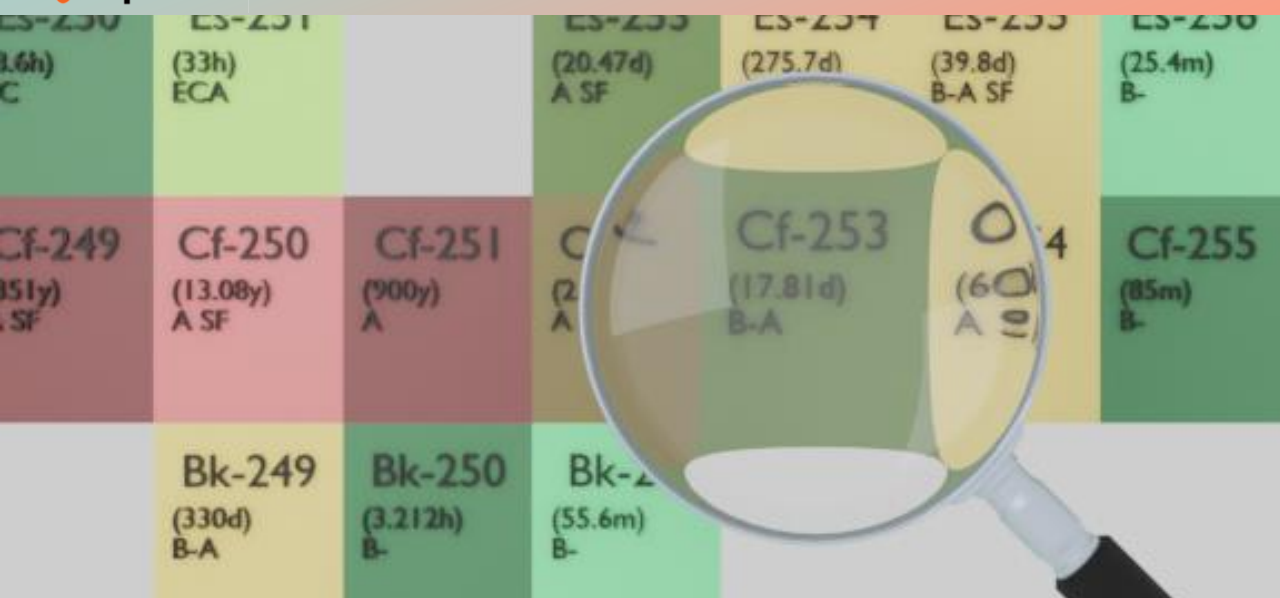




CALIFORNIUM-253

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Cf-253
Atomic number (Z): 98
Mass number (A): 253
Neutron number (N): 155

RADIOACTIVE DECAY

Decay modes: α , β^-
Half-life: 17.81 [d]
Decay constant: $4.5045\text{e-}07$ [1/s]
Daughters: Es-253 (99.7%), Cm-249 (0.31%)
Radioactive daughters: Es-253, Cm-249

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0188 [MeV]
Mean electron energy: 0.09076 [MeV]
Mean photon energy: 0.00483 [MeV]
Air kerma rate constant, Γ_{10} : $3.435\text{e-}18$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Air kerma coefficient, K_{air} : $3.435\text{e-}18$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $1.755\text{e-}14$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for alphas, Δ_{α} : $3.012\text{e-}15$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]

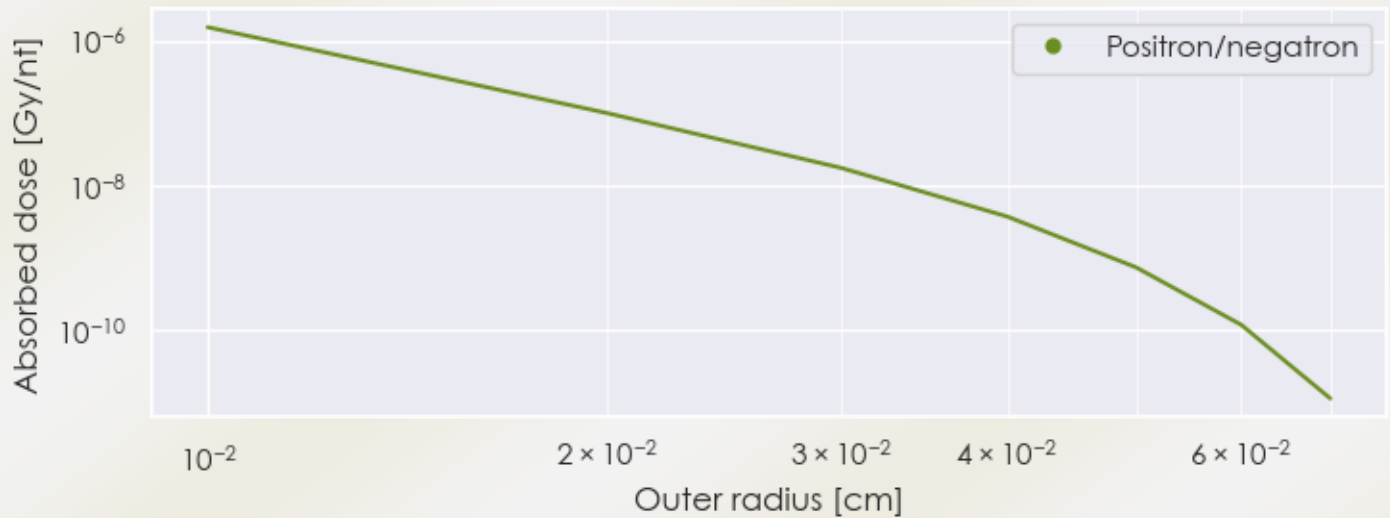
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 1.454×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 7.739×10^{-16} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

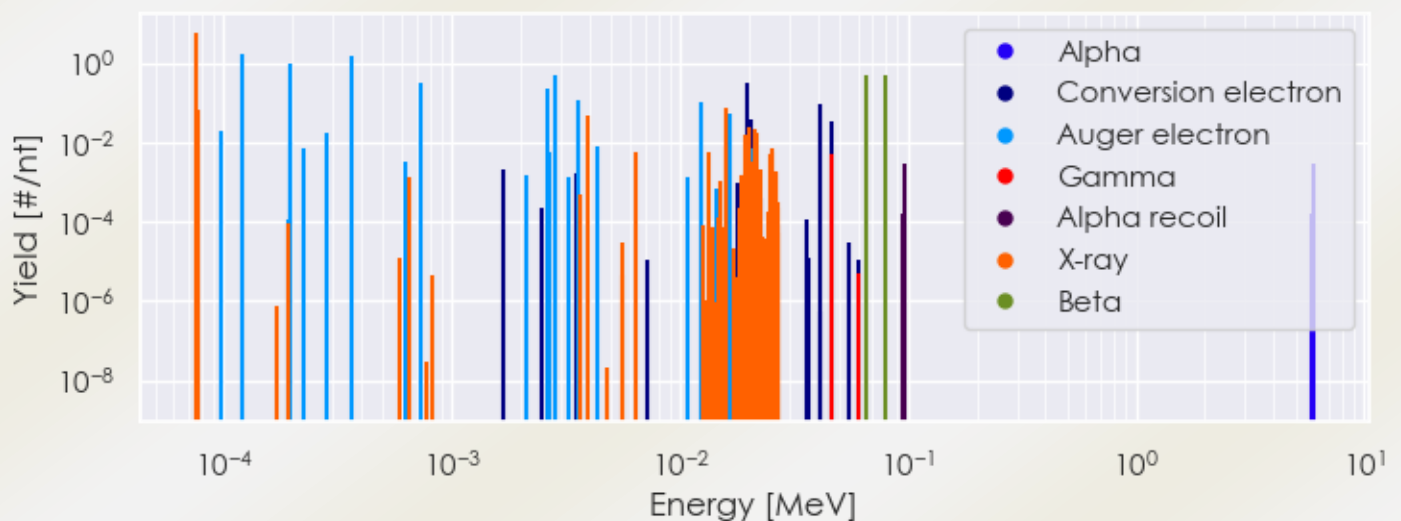
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Cf-253 DPK.csv

SUMMARY SPECTRA (PLOT)

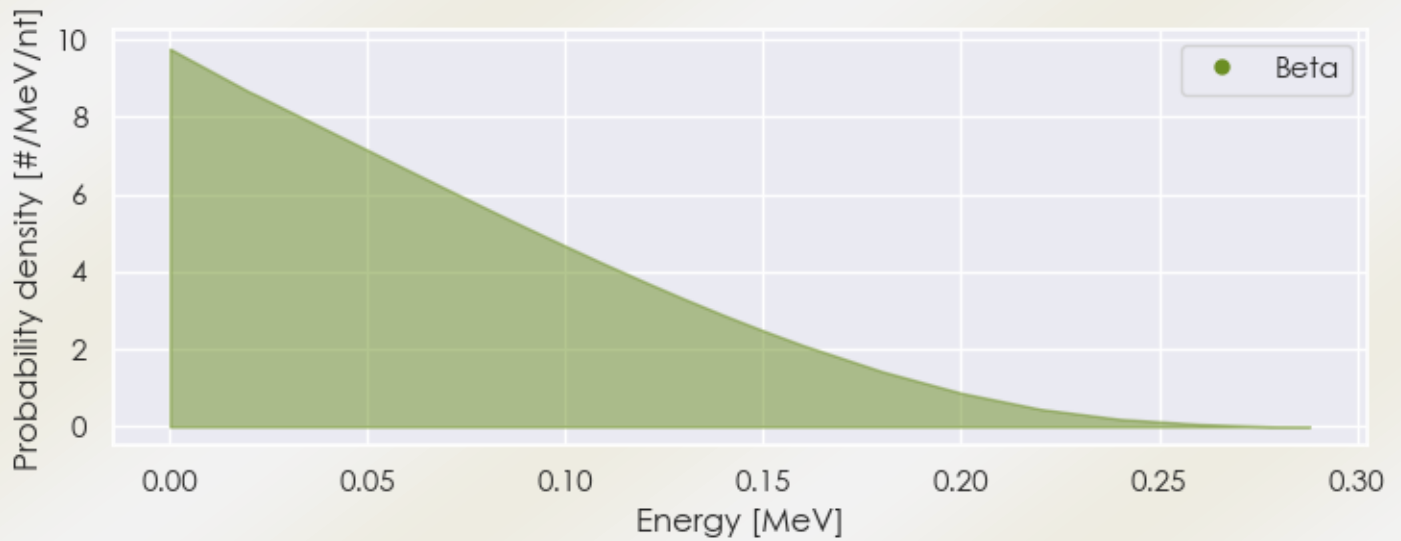
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Cf-253 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/Cf-253 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/Cf-253 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
7.54578e-05	5.982e+00	X-ray
7.75627e-05	6.935e-02	X-ray
3.96705e-03	4.465e-02	X-ray
1.60394e-02	7.313e-02	X-ray
1.94489e-02	1.607e-02	X-ray
2.02594e-02	2.539e-02	X-ray
2.13815e-02	2.071e-02	X-ray
2.15768e-02	1.779e-02	X-ray
6.55092e-02	4.985e-01	Beta
7.91489e-02	4.985e-01	Beta

9.70088e-05	1.981e-02	Auger electron
1.20836e-04	1.610e+00	Auger electron
1.93615e-04	1.022e-02	Auger electron
1.93723e-04	9.605e-01	Auger electron
2.80555e-04	1.821e-02	Auger electron
3.66309e-04	1.587e+00	Auger electron
7.26851e-04	3.226e-01	Auger electron
2.64718e-03	2.221e-01	Auger electron
2.85456e-03	4.849e-01	Auger electron
3.55449e-03	1.214e-01	Auger electron
1.22888e-02	1.023e-01	Auger electron
1.64544e-02	5.554e-02	Auger electron
1.95760e-02	3.292e-01	Conversion electron
2.03930e-02	3.731e-02	Conversion electron
4.11528e-02	9.122e-02	Conversion electron
4.64000e-02	3.429e-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