



BISMUTH-211

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Bi-211
Atomic number (Z): 83
Mass number (A): 211
Neutron number (N): 128

RADIOACTIVE DECAY

Decay modes: α , β^-
Half-life: 2.14 [m]
Decay constant: 5.3983×10^{-3} [1/s]
Daughters: Tl-207 (99.7%), Po-211 (0.276%)
Radioactive daughters: Tl-207, Po-211

DOSIMETRIC CONSTANTS

Mean alpha energy: 6.6756 [MeV]
Mean electron energy: 0.01003 [MeV]
Mean photon energy: 0.04726 [MeV]
Air kerma rate constant, Γ_{10} : 2.207×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 2.207×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.071×10^{-12} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 1.070×10^{-12} [Gy $\cdot$ kg/Bq $\cdot$ s]

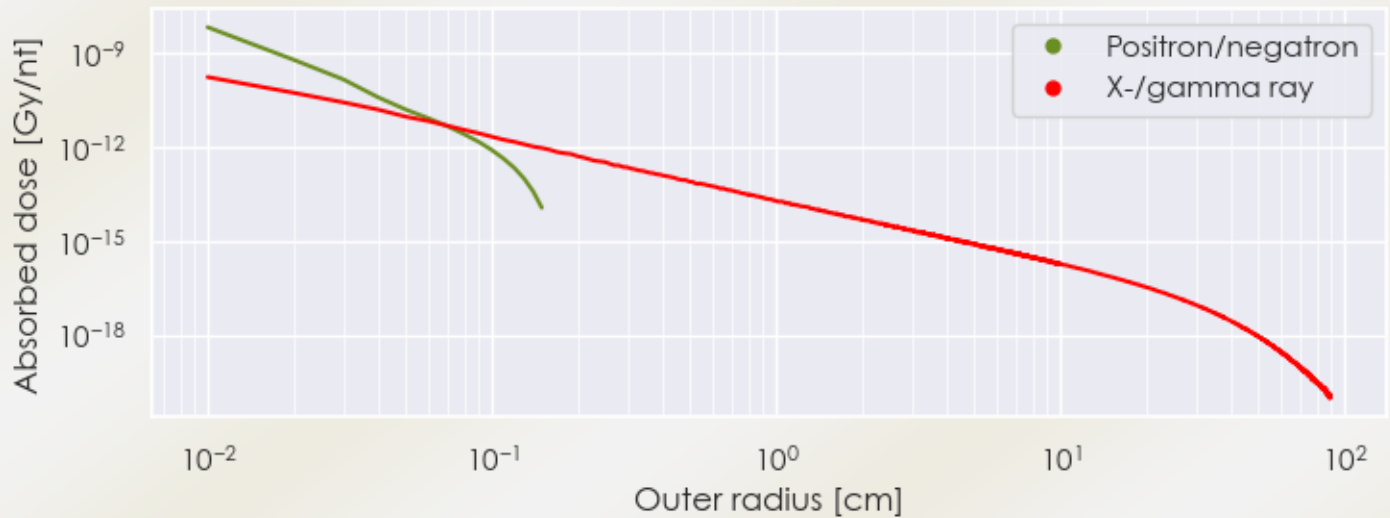
Equilibrium dose constant for betas/electrons, $\Delta_{\beta,\beta^+,e^-}$: 1.607×10^{-15} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 7.572×10^{-15} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

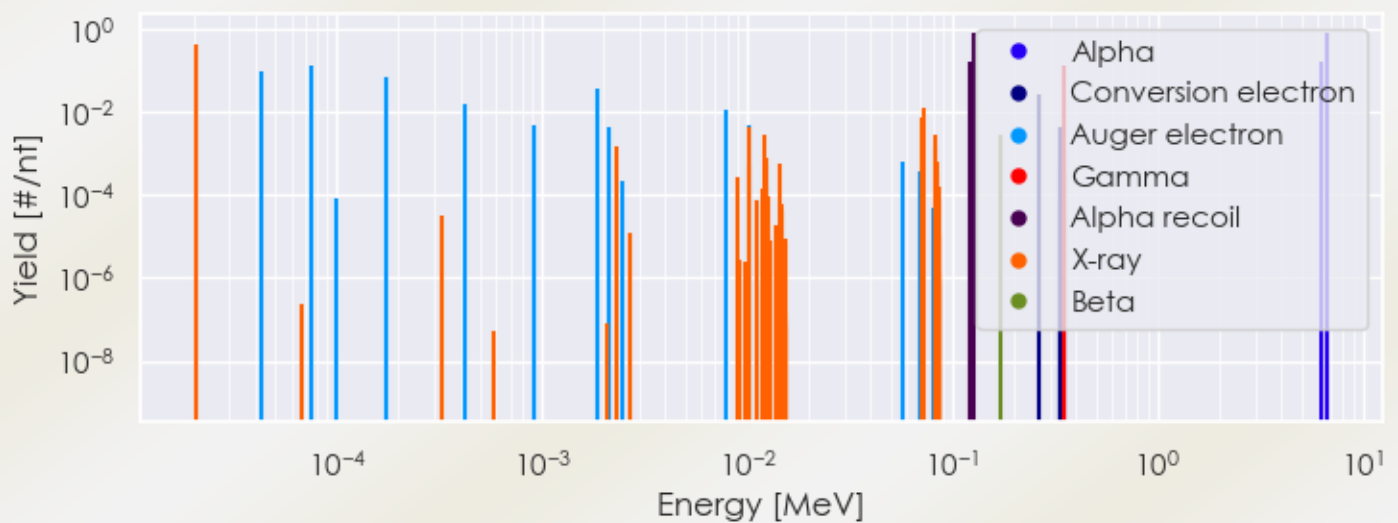
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Bi-211 DPK.csv

SUMMARY SPECTRA (PLOT)

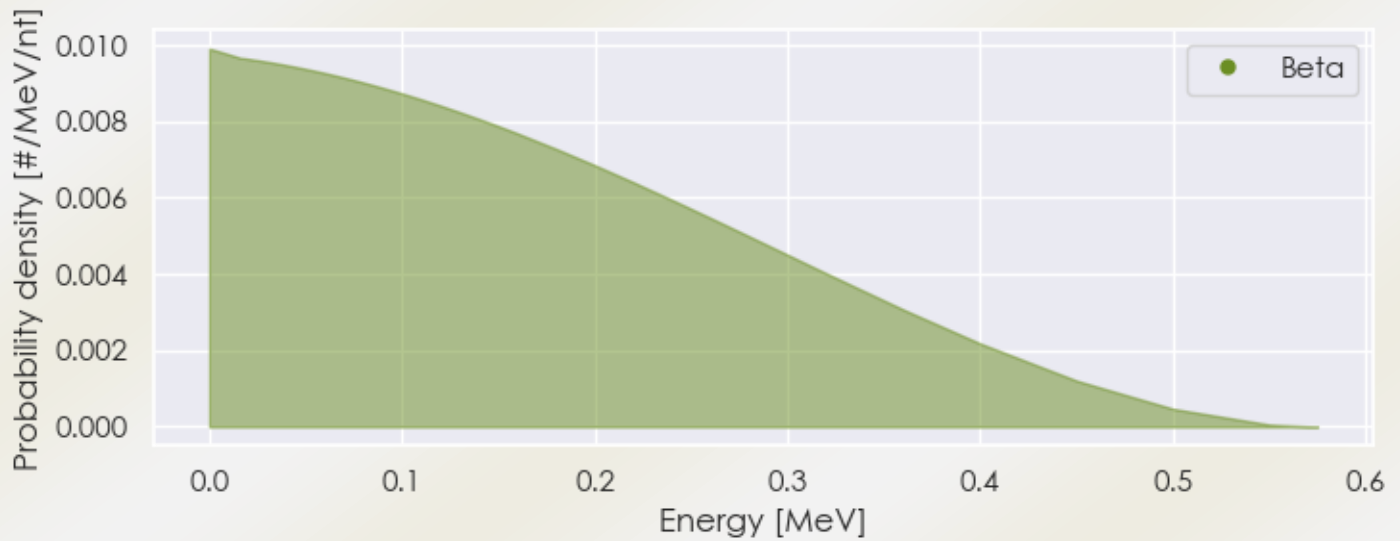
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Bi-211 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-211 Beta Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Bi-211%20Beta%20Spectrum.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-211 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Bi-211%20Summary%20Spectrum.csv)

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
2.07377e-05	4.174e-01	X-ray
7.31380e-02	1.283e-02	X-ray
3.51060e-01	1.288e-01	Gamma
4.30136e-05	9.162e-02	Auger electron
7.56897e-05	1.368e-01	Auger electron
1.74463e-04	7.169e-02	Auger electron
4.16877e-04	1.554e-02	Auger electron
1.85875e-03	3.784e-02	Auger electron
7.84069e-03	1.133e-02	Auger electron
2.65262e-01	2.702e-02	Conversion electron

6.27864e+00	1.619e-01	Alpha
6.62304e+00	8.354e-01	Alpha
1.21405e-01	1.619e-01	Alpha recoil
1.28065e-01	8.354e-01	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/SNMML-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6