



EUROPIUM-158

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Eu-158
Atomic number (Z): 63
Mass number (A): 158
Neutron number (N): 95

RADIOACTIVE DECAY

Decay modes: β^-
Half-life: 45.9 [m]
Decay constant: 2.5169×10^{-4} [1/s]
Daughters: Gd-158 (100.0%)
Radioactive daughters: None

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.89199 [MeV]
Mean photon energy: 1.29776 [MeV]
Air kerma rate constant, Γ_{10} : 4.537×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 4.537×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.429×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000×10^0 [Gy $\cdot$ kg/Bq $\cdot$ s]

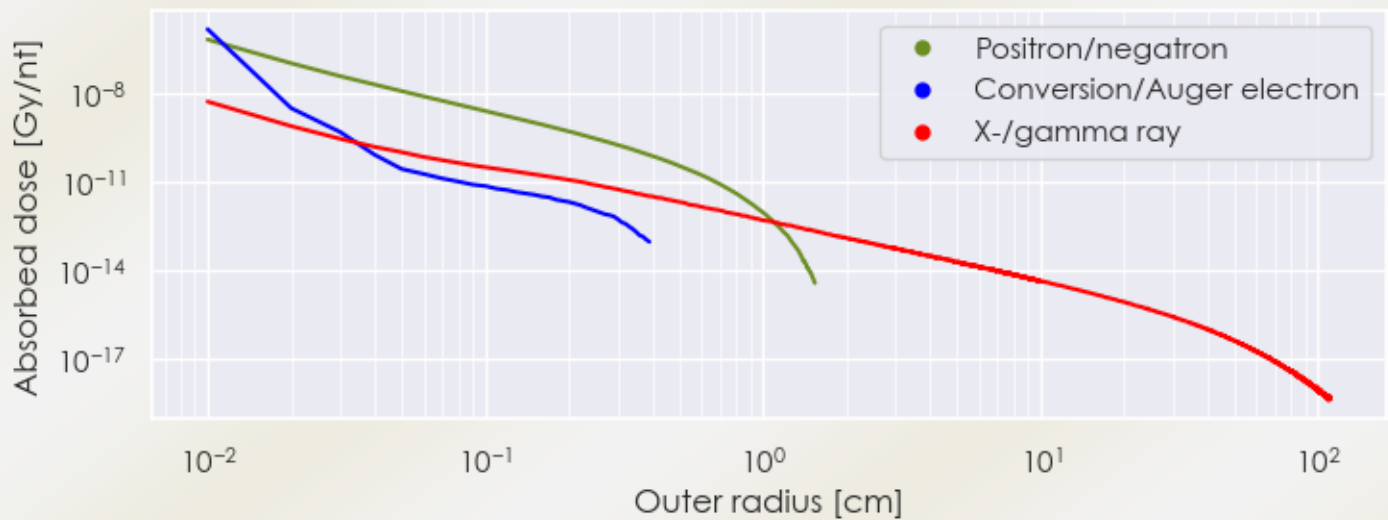
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 1.429×10^{-13} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 2.079×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

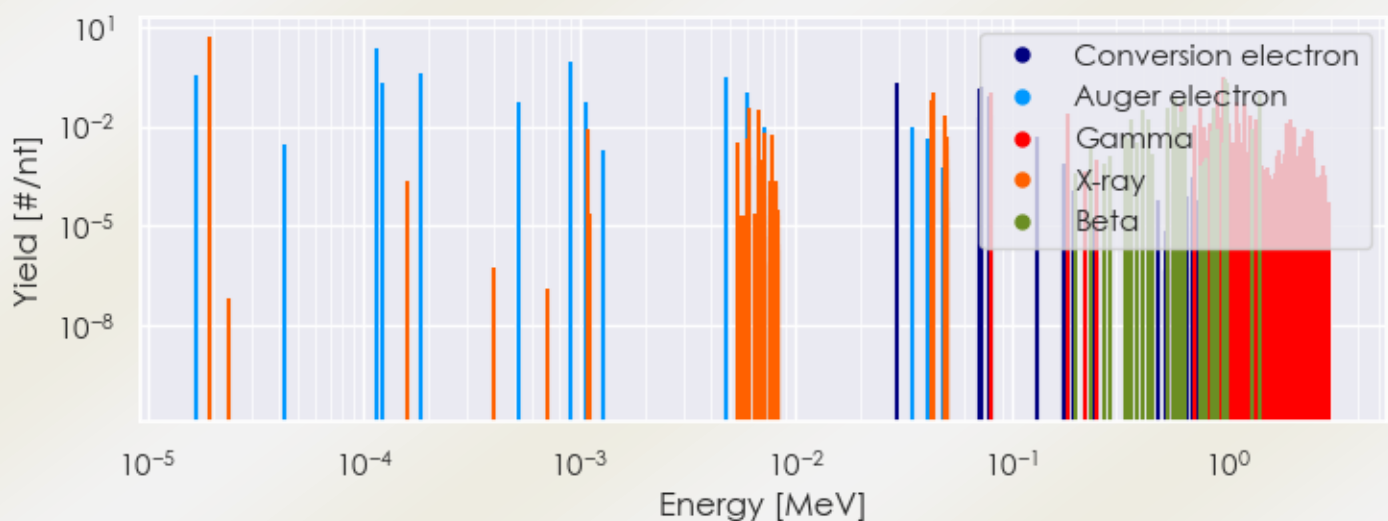
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Eu-158 DPK.csv

SUMMARY SPECTRA (PLOT)

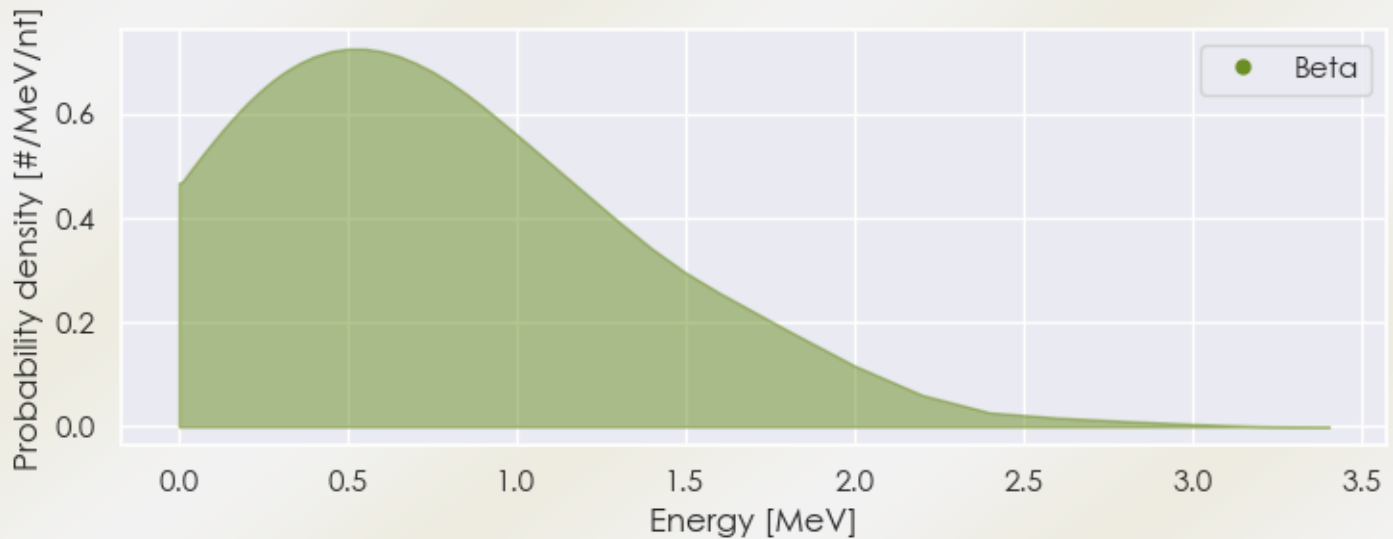
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Eu-158 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/Eu-158 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/Eu-158 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.94236e-05	5.426e+00	X-ray
6.04290e-03	3.739e-02	X-ray
6.71540e-03	3.093e-02	X-ray
4.23559e-02	5.819e-02	X-ray
4.30603e-02	1.046e-01	X-ray
4.86161e-02	1.063e-02	X-ray
4.87612e-02	2.056e-02	X-ray
7.94900e-02	1.050e-01	Gamma
1.81970e-01	2.340e-02	Gamma
5.28050e-01	1.530e-02	Gamma

6.06390e-01	3.960e-02	Gamma
6.98630e-01	1.056e-02	Gamma
7.43020e-01	3.600e-02	Gamma
8.24110e-01	1.290e-02	Gamma
8.70700e-01	1.260e-02	Gamma
8.97610e-01	1.236e-01	Gamma
9.06500e-01	1.830e-02	Gamma
9.22510e-01	1.620e-02	Gamma
9.44150e-01	3.000e-01	Gamma
9.53030e-01	1.980e-02	Gamma
9.62090e-01	1.890e-02	Gamma
9.77140e-01	1.629e-01	Gamma
9.86960e-01	1.350e-02	Gamma
1.00540e+00	1.230e-02	Gamma
1.10763e+00	5.130e-02	Gamma
1.11649e+00	1.260e-02	Gamma
1.18410e+00	3.030e-02	Gamma
1.18600e+00	2.940e-02	Gamma
1.18710e+00	4.410e-02	Gamma
1.26361e+00	2.190e-02	Gamma
1.34795e+00	1.650e-02	Gamma
1.88462e+00	1.230e-02	Gamma
1.94447e+00	1.620e-02	Gamma
3.54190e-01	1.558e-02	Beta
4.03672e-01	3.236e-02	Beta
4.26723e-01	1.638e-02	Beta
5.29556e-01	3.467e-02	Beta
5.55026e-01	6.633e-02	Beta
5.69564e-01	7.638e-02	Beta
6.04976e-01	2.603e-02	Beta
6.28451e-01	7.035e-02	Beta
8.61676e-01	3.719e-02	Beta
9.69178e-01	2.523e-01	Beta
9.90109e-01	2.141e-01	Beta
1.39831e+00	9.045e-02	Beta
1.68638e-05	3.612e-01	Auger electron
1.13488e-04	2.438e+00	Auger electron
1.21991e-04	2.026e-01	Auger electron

1.84607e-04	3.751e-01	Auger electron
5.26410e-04	5.054e-02	Auger electron
8.97626e-04	8.388e-01	Auger electron
1.07414e-03	5.679e-02	Auger electron
4.76875e-03	3.038e-01	Auger electron
5.92191e-03	1.065e-01	Auger electron
2.91870e-02	2.100e-01	Conversion electron
7.11402e-02	1.887e-02	Conversion electron
7.15430e-02	1.464e-01	Conversion electron
7.22473e-02	1.588e-01	Conversion electron
7.79482e-02	7.668e-02	Conversion electron
7.94900e-02	2.025e-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