



CALIFORNIUM-251

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Cf-251
Atomic number (Z): 98
Mass number (A): 251
Neutron number (N): 153

RADIOACTIVE DECAY

Decay modes: α
Half-life: 900.0 [y]
Decay constant: 2.4406×10^{-11} [1/s]
Daughters: Cm-247 (100.0%)
Radioactive daughters: Cm-247

DOSIMETRIC CONSTANTS

Mean alpha energy: 5.879 [MeV]
Mean electron energy: 0.17054 [MeV]
Mean photon energy: 0.12453 [MeV]
Air kerma rate constant, Γ_{10} : 1.375×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 1.375×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 9.692×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 9.419×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]

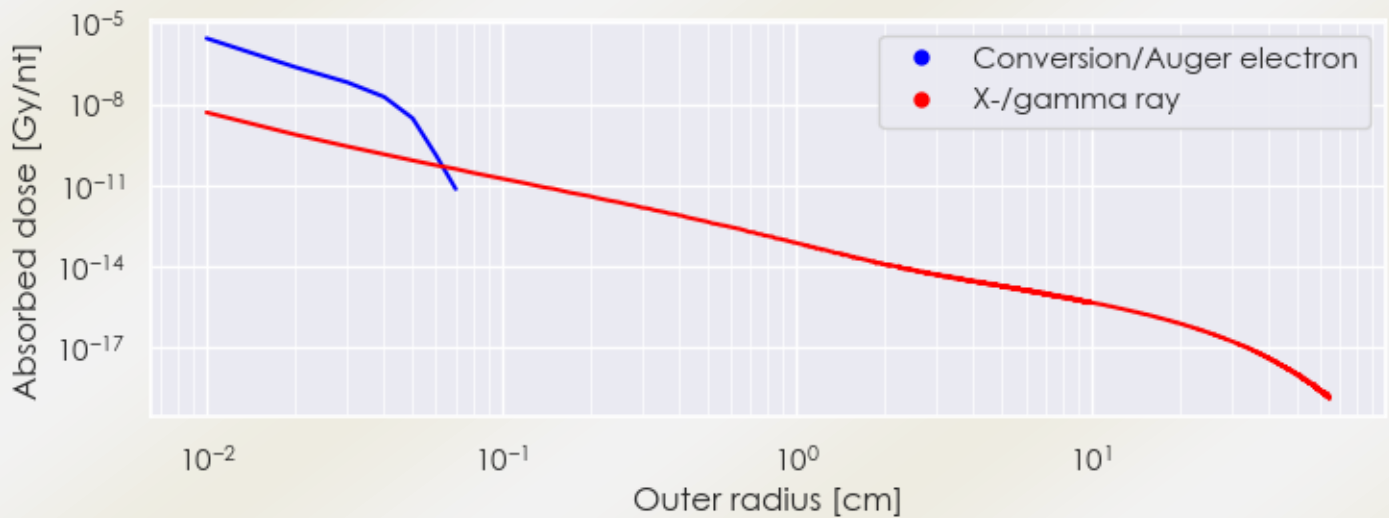
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-, \beta+, e-}$: 2.732×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.995×10^{-14} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

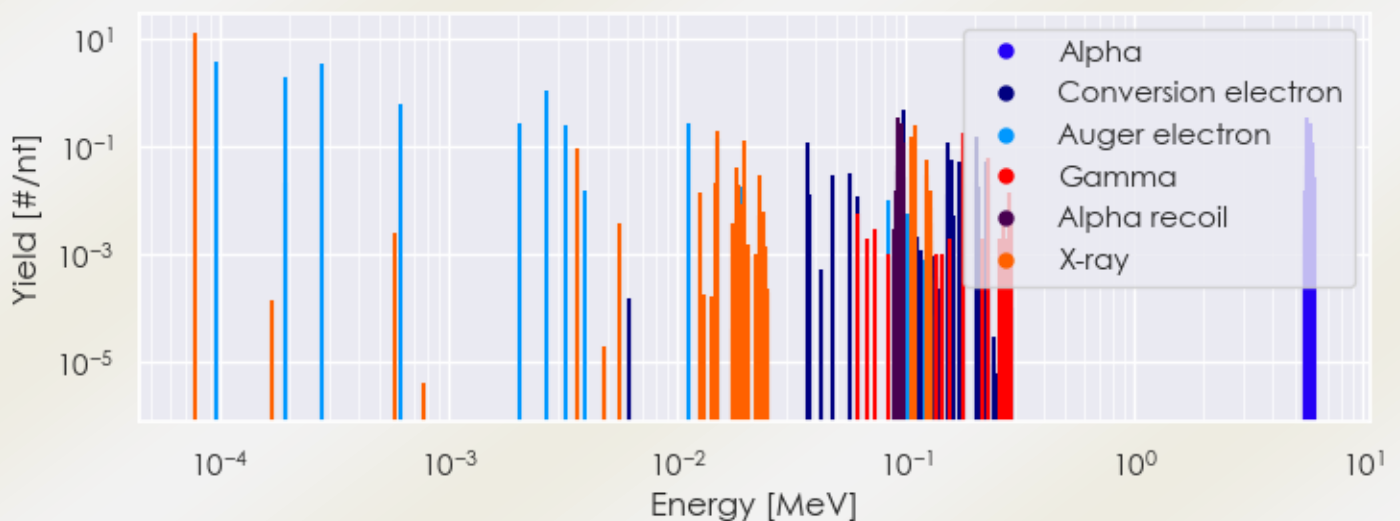
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Cf-251 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-251 Summary 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-251 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Cf-251%20Summary%20Spectrum.csv)

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
7.75880e-05	1.350e+01	X-ray
3.65191e-03	9.415e-02	X-ray
1.26809e-02	1.425e-02	X-ray
1.47568e-02	2.195e-02	X-ray
1.49784e-02	1.927e-01	X-ray
1.81285e-02	4.157e-02	X-ray
1.86084e-02	1.970e-02	X-ray
1.95388e-02	1.298e-01	X-ray
1.97249e-02	1.524e-02	X-ray
2.28564e-02	3.049e-02	X-ray
1.05084e-01	1.584e-01	X-ray
1.09866e-01	2.479e-01	X-ray
1.22914e-01	2.890e-02	X-ray
1.24031e-01	5.689e-02	X-ray
1.27666e-01	1.506e-02	X-ray
1.76600e-01	1.770e-01	Gamma
2.27000e-01	6.300e-02	Gamma
2.85000e-01	1.430e-02	Gamma
9.70251e-05	3.835e+00	Auger electron
1.92024e-04	2.012e+00	Auger electron
1.92940e-04	2.104e-02	Auger electron
2.79478e-04	3.545e+00	Auger electron
6.12235e-04	6.045e-01	Auger electron
2.04093e-03	2.664e-01	Auger electron
2.66803e-03	1.139e+00	Auger electron
3.26170e-03	2.519e-01	Auger electron
3.96955e-03	1.584e-02	Auger electron

1.12001e-02	2.724e-01	Auger electron
1.49732e-02	1.440e-01	Auger electron
1.87939e-02	1.787e-02	Auger electron
3.69460e-02	1.167e-01	Conversion electron
3.77240e-02	1.289e-02	Conversion electron
4.77400e-02	2.991e-02	Conversion electron
5.66710e-02	3.146e-02	Conversion electron
6.15000e-02	1.199e-02	Conversion electron
9.81400e-02	5.046e-01	Conversion electron
1.52046e-01	1.331e-02	Conversion electron
1.52824e-01	1.170e-01	Conversion electron
1.57606e-01	5.666e-02	Conversion electron
1.71771e-01	5.207e-02	Conversion electron
1.76600e-01	1.966e-02	Conversion electron
2.02446e-01	1.538e-01	Conversion electron
2.03224e-01	2.202e-02	Conversion electron
2.08006e-01	1.827e-02	Conversion electron
2.22171e-01	5.144e-02	Conversion electron
2.27000e-01	1.990e-02	Conversion electron
5.56699e+00	1.532e-02	Alpha
5.63489e+00	4.596e-02	Alpha
5.65063e+00	3.574e-02	Alpha
5.67956e+00	3.574e-01	Alpha
5.74117e+00	1.021e-02	Alpha
5.76478e+00	3.881e-02	Alpha
5.79627e+00	2.042e-02	Alpha
5.81497e+00	4.289e-02	Alpha
5.85335e+00	2.757e-01	Alpha
6.01621e+00	1.185e-01	Alpha
6.07673e+00	2.757e-02	Alpha
9.02123e-02	1.532e-02	Alpha recoil
9.13126e-02	4.596e-02	Alpha recoil
9.15677e-02	3.574e-02	Alpha recoil
9.20365e-02	3.574e-01	Alpha recoil
9.30348e-02	1.021e-02	Alpha recoil
9.34175e-02	3.881e-02	Alpha recoil
9.39278e-02	2.042e-02	Alpha recoil
9.42308e-02	4.289e-02	Alpha recoil

9.48527e-02	2.757e-01	Alpha recoil
9.74918e-02	1.185e-01	Alpha recoil
9.84725e-02	2.757e-02	Alpha recoil

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