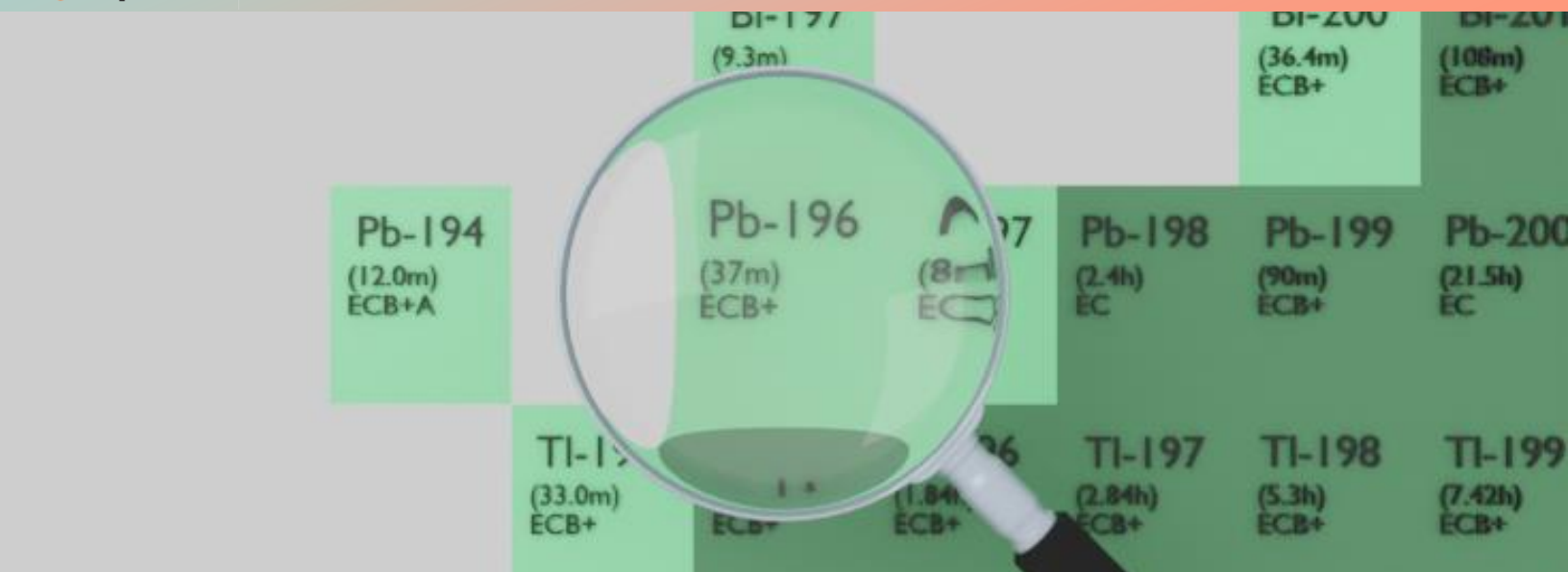




LEAD-196

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Pb-196
Atomic number (Z): 82
Mass number (A): 196
Neutron number (N): 114

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 37.0 [m]
Decay constant: $3.1223\text{e-}04$ [1/s]
Daughters: Tl-196 (100.0%)
Radioactive daughters: Tl-196

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.09688 [MeV]
Mean photon energy: 0.494 [MeV]
Air kerma rate constant, Γ_{10} : $3.707\text{e-}17$ [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : $3.718\text{e-}17$ [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $1.552\text{e-}14$ [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : $0.000\text{e+}00$ [Gy $\cdot$ kg/Bq $\cdot$ s]

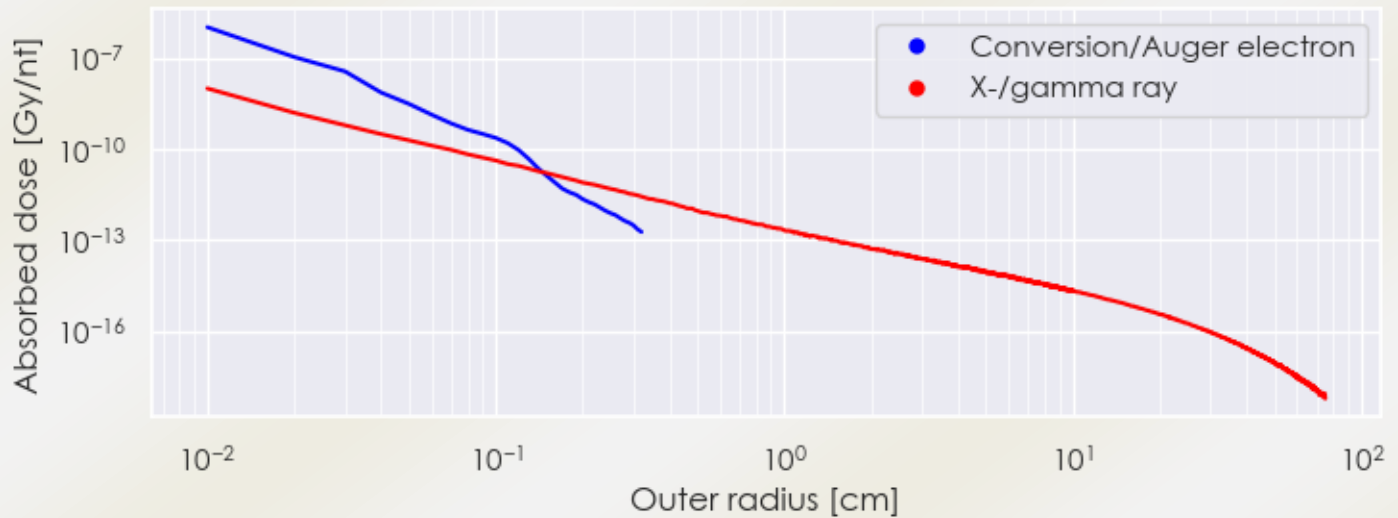
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 1.552×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 7.915×10^{-14} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

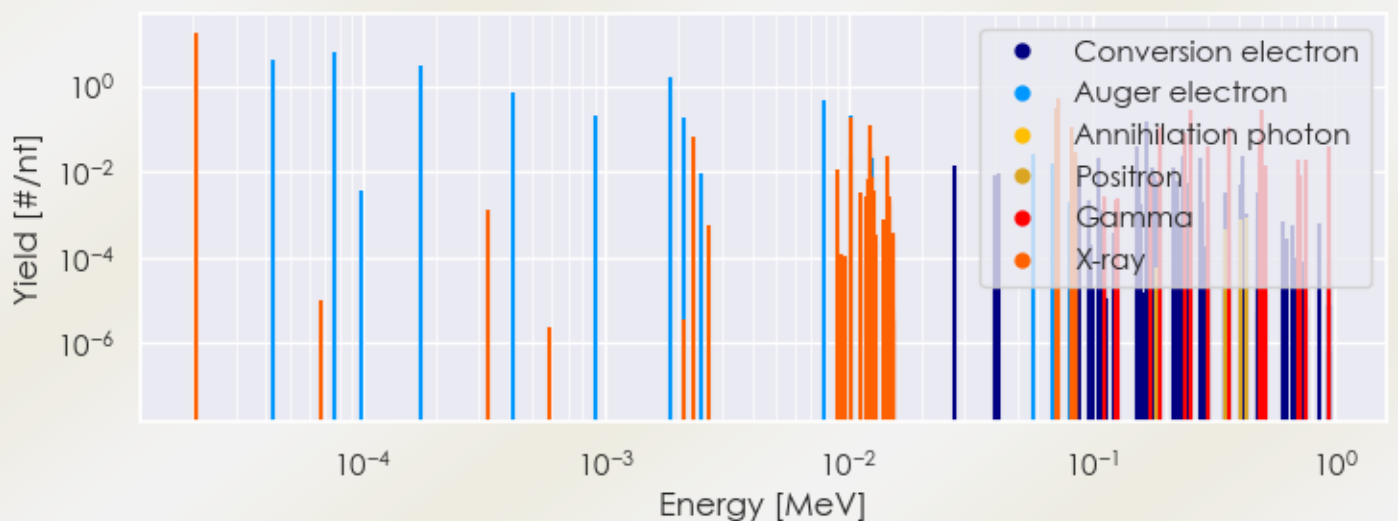
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Pb-196 DPK.csv

SUMMARY SPECTRA (PLOT)

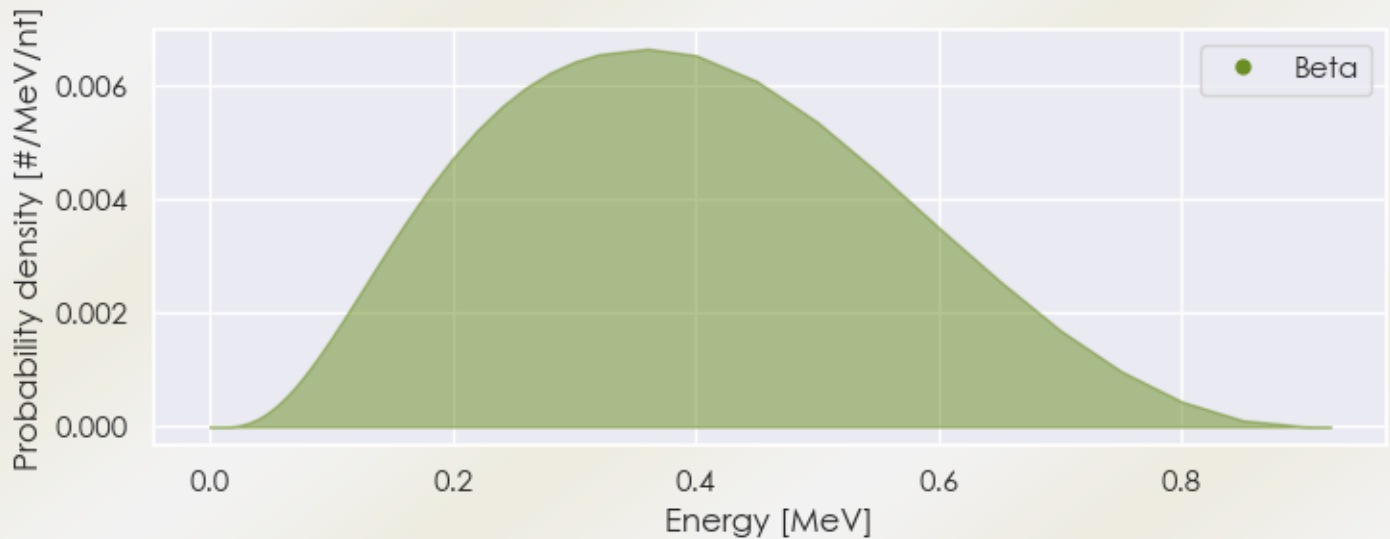
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Pb-196 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-196 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-196 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
2.07376e-05	1.794e+01	X-ray
2.30035e-03	6.311e-02	X-ray
8.98130e-03	1.174e-02	X-ray
1.01663e-02	2.052e-02	X-ray
1.02661e-02	1.807e-01	X-ray
1.22523e-02	1.169e-01	X-ray
1.22749e-02	3.443e-02	X-ray
1.43396e-02	2.362e-02	X-ray
7.10519e-02	3.149e-01	X-ray
7.31380e-02	5.313e-01	X-ray

8.23884e-02	5.894e-02	X-ray
8.28534e-02	1.141e-01	X-ray
8.50837e-02	1.397e-02	X-ray
8.51979e-02	2.741e-02	X-ray
1.91700e-01	1.107e-01	Gamma
2.40000e-01	8.100e-02	Gamma
2.53100e-01	2.700e-01	Gamma
3.02200e-01	3.780e-02	Gamma
3.66500e-01	1.107e-01	Gamma
4.93900e-01	5.670e-02	Gamma
5.02100e-01	2.646e-01	Gamma
5.15200e-01	1.350e-02	Gamma
7.01000e-01	1.890e-02	Gamma
7.55200e-01	1.890e-02	Gamma
9.54100e-01	4.050e-02	Gamma
4.30144e-05	3.938e+00	Auger electron
7.57406e-05	5.878e+00	Auger electron
1.74499e-04	3.081e+00	Auger electron
4.17572e-04	6.709e-01	Auger electron
9.04053e-04	2.079e-01	Auger electron
1.85895e-03	1.623e+00	Auger electron
2.10444e-03	1.911e-01	Auger electron
7.84577e-03	4.838e-01	Auger electron
1.01368e-02	2.105e-01	Auger electron
1.24553e-02	2.201e-02	Auger electron
2.72020e-02	1.410e-02	Conversion electron
5.72241e-02	2.729e-02	Auger electron
6.88063e-02	1.485e-02	Auger electron
8.92020e-02	1.178e-02	Conversion electron
1.05902e-01	2.068e-02	Conversion electron
1.54202e-01	3.967e-02	Conversion electron
1.67302e-01	1.462e-01	Conversion electron
1.76954e-01	1.322e-02	Conversion electron
2.16402e-01	1.258e-02	Conversion electron
2.37770e-01	2.233e-02	Conversion electron
2.80702e-01	2.189e-02	Conversion electron
4.16302e-01	2.267e-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