



LEAD-197

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Pb-197
Atomic number (Z): 82
Mass number (A): 197
Neutron number (N): 115

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 8.0 [m]
Decay constant: 1.4441×10^{-3} [1/s]
Daughters: Tl-197 (100.0%)
Radioactive daughters: Tl-197

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.08176 [MeV]
Mean photon energy: 1.53192 [MeV]
Air kerma rate constant, Γ_{10} : 6.516×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 6.669×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.310×10^{-14} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000×10^0 [Gy $\cdot$ kg/Bq $\cdot$ s]

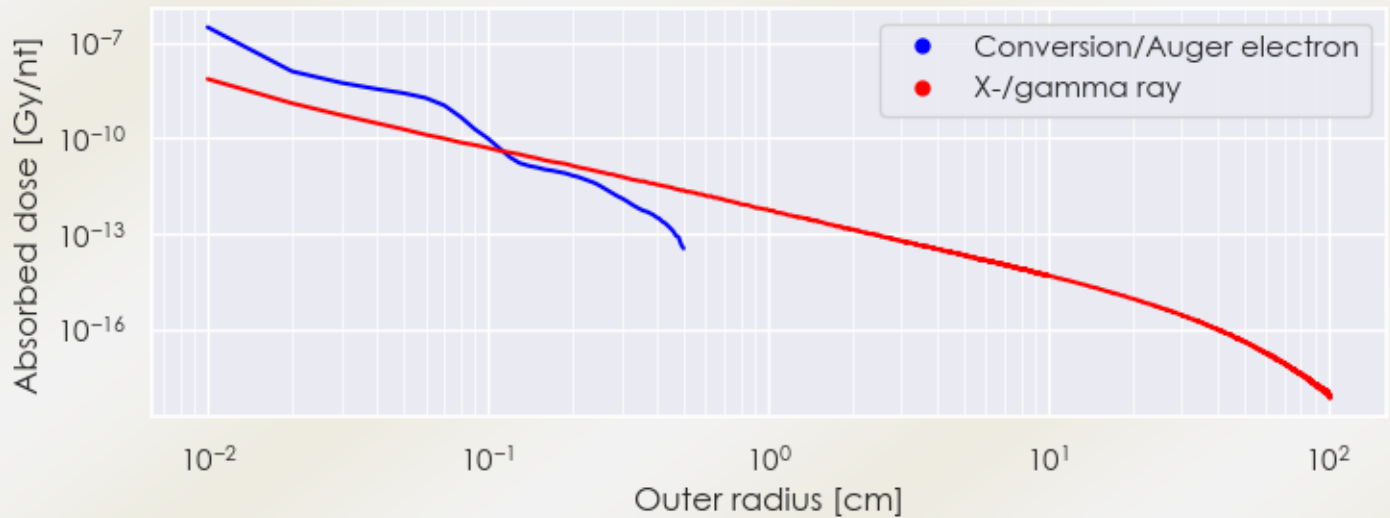
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 1.310×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 2.454×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

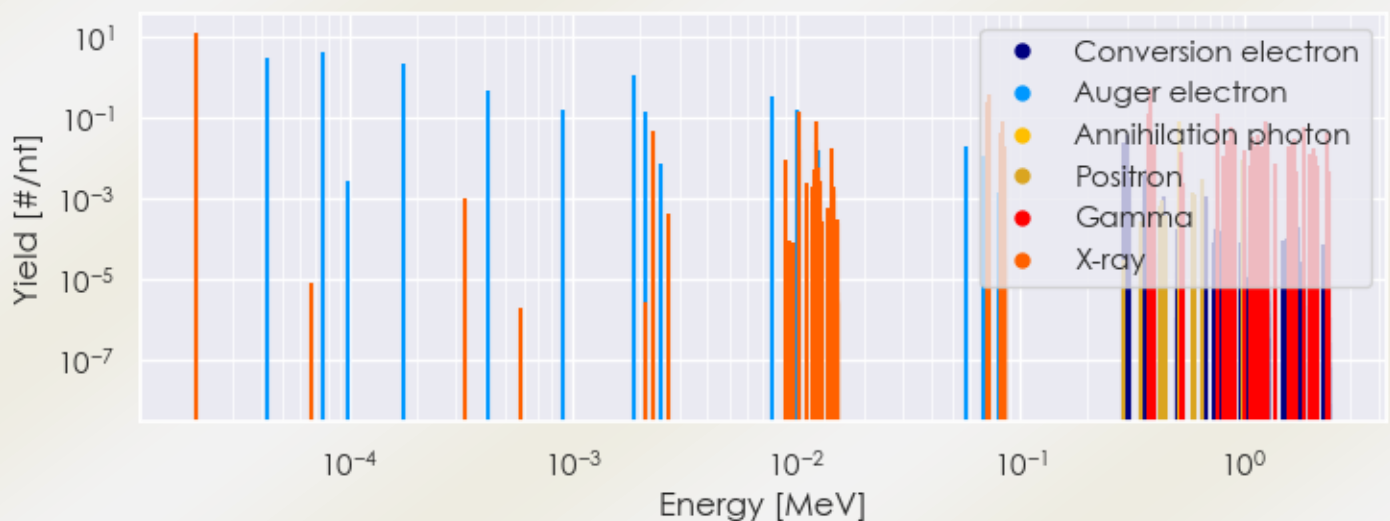
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Pb-197 DPK.csv

SUMMARY SPECTRA (PLOT)

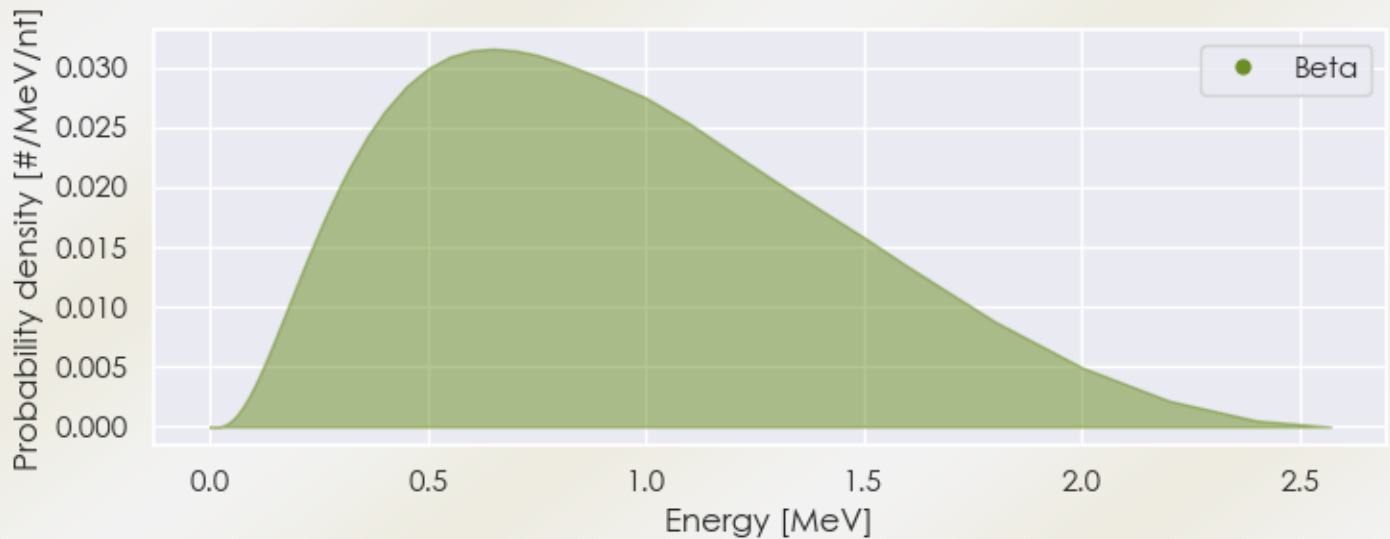
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Pb-197 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/Pb-197 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/Pb-197 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
2.07372e-05	1.330e+01	X-ray
2.30020e-03	4.682e-02	X-ray
1.01663e-02	1.528e-02	X-ray
1.02661e-02	1.346e-01	X-ray
1.22523e-02	8.536e-02	X-ray
1.22749e-02	2.563e-02	X-ray
1.43396e-02	1.724e-02	X-ray
7.10519e-02	2.370e-01	X-ray
7.31380e-02	3.998e-01	X-ray
8.23884e-02	4.435e-02	X-ray

8.28534e-02	8.586e-02	X-ray
8.50837e-02	1.051e-02	X-ray
8.51979e-02	2.063e-02	X-ray
3.75480e-01	1.278e-01	Gamma
3.85850e-01	5.040e-01	Gamma
3.94740e-01	2.070e-02	Gamma
5.11000e-01	7.930e-02	Annihilation photon
5.20700e-01	1.413e-02	Gamma
7.61140e-01	1.332e-01	Gamma
7.69840e-01	2.520e-02	Gamma
8.15280e-01	1.071e-02	Gamma
8.44180e-01	2.610e-02	Gamma
8.71610e-01	6.120e-02	Gamma
8.96090e-01	5.040e-02	Gamma
9.01680e-01	3.150e-02	Gamma
9.13450e-01	2.160e-02	Gamma
1.00383e+00	1.620e-02	Gamma
1.08816e+00	2.088e-02	Gamma
1.09282e+00	3.330e-02	Gamma
1.14006e+00	1.890e-02	Gamma
1.15609e+00	3.780e-02	Gamma
1.20899e+00	2.034e-02	Gamma
1.21921e+00	1.674e-02	Gamma
1.26123e+00	8.280e-02	Gamma
1.27727e+00	1.476e-02	Gamma
1.28886e+00	4.860e-02	Gamma
1.58449e+00	1.890e-02	Gamma
1.64714e+00	2.340e-02	Gamma
1.67462e+00	2.970e-02	Gamma
1.85404e+00	6.120e-02	Gamma
1.97575e+00	1.206e-02	Gamma
2.04377e+00	1.674e-02	Gamma
2.11273e+00	1.089e-02	Gamma
2.34545e+00	4.410e-02	Gamma
1.15936e+00	1.788e-02	Positron
4.30125e-05	2.922e+00	Auger electron
7.57404e-05	4.360e+00	Auger electron
1.74481e-04	2.285e+00	Auger electron

4.17348e-04	4.977e-01	Auger electron
8.98218e-04	1.562e-01	Auger electron
1.85873e-03	1.204e+00	Auger electron
2.10412e-03	1.417e-01	Auger electron
7.84082e-03	3.588e-01	Auger electron
1.01316e-02	1.560e-01	Auger electron
1.24498e-02	1.632e-02	Auger electron
5.72241e-02	2.054e-02	Auger electron
6.88063e-02	1.118e-02	Auger electron
2.89682e-01	2.369e-02	Conversion electron
3.00052e-01	3.577e-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