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

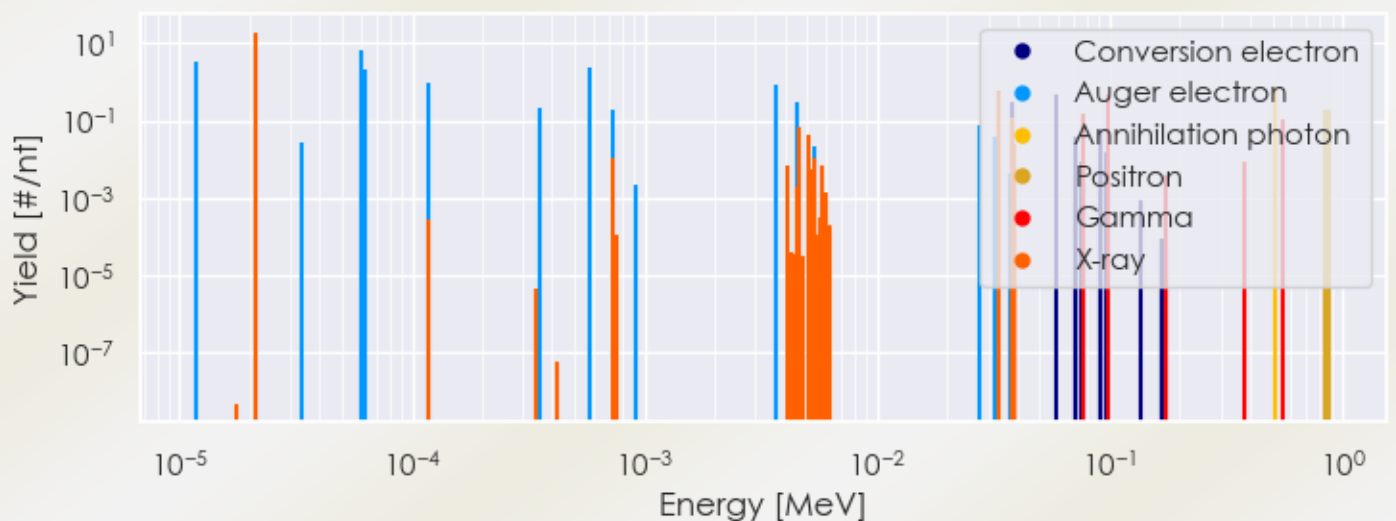
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Ce-133 DPK.csv

SUMMARY SPECTRA (PLOT)

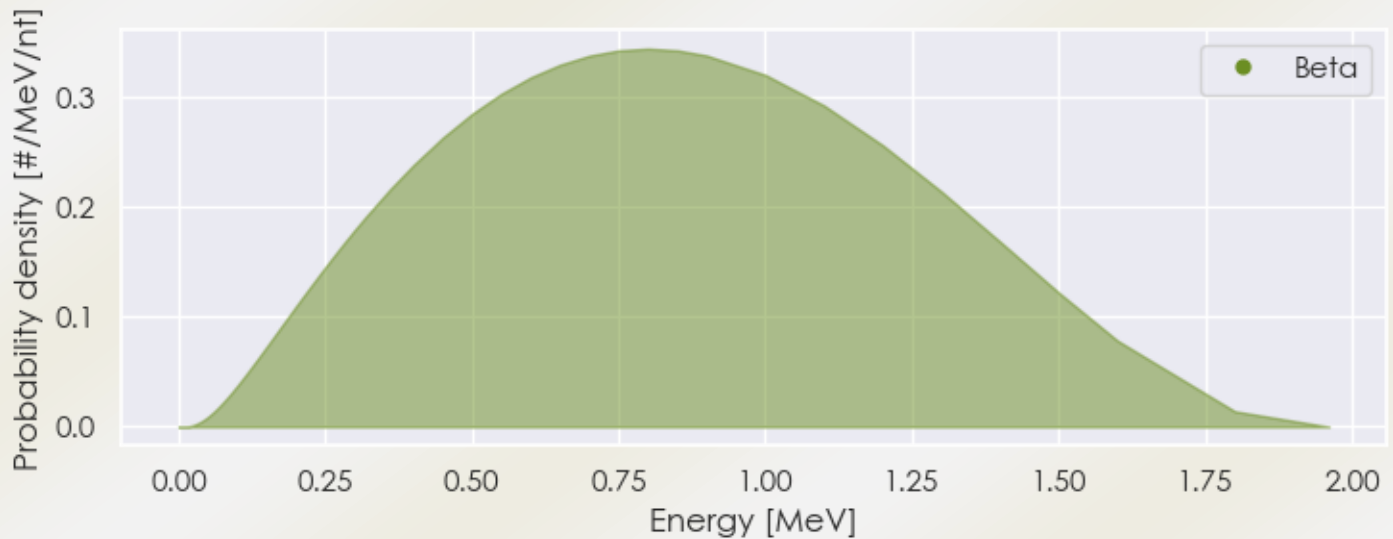
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Ce-133 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/Ce-133 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/Ce-133 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
2.10724e-05	1.919e+01	X-ray
7.27424e-04	1.056e-02	X-ray
4.63652e-03	6.919e-02	X-ray
5.03753e-03	4.133e-02	X-ray
5.37004e-03	1.132e-02	X-ray
3.30405e-02	3.432e-01	X-ray
3.34591e-02	6.304e-01	X-ray
3.77381e-02	6.076e-02	X-ray
3.78203e-02	1.177e-01	X-ray
3.87183e-02	1.289e-02	X-ray

3.87359e-02	2.510e-02	X-ray
7.69000e-02	1.575e-01	Gamma
9.72610e-02	4.500e-01	Gamma
5.11000e-01	7.400e-01	Annihilation photon
5.57700e-01	1.125e-01	Gamma
8.47296e-01	1.900e-01	Positron
8.82083e-01	1.800e-01	Positron
1.18532e-05	3.353e+00	Auger electron
3.33700e-05	2.763e-02	Auger electron
6.07180e-05	6.683e+00	Auger electron
6.29255e-05	2.116e+00	Auger electron
1.17795e-04	9.444e-01	Auger electron
3.55016e-04	2.029e-01	Auger electron
5.79543e-04	2.244e+00	Auger electron
7.30026e-04	1.936e-01	Auger electron
3.69645e-03	8.821e-01	Auger electron
4.51004e-03	2.917e-01	Auger electron
5.35472e-03	2.292e-02	Auger electron
2.73123e-02	7.886e-02	Auger electron
3.21336e-02	3.690e-02	Auger electron
3.79570e-02	3.168e-01	Conversion electron
5.83180e-02	4.645e-01	Conversion electron
7.06582e-02	3.943e-02	Conversion electron
9.10192e-02	5.734e-02	Conversion electron
9.61383e-02	1.486e-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/SNMML-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6