



POLONIUM-204

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Po-204
Atomic number (Z): 84
Mass number (A): 204
Neutron number (N): 120

RADIOACTIVE DECAY

Decay modes: α , Electron capture
Half-life: 3.53 [h]
Decay constant: 5.4544×10^{-5} [1/s]
Daughters: Bi-204 (99.3%), Pb-200 (0.66%)
Radioactive daughters: Bi-204, Pb-200

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0362 [MeV]
Mean electron energy: 0.18386 [MeV]
Mean photon energy: 1.16498 [MeV]
Air kerma rate constant, Γ_{10} : 7.532×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 7.532×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 3.526×10^{-14} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 5.800×10^{-15} [Gy $\cdot$ kg/Bq $\cdot$ s]

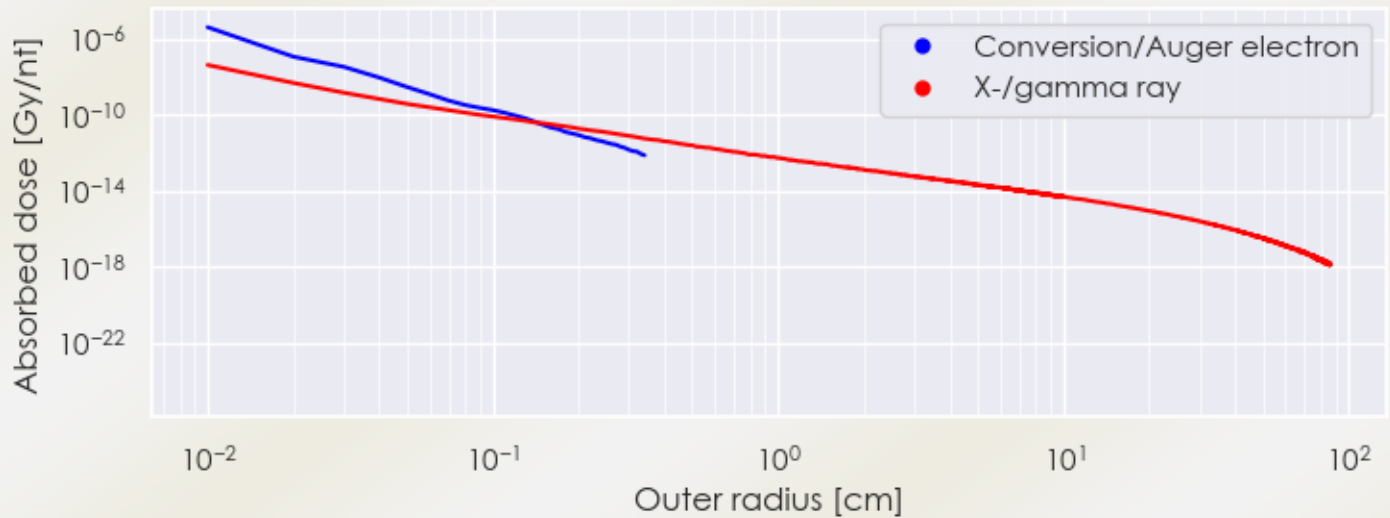
Equilibrium dose constant for betas/electrons, $\Delta_{\beta,\beta+,e-}$: 2.946e-14 [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.867e-13 [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

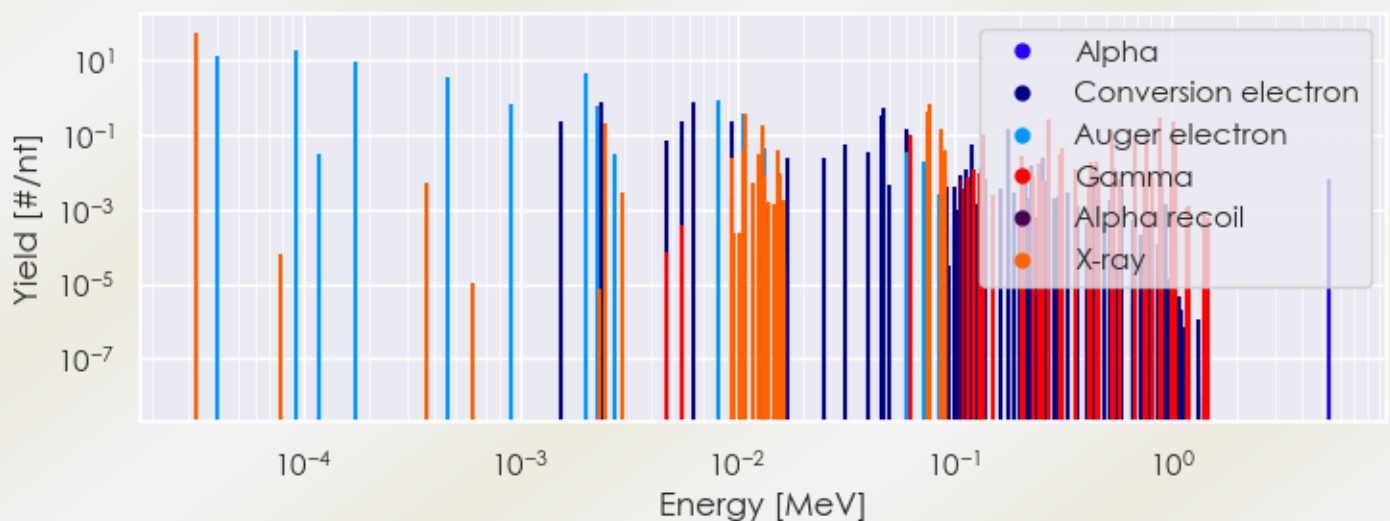
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Po-204 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/Po-204 Summary 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/Po-204 Summary Spectrum.csv

Energy [MeV]	Yield [#/(nt)] if > 0.01	Radiation type
3.24675e-05	5.825e+01	X-ray
2.48302e-03	2.028e-01	X-ray
9.45110e-03	2.317e-02	X-ray
1.07270e-02	4.052e-02	X-ray
1.08390e-02	3.568e-01	X-ray
1.26833e-02	3.015e-02	X-ray
1.29844e-02	6.928e-02	X-ray
1.30700e-02	1.890e-01	X-ray
1.32091e-02	3.228e-02	X-ray
1.53031e-02	3.903e-02	X-ray
6.31850e-02	1.076e-01	Gamma
7.50642e-02	4.223e-01	X-ray
7.74071e-02	7.062e-01	X-ray
8.71393e-02	7.897e-02	X-ray
8.76651e-02	1.531e-01	X-ray
9.00323e-02	1.894e-02	X-ray
9.01629e-02	3.730e-02	X-ray
1.22582e-01	1.136e-02	Gamma
1.37023e-01	9.718e-02	Gamma
2.03561e-01	2.811e-02	Gamma
2.44724e-01	1.815e-02	Gamma
2.70068e-01	2.781e-01	Gamma
3.04964e-01	3.259e-02	Gamma
3.17016e-01	4.276e-02	Gamma
3.62140e-01	1.268e-02	Gamma
4.26820e-01	1.884e-02	Gamma
4.51846e-01	1.914e-02	Gamma

5.34920e-01	1.325e-01	Gamma
5.39500e-01	1.346e-02	Gamma
6.80390e-01	7.625e-02	Gamma
7.51590e-01	1.059e-02	Gamma
7.62520e-01	1.151e-01	Gamma
8.83960e-01	2.990e-01	Gamma
9.05150e-01	1.238e-02	Gamma
1.01629e+00	2.407e-01	Gamma
1.04001e+00	9.598e-02	Gamma
4.07057e-05	1.403e+01	Auger electron
9.33564e-05	1.819e+01	Auger electron
1.19539e-04	2.997e-02	Auger electron
1.76378e-04	9.936e+00	Auger electron
4.63189e-04	3.734e+00	Auger electron
9.12429e-04	7.218e-01	Auger electron
1.53310e-03	2.327e-01	Conversion electron
1.99116e-03	4.609e+00	Auger electron
2.29403e-03	6.235e-01	Auger electron
2.38310e-03	7.490e-01	Conversion electron
2.72727e-03	3.288e-02	Auger electron
4.70000e-03	7.526e-02	Conversion electron
5.55000e-03	2.433e-01	Conversion electron
6.35310e-03	7.471e-01	Conversion electron
8.26996e-03	8.664e-01	Auger electron
9.52000e-03	2.437e-01	Conversion electron
1.07378e-02	3.897e-01	Auger electron
1.32388e-02	4.191e-02	Auger electron
1.72230e-02	2.487e-02	Conversion electron
2.52250e-02	2.582e-02	Conversion electron
3.17500e-02	5.587e-02	Conversion electron
4.03920e-02	3.631e-02	Conversion electron
4.61910e-02	3.472e-01	Conversion electron
4.68090e-02	5.711e-01	Conversion electron
4.74170e-02	5.672e-02	Conversion electron
6.00181e-02	1.495e-01	Conversion electron
6.03003e-02	3.500e-02	Auger electron
6.31850e-02	4.880e-02	Conversion electron
7.26460e-02	1.923e-02	Auger electron

1.12729e-01	1.274e-02	Conversion electron
1.20647e-01	5.475e-02	Conversion electron
1.33856e-01	1.435e-02	Conversion electron
1.79236e-01	1.488e-01	Conversion electron
2.14132e-01	1.252e-02	Conversion electron
2.26184e-01	1.478e-02	Conversion electron
2.53692e-01	2.325e-02	Conversion electron
4.44088e-01	1.129e-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