



TUNGSTEN-178

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: W-178
Atomic number (Z): 74
Mass number (A): 178
Neutron number (N): 104

RADIOACTIVE DECAY

Decay modes: Electron capture
Half-life: 21.6 [d]
Decay constant: 3.7141×10^{-7} [1/s]
Daughters: Ta-178 (100.0%)
Radioactive daughters: Ta-178

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.00749 [MeV]
Mean photon energy: 0.01637 [MeV]
Air kerma rate constant, Γ_{10} : 1.302×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 1.302×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.200×10^{-15} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000e+00 [Gy $\cdot$ kg/Bq $\cdot$ s]

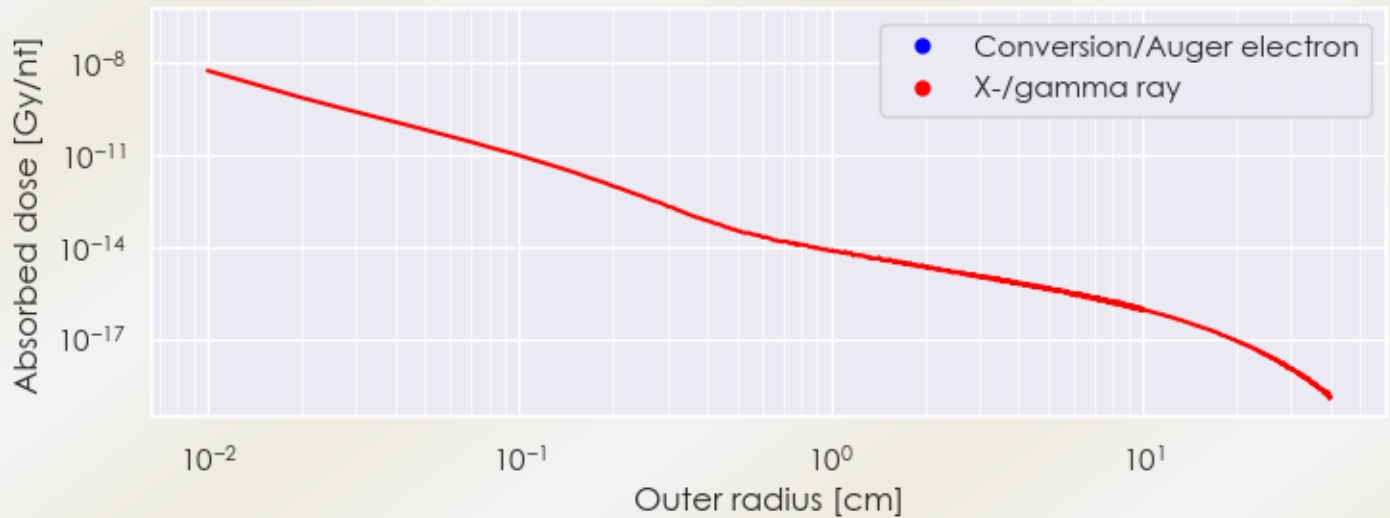
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-\beta+,e-}$: $1.200\text{e-}15$ [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : $2.623\text{e-}15$ [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

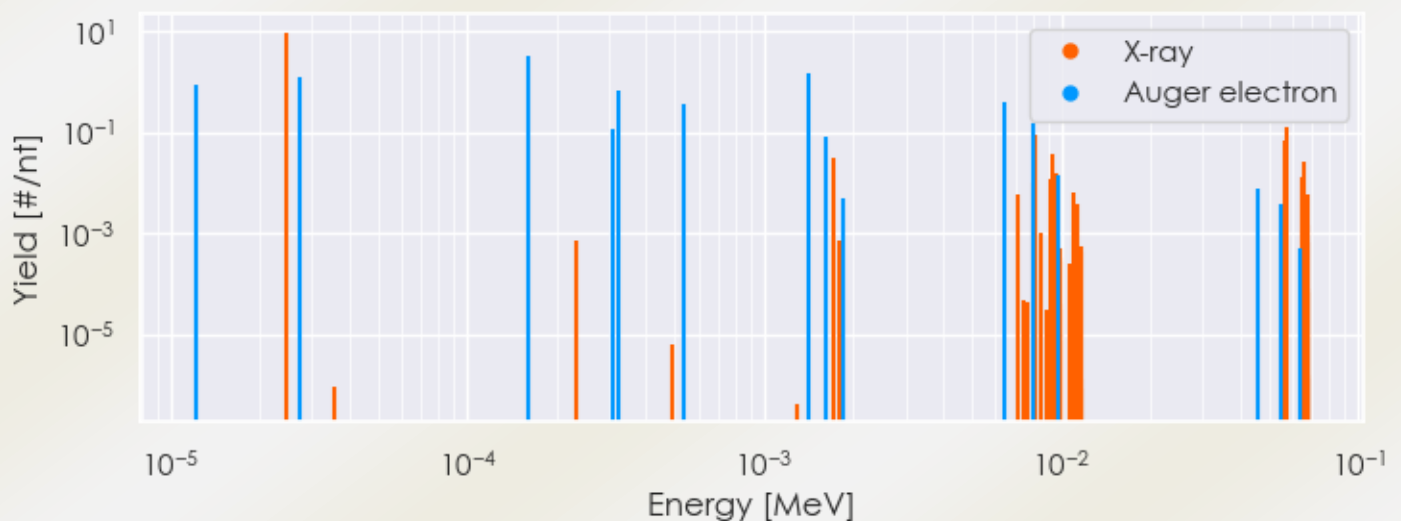
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/W-178 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/W-178 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/W-178 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/W-178%20Summary%20Spectrum.csv)

Energy [MeV]	Yield [# /n ^t] if > 0.01	Radiation type
2.47285e-05	9.505e+00	X-ray
1.70816e-03	3.042e-02	X-ray
8.13761e-03	8.722e-02	X-ray
9.19462e-03	1.205e-02	X-ray
9.36071e-03	3.610e-02	X-ray
9.47190e-03	1.531e-02	X-ray
9.64849e-03	1.531e-02	X-ray
5.64020e-02	7.019e-02	X-ray
5.76858e-02	1.223e-01	X-ray
6.51037e-02	1.309e-02	X-ray
6.53809e-02	2.530e-02	X-ray
1.21569e-05	8.530e-01	Auger electron
2.73603e-05	1.196e+00	Auger electron
1.60259e-04	3.219e+00	Auger electron
3.09868e-04	1.117e-01	Auger electron
3.20583e-04	6.520e-01	Auger electron
5.32250e-04	3.610e-01	Auger electron
1.41753e-03	1.406e+00	Auger electron
1.60201e-03	8.159e-02	Auger electron
6.38901e-03	3.862e-01	Auger electron
8.08924e-03	1.461e-01	Auger electron
9.82666e-03	1.388e-02	Auger 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