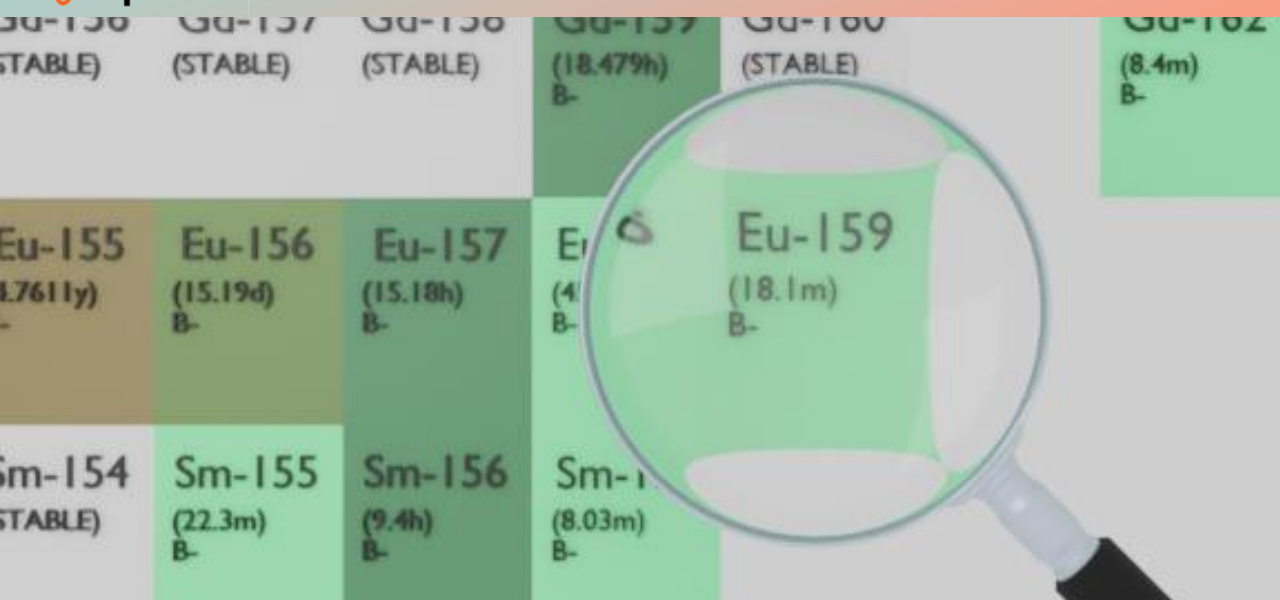




EUROPIUM-159

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Eu-159
Atomic number (Z): 63
Mass number (A): 159
Neutron number (N): 96

RADIOACTIVE DECAY

Decay modes: β^-
Half-life: 18.1 [m]
Decay constant: 6.3826×10^{-4} [1/s]
Daughters: Gd-159 (100.0%)
Radioactive daughters: Gd-159

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.89226 [MeV]
Mean photon energy: 0.30317 [MeV]
Air kerma rate constant, Γ_{10} : 1.241×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 1.241×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.430×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000×10^0 [Gy $\cdot$ kg/Bq $\cdot$ s]

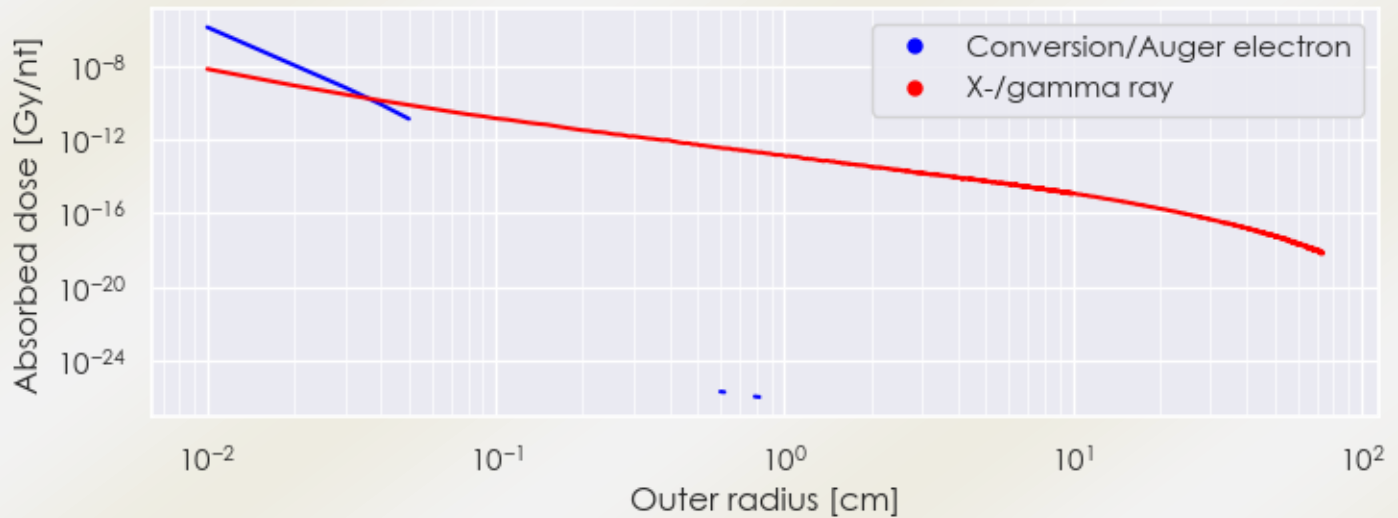
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-, \beta+, e-}$: 1.430×10^{-13} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 4.857×10^{-14} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

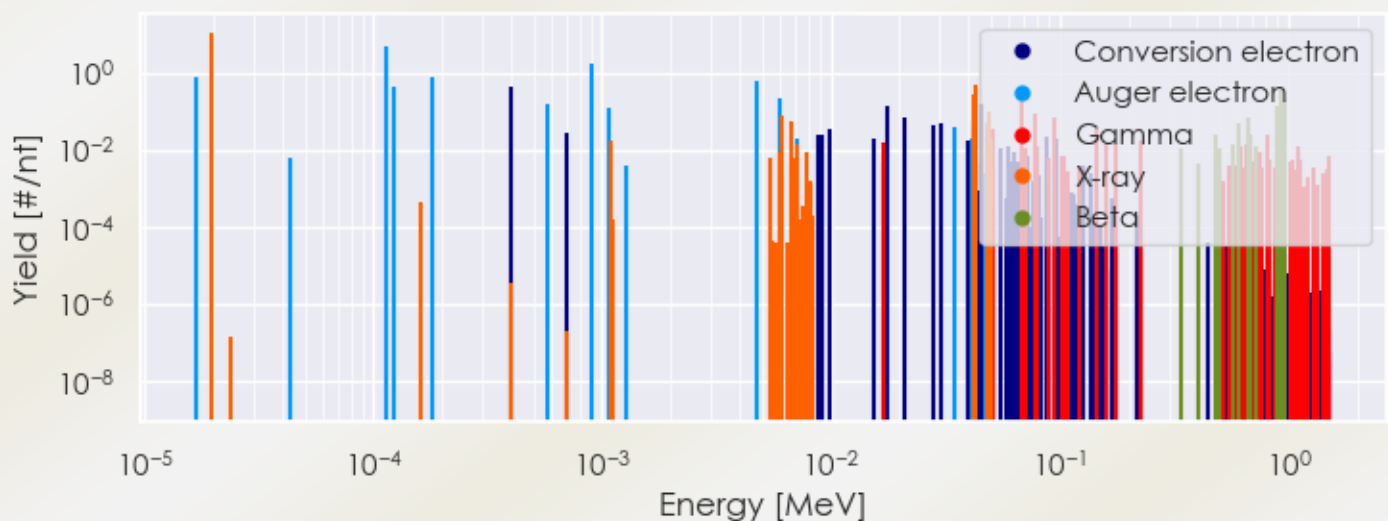
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Eu-159 DPK.csv

SUMMARY SPECTRA (PLOT)

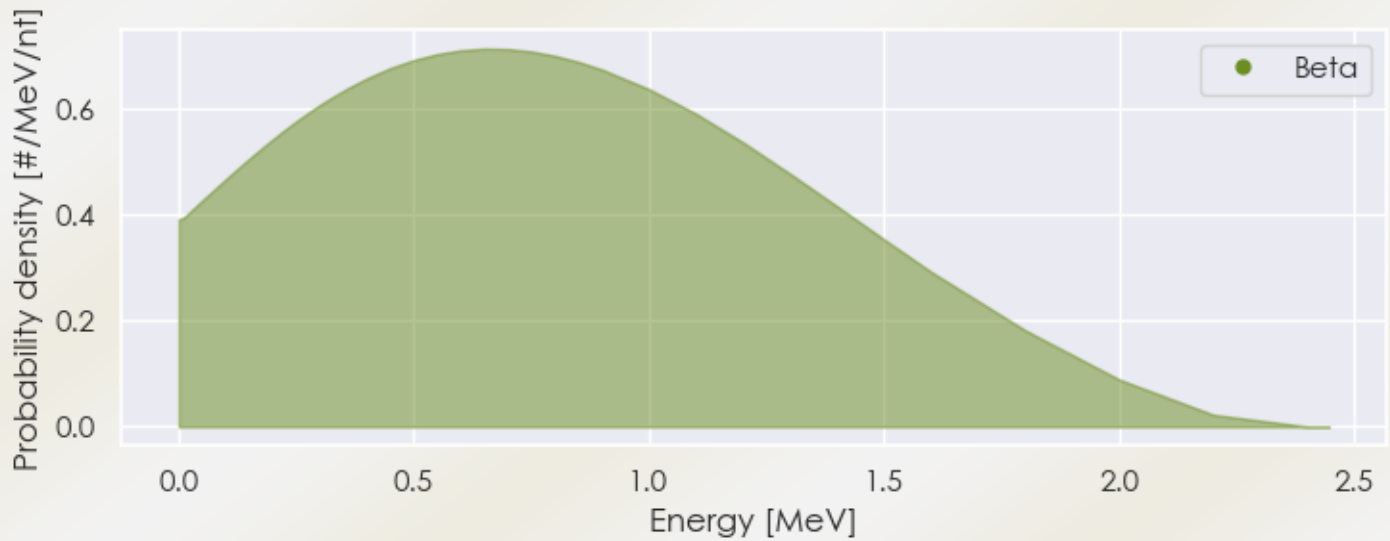
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Eu-159 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-159 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-159 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.94281e-05	1.122e+01	X-ray
1.09457e-03	1.713e-02	X-ray
6.04290e-03	7.871e-02	X-ray
6.71540e-03	5.151e-02	X-ray
7.08640e-03	1.338e-02	X-ray
1.71000e-02	1.593e-02	Gamma
4.23559e-02	2.583e-01	X-ray
4.30603e-02	4.645e-01	X-ray
4.86161e-02	4.720e-02	X-ray
4.87612e-02	9.129e-02	X-ray

4.99916e-02	1.037e-02	X-ray
5.00239e-02	2.013e-02	X-ray
5.07000e-02	3.412e-02	Gamma
6.78000e-02	1.918e-01	Gamma
7.14000e-02	1.073e-02	Gamma
7.86000e-02	9.100e-02	Gamma
8.04000e-02	1.235e-02	Gamma
9.57000e-02	6.988e-02	Gamma
1.46400e-01	3.250e-02	Gamma
1.59800e-01	1.365e-02	Gamma
1.76900e-01	1.300e-02	Gamma
2.27500e-01	1.625e-02	Gamma
6.13400e-01	1.268e-02	Gamma
6.59500e-01	1.333e-02	Gamma
6.64900e-01	3.055e-02	Gamma
6.76600e-01	1.885e-02	Gamma
6.81900e-01	2.307e-02	Gamma
8.04700e-01	2.567e-02	Gamma
1.09480e+00	1.202e-02	Gamma
3.36783e-01	1.080e-02	Beta
4.83204e-01	2.455e-02	Beta
4.97570e-01	1.080e-02	Beta
5.74131e-01	1.375e-02	Beta
6.06742e-01	4.615e-02	Beta
6.62382e-01	3.240e-02	Beta
6.67524e-01	6.480e-02	Beta
6.77291e-01	2.062e-02	Beta
7.24622e-01	1.276e-02	Beta
8.85287e-01	2.258e-02	Beta
8.90774e-01	1.375e-01	Beta
9.27079e-01	3.633e-01	Beta
9.38054e-01	4.909e-02	Beta
9.62368e-01	1.865e-01	Beta
1.68638e-05	7.547e-01	Auger electron
1.13388e-04	5.047e+00	Auger electron
1.23519e-04	4.152e-01	Auger electron
1.82344e-04	7.855e-01	Auger electron
3.97000e-04	4.288e-01	Conversion electron

5.71241e-04	1.572e-01	Auger electron
6.97002e-04	2.821e-02	Conversion electron
8.97831e-04	1.703e+00	Auger electron
1.07550e-03	1.156e-01	Auger electron
4.77207e-03	6.261e-01	Auger electron
5.92803e-03	2.195e-01	Auger electron
7.11861e-03	1.907e-02	Auger electron
8.75020e-03	2.359e-02	Conversion electron
9.15300e-03	2.334e-02	Conversion electron
9.85730e-03	3.627e-02	Conversion electron
1.55582e-02	1.860e-02	Conversion electron
1.74970e-02	1.310e-01	Conversion electron
2.10970e-02	6.598e-02	Conversion electron
2.82970e-02	4.229e-02	Conversion electron
3.00970e-02	5.001e-02	Conversion electron
3.47387e-02	4.030e-02	Auger electron
4.00970e-02	1.667e-02	Conversion electron
4.11460e-02	1.995e-02	Auger electron
4.23502e-02	5.663e-02	Conversion electron
4.53970e-02	1.592e-01	Conversion electron
4.91582e-02	1.361e-02	Conversion electron
5.51970e-02	1.073e-02	Conversion electron
5.94502e-02	1.288e-02	Conversion electron
8.73502e-02	2.101e-02	Conversion electron
9.60970e-02	1.927e-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