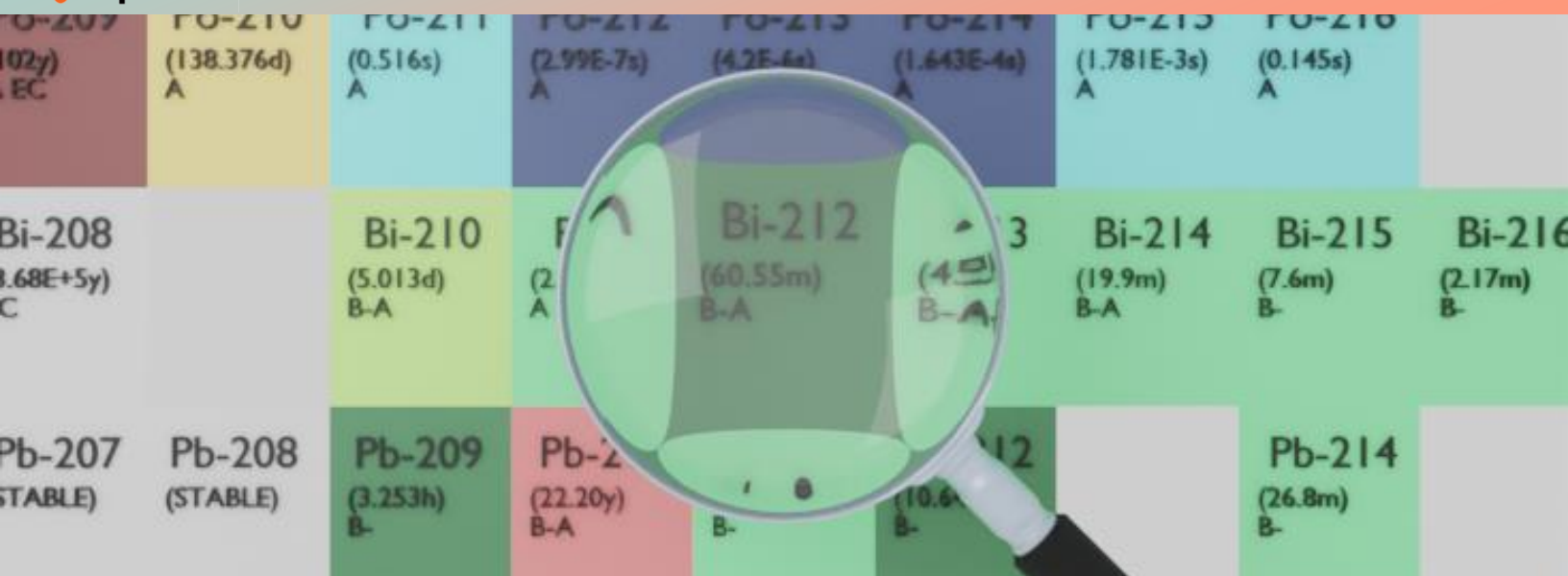




BISMUTH-212

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Bi-212
Atomic number (Z): 83
Mass number (A): 212
Neutron number (N): 129

RADIOACTIVE DECAY

Decay modes: α , β^-
Half-life: 60.55 [m]
Decay constant: 1.9079×10^{-4} [1/s]
Daughters: Po-212 (64.1%), Tl-208 (35.9%)
Radioactive daughters: Po-212, Tl-208

DOSIMETRIC CONSTANTS

Mean alpha energy: 2.2163 [MeV]
Mean electron energy: 0.50456 [MeV]
Mean photon energy: 0.10376 [MeV]
Air kerma rate constant, Γ_{10} : 7.052×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 7.052×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 4.359×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 3.551×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]

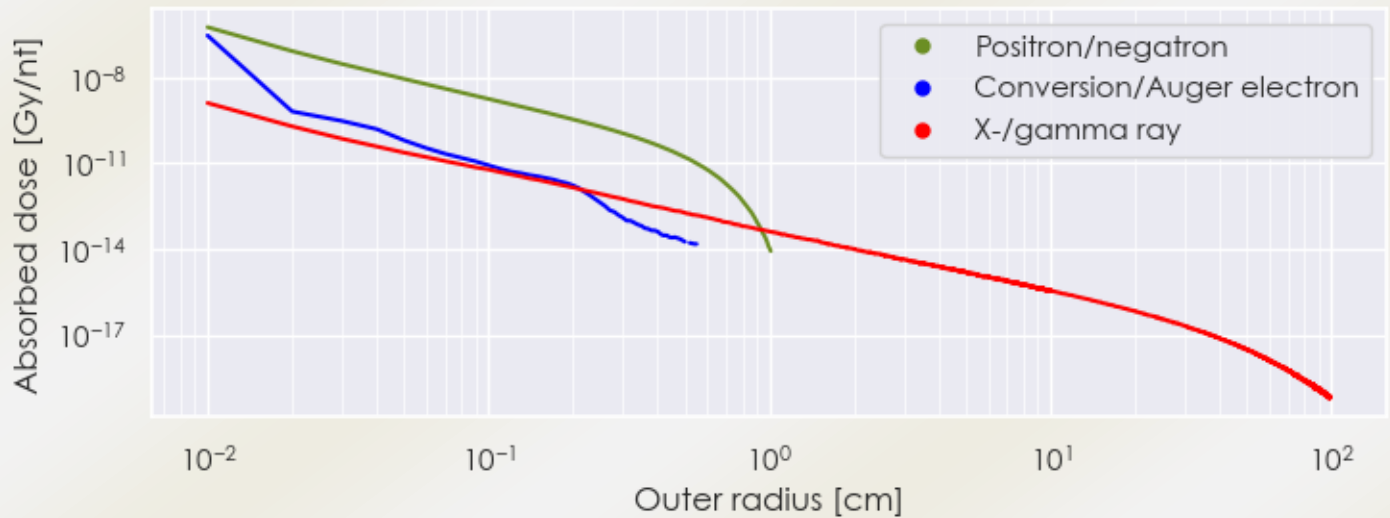
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 8.084×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.662×10^{-14} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

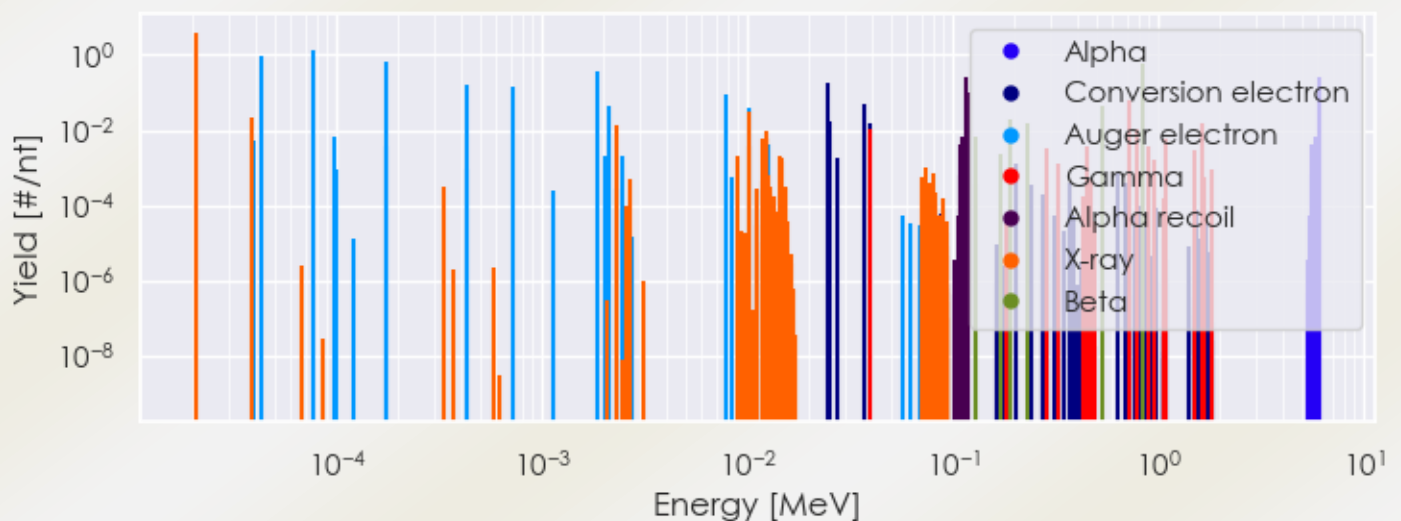
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Bi-212 DPK.csv

SUMMARY SPECTRA (PLOT)

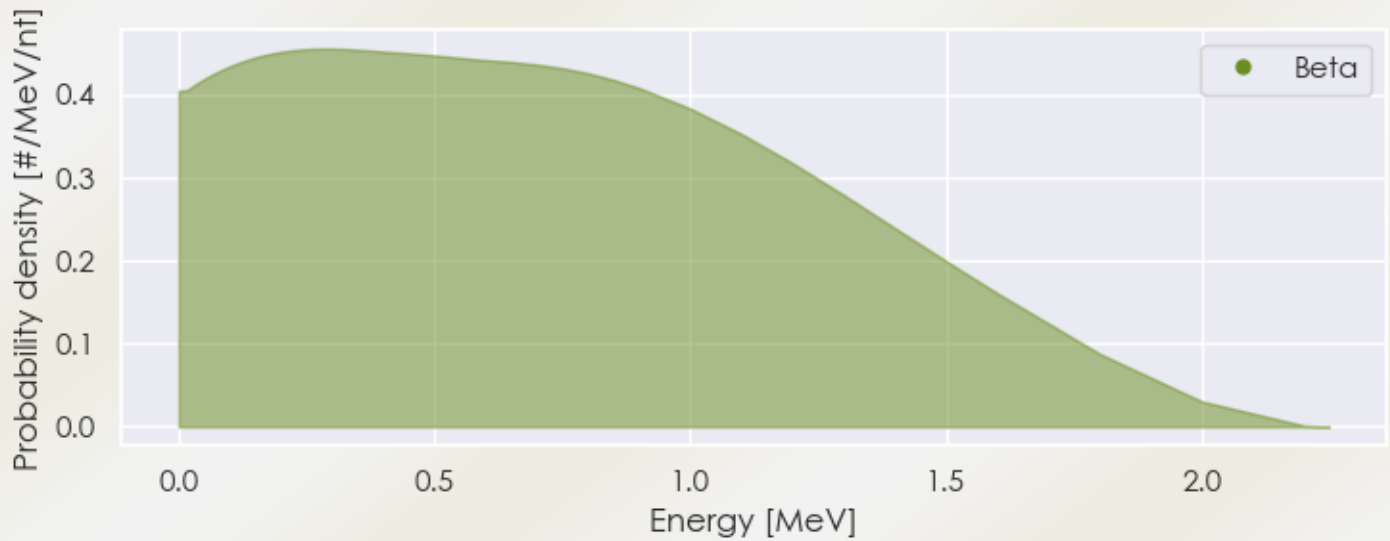
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Bi-212 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/Bi-212 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/Bi-212 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
2.07247e-05	4.027e+00	X-ray
3.84122e-05	2.193e-02	X-ray
2.30042e-03	1.394e-02	X-ray
1.02661e-02	3.155e-02	X-ray
3.98570e-02	1.064e-02	Gamma
7.27330e-01	6.579e-02	Gamma
7.85370e-01	1.102e-02	Gamma
1.62050e+00	1.486e-02	Gamma
1.91176e-01	1.870e-02	Beta
2.29311e-01	1.435e-02	Beta

5.31335e-01	4.362e-02	Beta
8.32328e-01	5.545e-01	Beta
4.29936e-05	8.917e-01	Auger electron
7.66264e-05	1.316e+00	Auger electron
1.74792e-04	6.870e-01	Auger electron
4.29783e-04	1.625e-01	Auger electron
7.25199e-04	1.393e-01	Auger electron
1.85584e-03	3.568e-01	Auger electron
2.10070e-03	4.179e-02	Auger electron
7.92956e-03	8.709e-02	Auger electron
1.02397e-02	3.796e-02	Auger electron
2.45270e-02	1.809e-01	Conversion electron
2.51110e-02	1.772e-02	Conversion electron
3.69124e-02	4.682e-02	Conversion electron
3.98570e-02	1.494e-02	Conversion electron
6.05090e+00	2.508e-01	Alpha
6.09001e+00	9.729e-02	Alpha
1.16439e-01	2.508e-01	Alpha recoil
1.17192e-01	9.729e-02	Alpha recoil

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