



U-176 (37m) CB+	U-177 (8m) ECB+	U-178 (2.4h) EC	U-179 (90m) ECB+	U-200 (21.5h) ECB+	U-201 (9.33h) ECB+	U-202 (5.25E+4y) ECA	U-203 (51.873h) EC	U-204 (STABLE)
Tl-195 (1.16h) CB+	Tl-196 (1.84h) ECB+	Tl-197 (2.84h) ECB+	Tl-198 (5.01h) ECB+	Tl-199 (7.42h) ECB+	Tl-200 (2.01h) ECB+	Tl-201 (72.912h) EC	Tl-202 (12.23d) EC	Tl-203 (STABLE)
Hg-194 (140y) C	Hg-195 (10.53h) ECB+	Hg-196 (STABLE)	Hg-197 (64.94h) EC	Hg-198 (STABLE)	Hg-199 (STABLE)	Hg-200 (STABLE)	Hg-201 (STABLE)	Hg-202 (STABLE)

THALLIUM-199

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Tl-199
Atomic number (Z): 81
Mass number (A): 199
Neutron number (N): 118

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 7.42 [h]
Decay constant: 2.5949e-05 [1/s]
Daughters: Hg-199 (100.0%)
Radioactive daughters: None

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.05998 [MeV]
Mean photon energy: 0.25203 [MeV]
Air kerma rate constant, Γ_{10} : 1.643e-17 [Gy·m²/Bq·s]
Air kerma coefficient, K_{air} : 1.644e-17 [Gy·m²/Bq·s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 9.610e-15 [Gy·kg/Bq·s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000e+00 [Gy·kg/Bq·s]

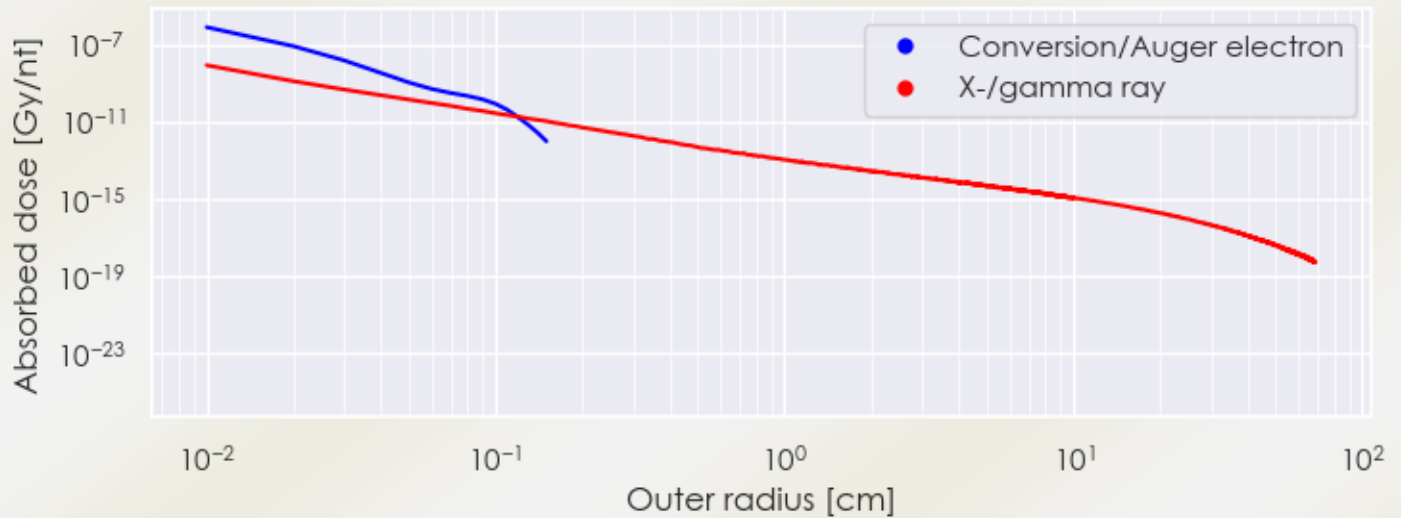
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-, \beta+, e-}$: 9.610×10^{-15} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 4.038×10^{-14} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

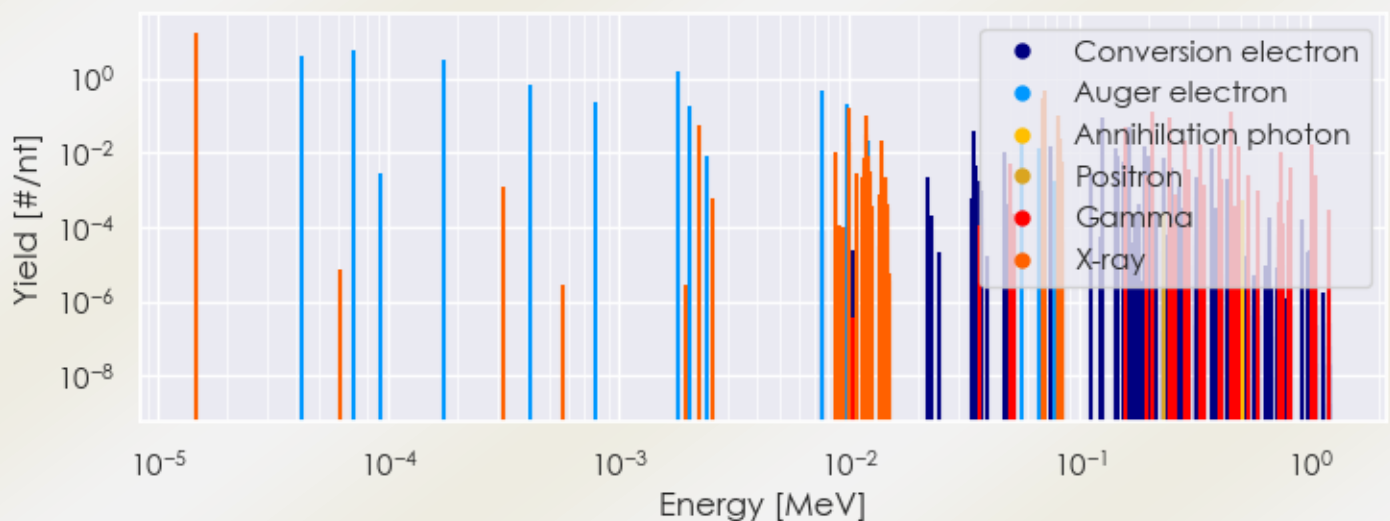
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/TI-199 DPK.csv

SUMMARY SPECTRA (PLOT)

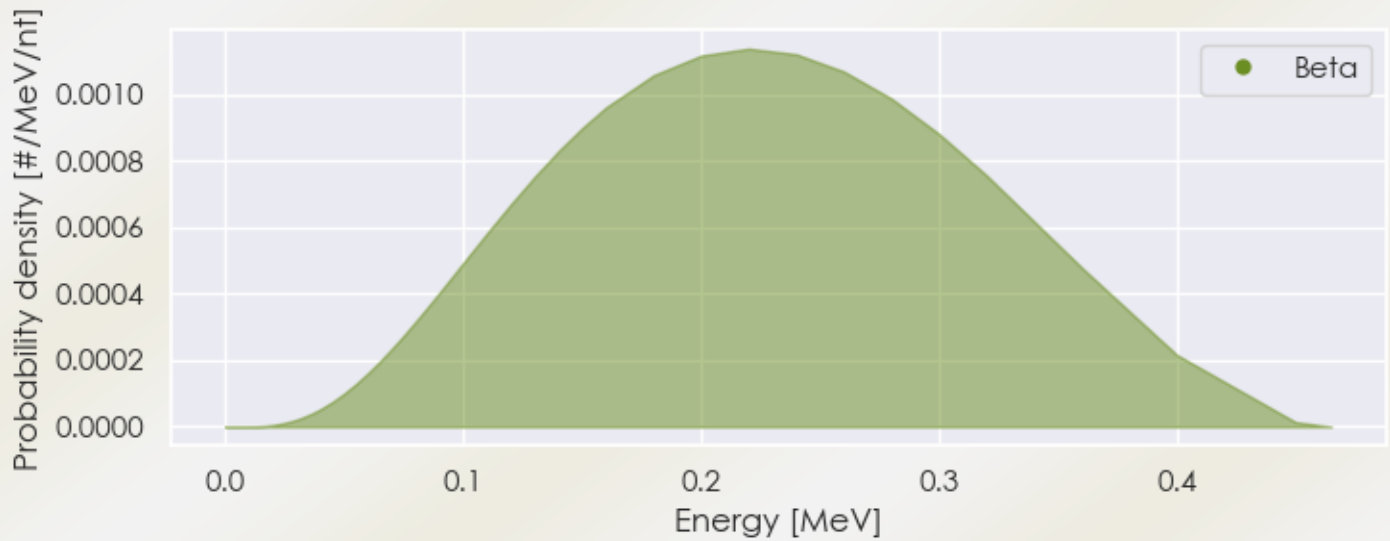
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/TI-199 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/TI-199 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/TI-199 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.47030e-05	1.740e+01	X-ray
2.22245e-03	5.691e-02	X-ray
8.75019e-03	1.068e-02	X-ray
9.89221e-03	1.863e-02	X-ray
9.98619e-03	1.641e-01	X-ray
1.18592e-02	1.025e-01	X-ray
1.19285e-02	3.098e-02	X-ray
1.38758e-02	2.047e-02	X-ray
6.90989e-02	2.764e-01	X-ray
7.10661e-02	4.685e-01	X-ray

8.00792e-02	5.175e-02	X-ray
8.05161e-02	1.002e-01	X-ray
8.26796e-02	1.220e-02	X-ray
8.27860e-02	2.389e-02	X-ray
1.58359e-01	4.960e-02	Gamma
2.08200e-01	1.228e-01	Gamma
2.47260e-01	9.300e-02	Gamma
2.84090e-01	2.207e-02	Gamma
3.33930e-01	1.761e-02	Gamma
4.03500e-01	1.724e-02	Gamma
4.55460e-01	1.240e-01	Gamma
4.92300e-01	1.525e-02	Gamma
7.50400e-01	1.042e-02	Gamma
1.01295e+00	1.761e-02	Gamma
4.20445e-05	3.942e+00	Auger electron
6.99419e-05	5.763e+00	Auger electron
1.74650e-04	3.030e+00	Auger electron
4.16058e-04	6.416e-01	Auger electron
7.99380e-04	2.279e-01	Auger electron
1.80738e-03	1.562e+00	Auger electron
2.03983e-03	1.726e-01	Auger electron
7.65351e-03	4.637e-01	Auger electron
9.86298e-03	1.983e-01	Auger electron
1.21009e-02	2.047e-02	Auger electron
3.49910e-02	4.058e-02	Conversion electron
4.69801e-02	1.077e-02	Conversion electron
5.57212e-02	2.454e-02	Auger electron
6.69357e-02	1.329e-02	Auger electron
7.50060e-02	1.447e-02	Conversion electron
1.24847e-01	9.348e-02	Conversion electron
1.44105e-01	1.251e-02	Conversion electron
1.63907e-01	4.932e-02	Conversion electron
1.93374e-01	1.415e-02	Conversion electron
3.72107e-01	1.264e-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