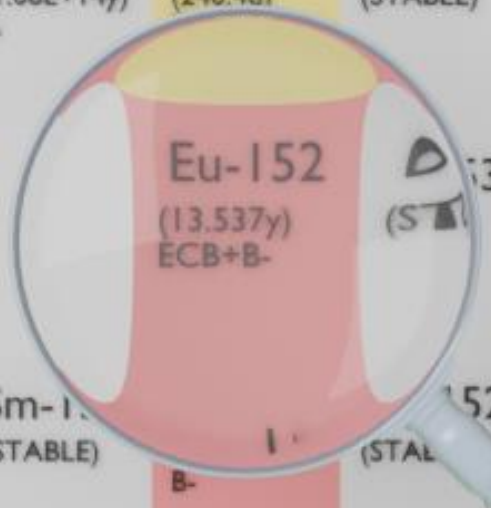




Eu-147 (9.28d) CB+	Eu-148 (64.5d) CB+A	Eu-149 (93.1d) EC	Eu-150 (36.9y) ECB+	Eu-152 (13.537y) ECB+B-	Eu-153 (10.1y) ECB	Eu-154 (8.593y) B-EC	Eu-155 (4.7611y) B-	Eu-156 (15.19d) B-
Gd-147 (1.28E+6y) A	Gd-148 (1.06E+11y) A	Gd-149 (7E+15y) A	Gd-150 (124d) ECA	Gd-151 (1.08E+14y) A	Gd-152 (240.4d) A	Gd-153 (1.08E+14y) A	Gd-154 (1.08E+14y) A	Gd-155 (1.08E+14y) A
Sm-147 (1.06E+11y) A	Sm-148 (7E+15y) A	Sm-149 (STABLE)	Sm-150 (STABLE)	Sm-151 (STABLE)	Sm-152 (STABLE)	Sm-153 (46.50h) B-	Sm-154 (STABLE)	Sm-155 (22.3m) B-

EUROPIUM-152

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Eu-152
Atomic number (Z): 63
Mass number (A): 152
Neutron number (N): 89

RADIOACTIVE DECAY

Decay modes: β^- , β^+ , Electron capture
Half-life: 13.54 [y]
Decay constant: 1.6226×10^{-9} [1/s]
Daughters: Gd-152 (27.9%), Sm-152 (72.1%)
Radioactive daughters: Gd-152

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.12856 [MeV]
Mean photon energy: 1.17591 [MeV]
Air kerma rate constant, Γ_{10} : 4.254×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 4.255×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 2.060×10^{-14} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000e+00 [Gy $\cdot$ kg/Bq $\cdot$ s]

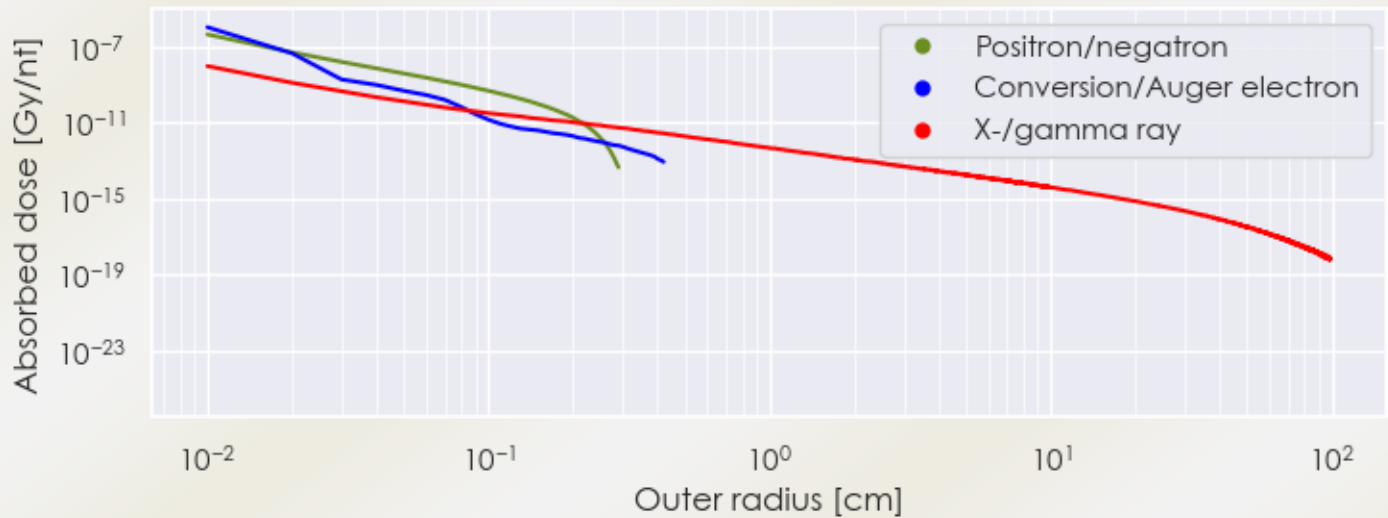
Equilibrium dose constant for betas/electrons, $\Delta_{\beta,\beta^+,e^-}$: 2.060×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.884×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

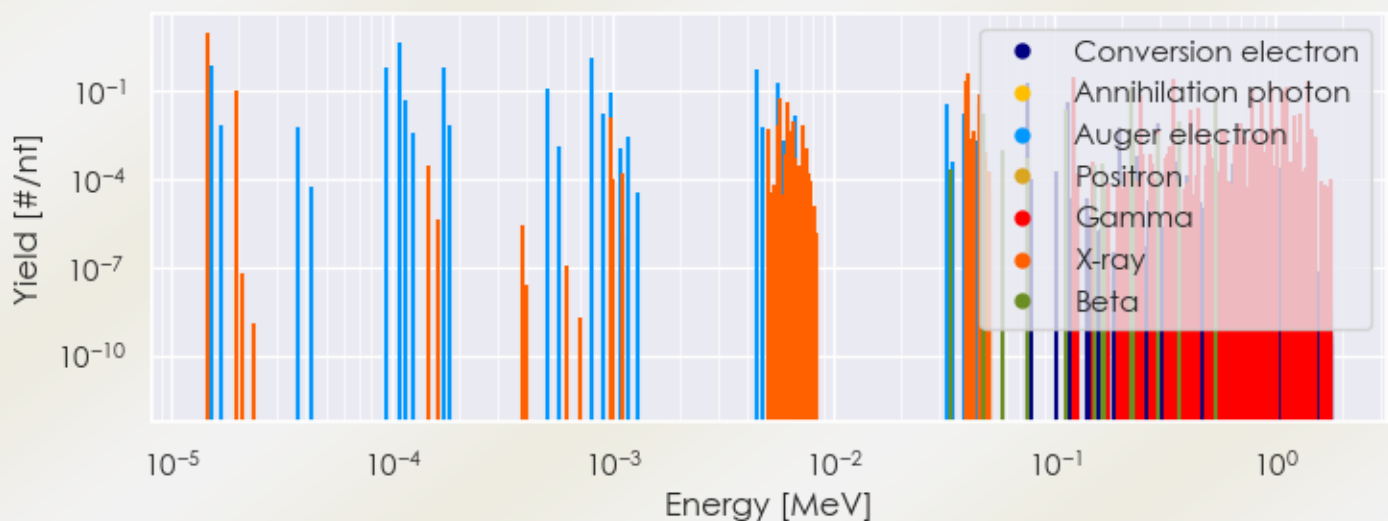
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Eu-152 DPK.csv

SUMMARY SPECTRA (PLOT)

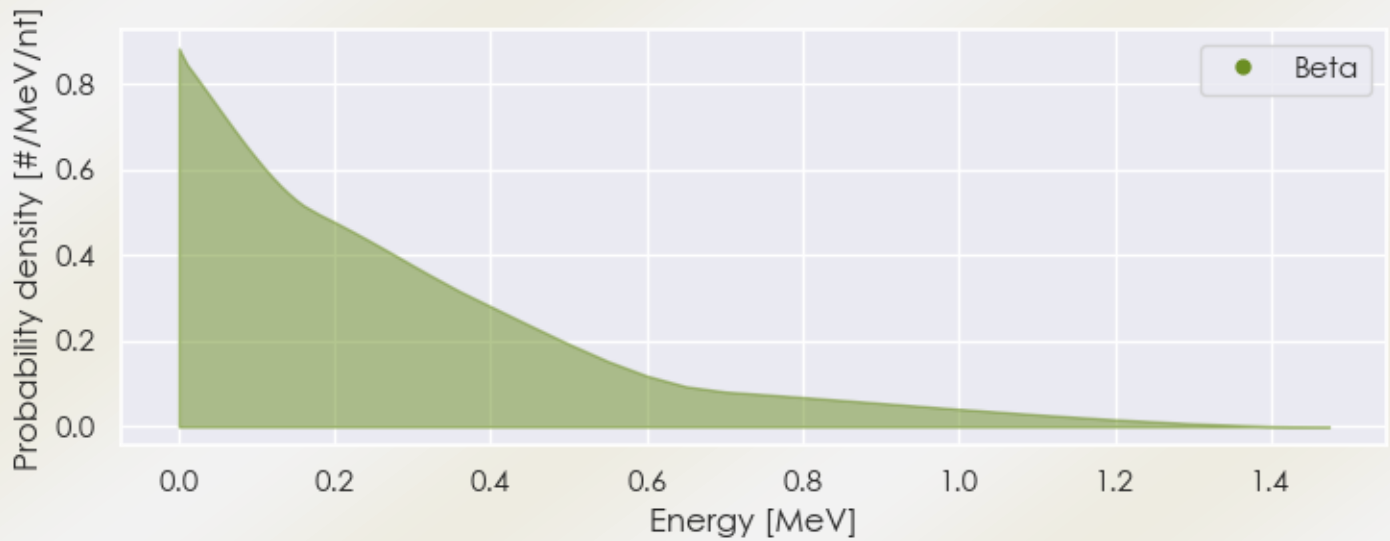
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Eu-152 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-152 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-152 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.45293e-05	1.030e+01	X-ray
1.94280e-05	1.071e-01	X-ray
9.69428e-04	1.208e-02	X-ray
5.62210e-03	5.989e-02	X-ray
6.20531e-03	4.003e-02	X-ray
3.95578e-02	2.115e-01	X-ray
4.01680e-02	3.829e-01	X-ray
4.53440e-02	3.837e-02	X-ray
4.54683e-02	7.423e-02	X-ray
4.66259e-02	1.615e-02	X-ray

1.21782e-01	2.867e-01	Gamma
2.44698e-01	7.607e-02	Gamma
3.44279e-01	2.656e-01	Gamma
4.11116e-01	2.237e-02	Gamma
4.43965e-01	2.830e-02	Gamma
7.78904e-01	1.296e-01	Gamma
8.67373e-01	4.258e-02	Gamma
9.64079e-01	1.465e-01	Gamma
1.08587e+00	1.024e-01	Gamma
1.08974e+00	1.730e-02	Gamma
1.11207e+00	1.369e-01	Gamma
1.21295e+00	1.426e-02	Gamma
1.29914e+00	1.625e-02	Gamma
1.40801e+00	2.107e-01	Gamma
4.73705e-02	1.823e-02	Beta
1.12287e-01	2.432e-02	Beta
2.21593e-01	1.381e-01	Beta
5.35309e-01	8.116e-02	Beta
1.51033e-05	8.048e-01	Auger electron
9.41769e-05	6.605e-01	Auger electron
1.06726e-04	4.302e+00	Auger electron
1.13413e-04	4.817e-02	Auger electron
1.69338e-04	6.871e-01	Auger electron
5.04335e-04	1.315e-01	Auger electron
8.03812e-04	1.478e+00	Auger electron
8.97742e-04	1.634e-02	Auger electron
9.73769e-04	9.463e-02	Auger electron
4.46001e-03	5.491e-01	Auger electron
5.50990e-03	1.877e-01	Auger electron
6.59336e-03	1.601e-02	Auger electron
3.25196e-02	3.651e-02	Auger electron
3.84443e-02	1.779e-02	Auger electron
7.49057e-02	1.939e-01	Conversion electron
1.14079e-01	1.831e-02	Conversion electron
1.14464e-01	4.540e-02	Conversion electron
1.15074e-01	4.485e-02	Conversion electron
1.20374e-01	2.511e-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