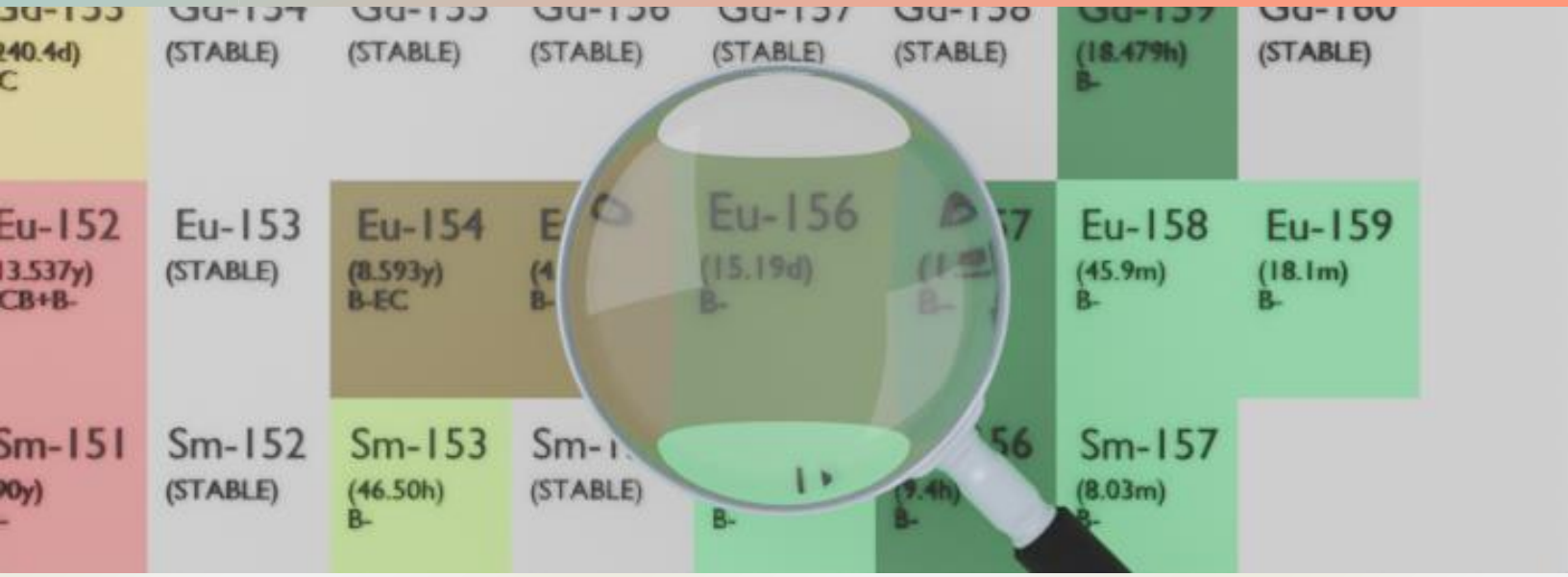


EUROPIUM-156

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Eu-156
Atomic number (Z): 63
Mass number (A): 156
Neutron number (N): 93

RADIOACTIVE DECAY

Decay modes: β-
Half-life: 15.19 [d]
Decay constant: 5.2815e-07 [1/s]
Daughters: Gd-156 (100.0%)
Radioactive daughters: None

DOSIMETRIC CONSTANTS

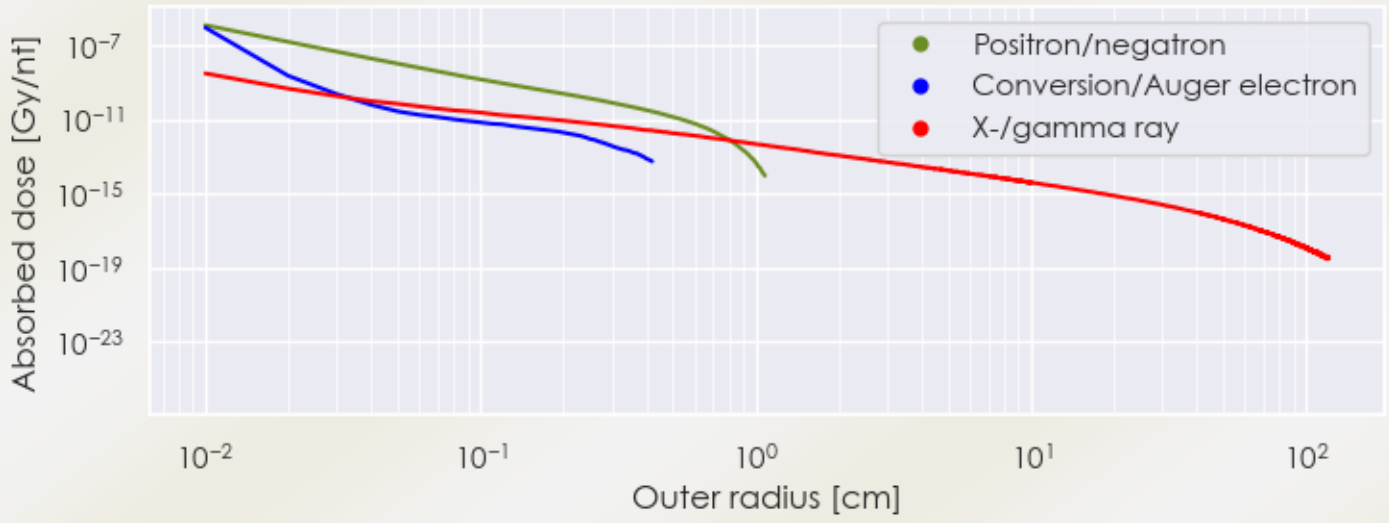
Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.45788 [MeV]
Mean photon energy: 1.23416 [MeV]
Air kerma rate constant, Γ_{10}: 4.105e-17 [Gy·m^2/Bq·s]
Air kerma coefficient, K_{air}: 4.105e-17 [Gy·m^2/Bq·s]
Equilibrium dose constant for weakly-penetrating radiations (a and/or electrons), Δ_{wp}: 7.336e-14 [Gy·kg/Bq·s]
Equilibrium dose constant for alphas, Δ_{a}: 0.000e+00 [Gy·kg/Bq·s]

Equilibrium dose constant for betas/electrons, $\Delta_{\beta-,\beta+,e-}$: 7.336e-14 [Gy·kg/Bq·s]
Equilibrium dose constant for photons, Δ_{p}: 1.977e-13 [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

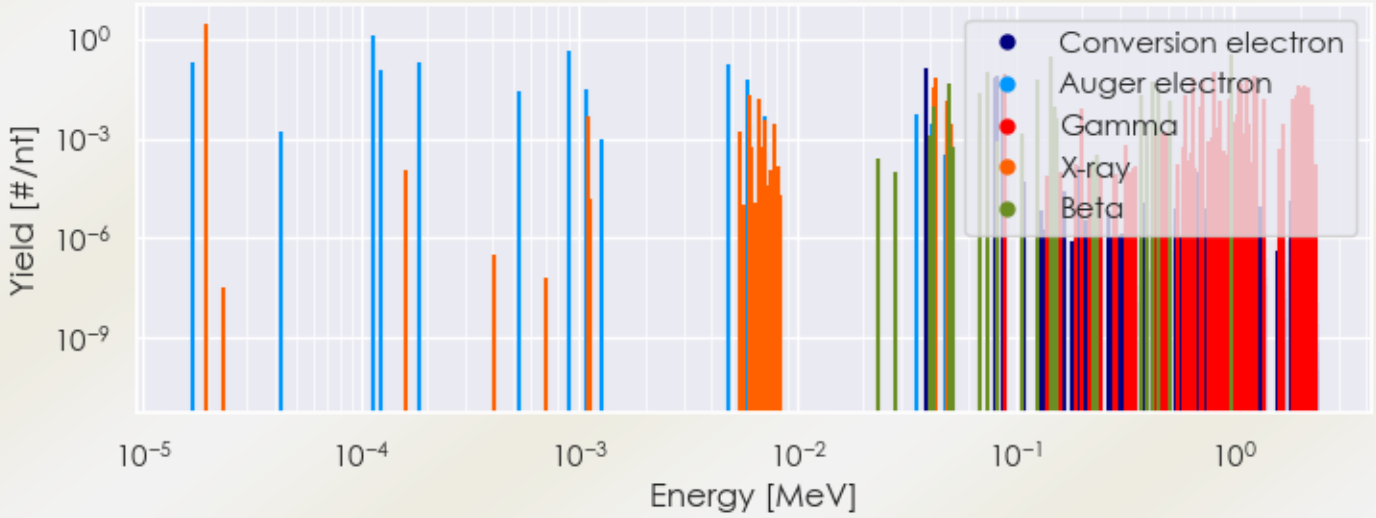
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Eu-156 DPK.csv

SUMMARY SPECTRA (PLOT)

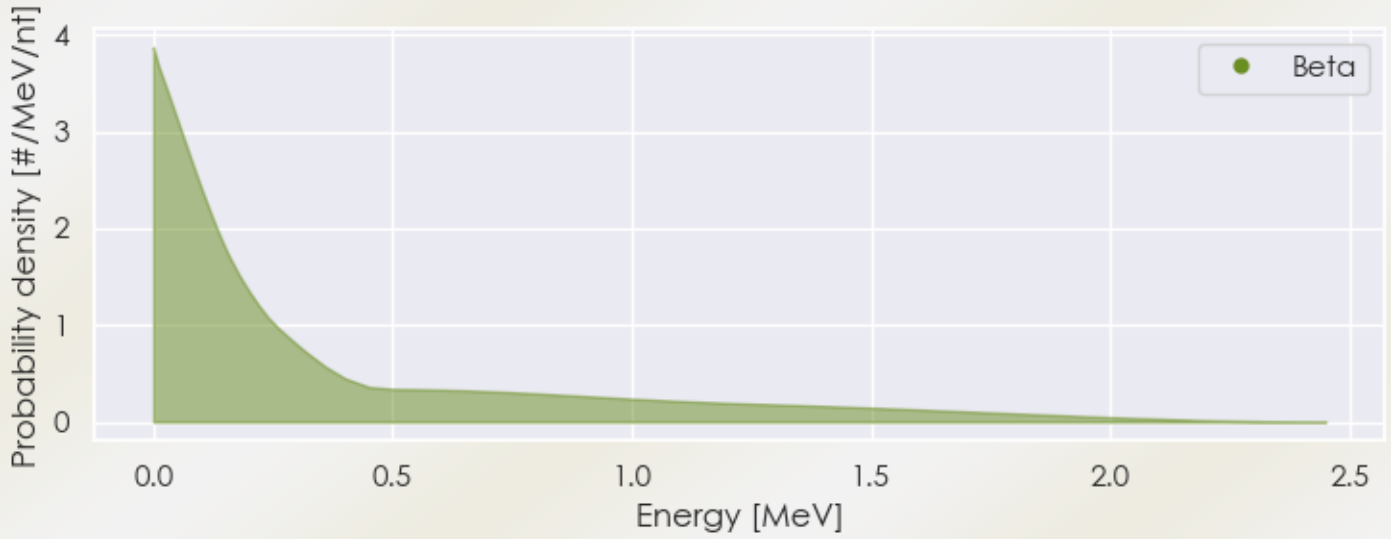
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Eu-156 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-156 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-156 Summary Spectrum.csv

Energy [MeV]	Yield [#/nt] if > 0.01	Radiation type
1.94243e-05	2.858e+00	X-ray
6.04290e-03	1.973e-02	X-ray
6.71540e-03	1.606e-02	X-ray
4.23559e-02	3.604e-02	X-ray
4.30603e-02	6.479e-02	X-ray
4.87612e-02	1.274e-02	X-ray
8.89700e-02	8.439e-02	Gamma
5.99470e-01	2.085e-02	Gamma
6.46290e-01	6.279e-02	Gamma
7.23470e-01	5.418e-02	Gamma

8.11770e-01	9.700e-02	Gamma
8.67010e-01	1.328e-02	Gamma
9.44350e-01	1.331e-02	Gamma
9.60500e-01	1.445e-02	Gamma
1.06514e+00	4.922e-02	Gamma
1.07916e+00	4.589e-02	Gamma
1.15367e+00	6.790e-02	Gamma
1.15408e+00	4.734e-02	Gamma
1.23071e+00	7.983e-02	Gamma
1.24242e+00	6.601e-02	Gamma
1.27743e+00	2.886e-02	Gamma
1.36641e+00	1.572e-02	Gamma
1.87703e+00	1.512e-02	Gamma
1.93771e+00	1.944e-02	Gamma
1.96595e+00	3.870e-02	Gamma
2.02665e+00	3.272e-02	Gamma
2.09770e+00	3.809e-02	Gamma
2.18091e+00	2.142e-02	Gamma
2.18671e+00	3.485e-02	Gamma
2.26990e+00	1.031e-02	Gamma
4.90325e-02	4.227e-02	Beta
6.81793e-02	2.214e-02	Beta
7.39031e-02	1.037e-01	Beta
1.25449e-01	5.737e-02	Beta
1.46089e-01	2.919e-01	Beta
3.73089e-01	2.114e-02	Beta
4.23768e-01	5.335e-02	Beta
4.54579e-01	4.127e-02	Beta
5.04377e-01	1.288e-02	Beta
9.64562e-01	3.221e-01	Beta
1.68638e-05	1.904e-01	Auger electron
1.13481e-04	1.284e+00	Auger electron
1.22109e-04	1.067e-01	Auger electron
1.84426e-04	1.977e-01	Auger electron
5.31558e-04	2.773e-02	Auger electron
8.97631e-04	4.412e-01	Auger electron
1.07422e-03	2.988e-02	Auger electron
4.76918e-03	1.601e-01	Auger electron

5.92257e-03	5.614e-02	Auger electron
3.86670e-02	1.310e-01	Conversion electron
8.06202e-02	1.176e-02	Conversion electron
8.10230e-02	6.923e-02	Conversion electron
8.17273e-02	7.302e-02	Conversion electron
8.74282e-02	3.639e-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