



CALIFORNIUM-252

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Cf-252
Atomic number (Z): 98
Mass number (A): 252
Neutron number (N): 154

RADIOACTIVE DECAY

Decay modes: α , Spontaneous fission
Half-life: 2.645 [y]
Decay constant: $8.3043\text{e-}09$ [1/s]
Daughters: Cm-248 (96.9%), SF (3.09%)
Radioactive daughters: Cm-248

DOSIMETRIC CONSTANTS

Mean alpha energy: 6.0177 [MeV]
Mean electron energy: 0.25158 [MeV]
Mean photon energy: 0.45724 [MeV]
Air kerma rate constant, Γ_{10} : $1.190\text{e-}18$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Air kerma coefficient, K_{air} : $7.543\text{e-}17$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $1.004\text{e-}12$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for alphas, Δ_{α} : $9.641\text{e-}13$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]

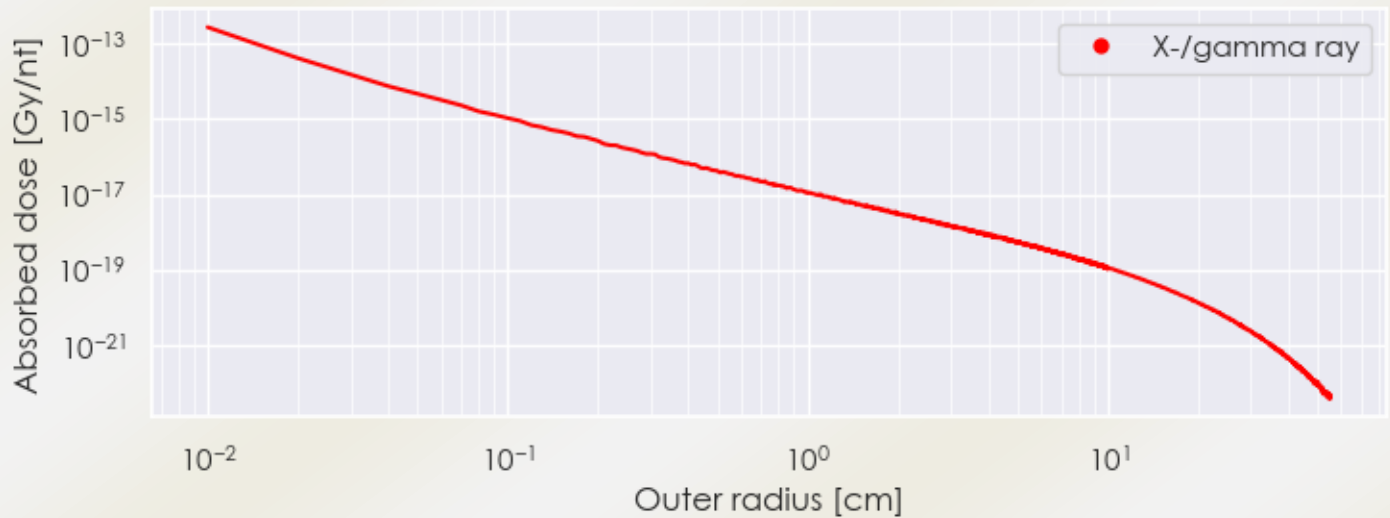
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 4.031e-14 [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 7.326e-14 [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

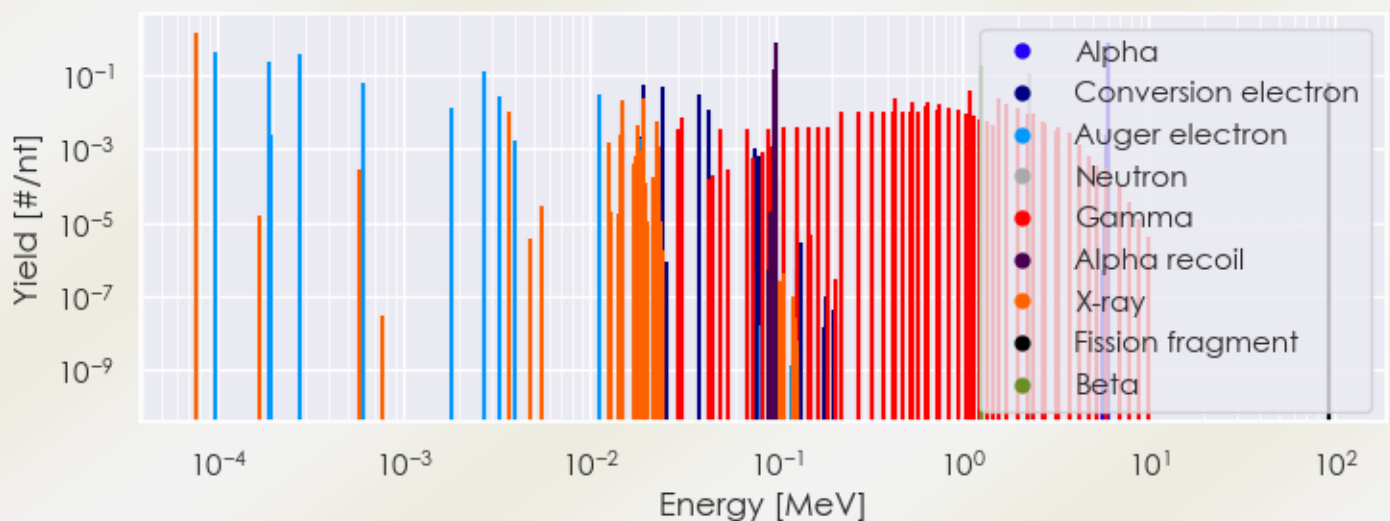
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Cf-252 DPK.csv

SUMMARY SPECTRA (PLOT)

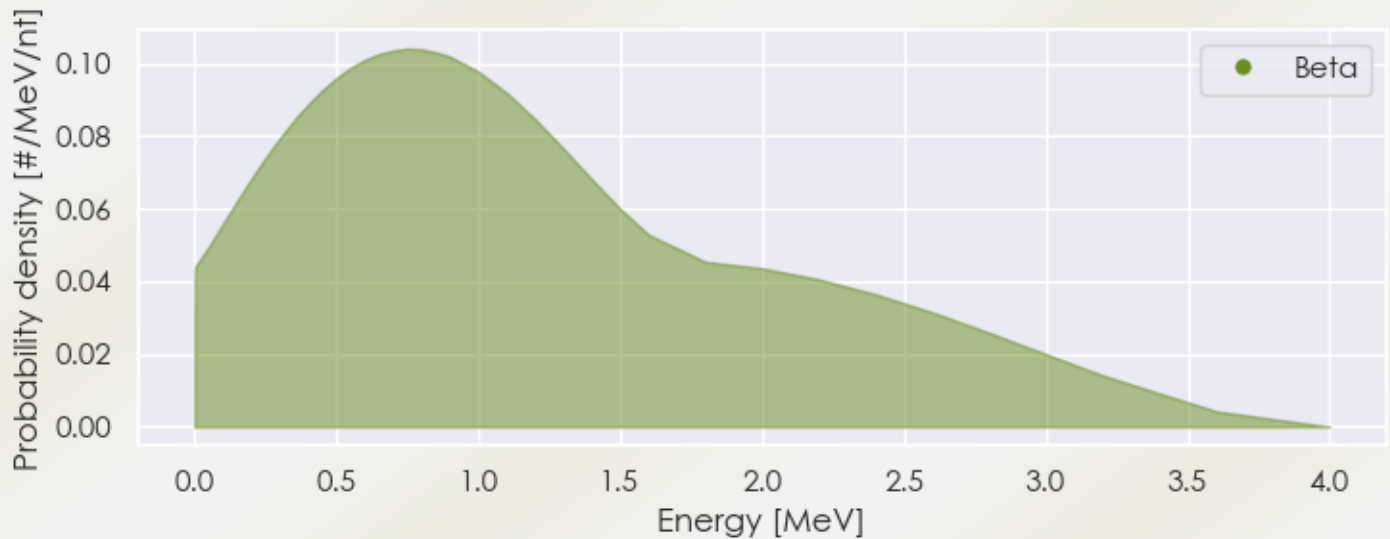
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Cf-252 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-252 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-252 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
7.76505e-05	1.495e+00	X-ray
3.66090e-03	1.056e-02	X-ray
1.49784e-02	2.088e-02	X-ray
1.95388e-02	2.321e-02	X-ray
4.40000e-01	2.533e-02	Delayed gamma
5.40000e-01	1.967e-02	Delayed gamma
6.40000e-01	1.533e-02	Delayed gamma
6.49000e-01	1.903e-02	Prompt gamma
7.40000e-01	1.200e-02	Delayed gamma
7.49000e-01	1.590e-02	Prompt gamma

8.49000e-01	1.334e-02	Prompt gamma
9.49000e-01	1.115e-02	Prompt gamma
1.10000e+00	3.933e-02	Delayed gamma
1.56000e+00	2.400e-02	Delayed gamma
1.73000e+00	1.618e-02	Prompt gamma
2.00000e+00	1.267e-02	Delayed gamma
1.27952e+00	1.922e-01	Delayed beta
9.71089e-05	4.230e-01	Auger electron
1.90616e-04	2.264e-01	Auger electron
2.79669e-04	3.923e-01	Auger electron
6.01166e-04	6.483e-02	Auger electron
1.79582e-03	1.360e-02	Auger electron
2.67813e-03	1.268e-01	Auger electron
3.27252e-03	2.810e-02	Auger electron
1.12900e-02	3.093e-02	Auger electron
1.50636e-02	1.637e-02	Auger electron
1.96230e-02	5.849e-02	Conversion electron
2.44050e-02	4.952e-02	Conversion electron
3.85700e-02	3.067e-02	Conversion electron
4.33990e-02	1.144e-02	Conversion electron
6.07542e+00	1.519e-01	Alpha
6.11813e+00	8.148e-01	Alpha
9.80543e-02	1.519e-01	Alpha recoil
9.87436e-02	8.148e-01	Alpha recoil
9.40435e+01	6.184e-02	Fission fragment
2.30603e+00	1.164e-01	Neutron

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