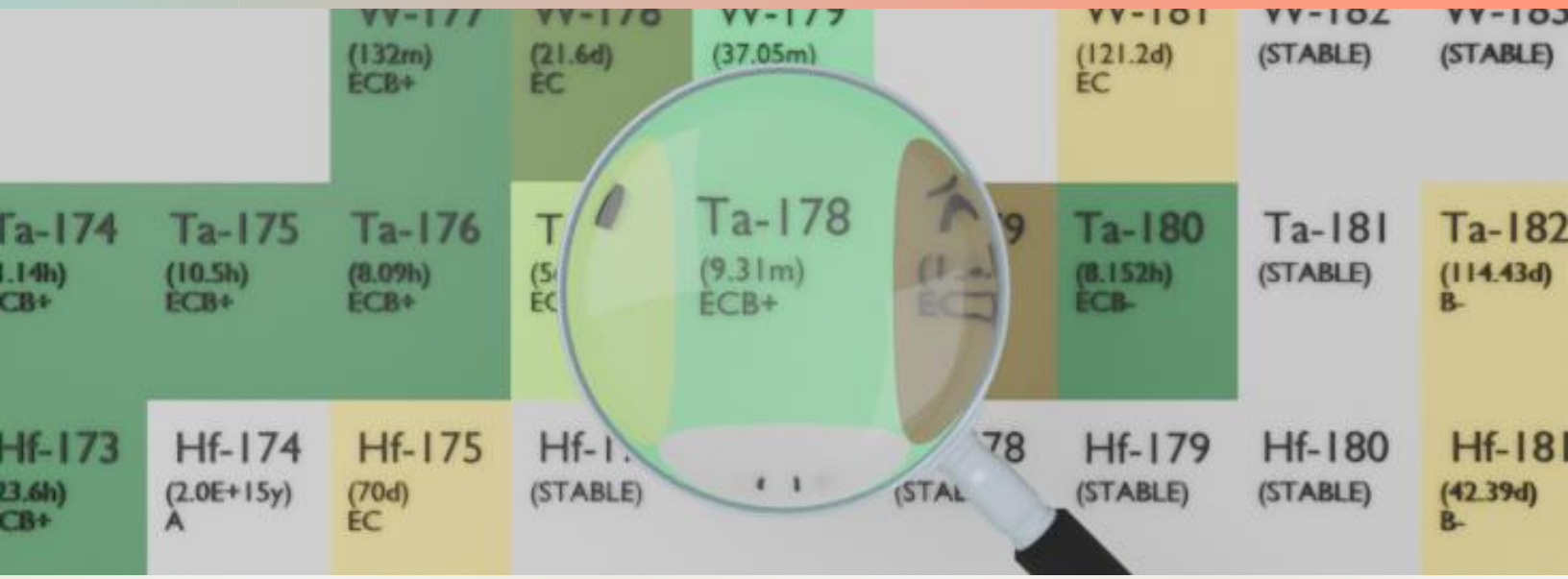


TANTALUM-178

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Ta-178
Atomic number (Z): 73
Mass number (A): 178
Neutron number (N): 105

RADIOACTIVE DECAY

Decay modes: β+, Electron capture
Half-life: 9.31 [m]
Decay constant: 1.2409e-03 [1/s]
Daughters: Hf-178 (100.0%)
Radioactive daughters: None

DOSIMETRIC CONSTANTS

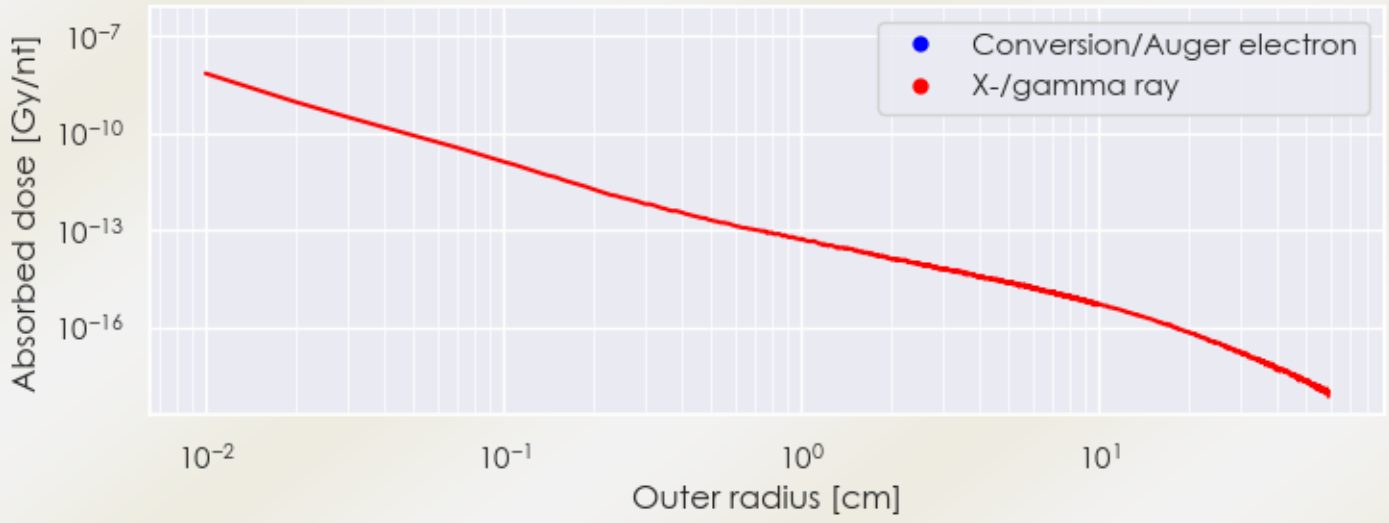
Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.03912 [MeV]
Mean photon energy: 0.12182 [MeV]
Air kerma rate constant, Γ_{10}: 4.942e-18 [Gy·m^2/Bq·s]
Air kerma coefficient, K_{air}: 5.420e-18 [Gy·m^2/Bq·s]
Equilibrium dose constant for weakly-penetrating radiations (a and/or electrons), Δ_{wp}: 6.268e-15 [Gy·kg/Bq·s]
Equilibrium dose constant for alphas, Δ_{a}: 0.000e+00 [Gy·kg/Bq·s]

Equilibrium dose constant for betas/electrons, $\Delta_{\beta-,\beta+,e-}$: 6.268e-15 [Gy·kg/Bq·s]
Equilibrium dose constant for photons, Δ_{p}: 1.952e-14 [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

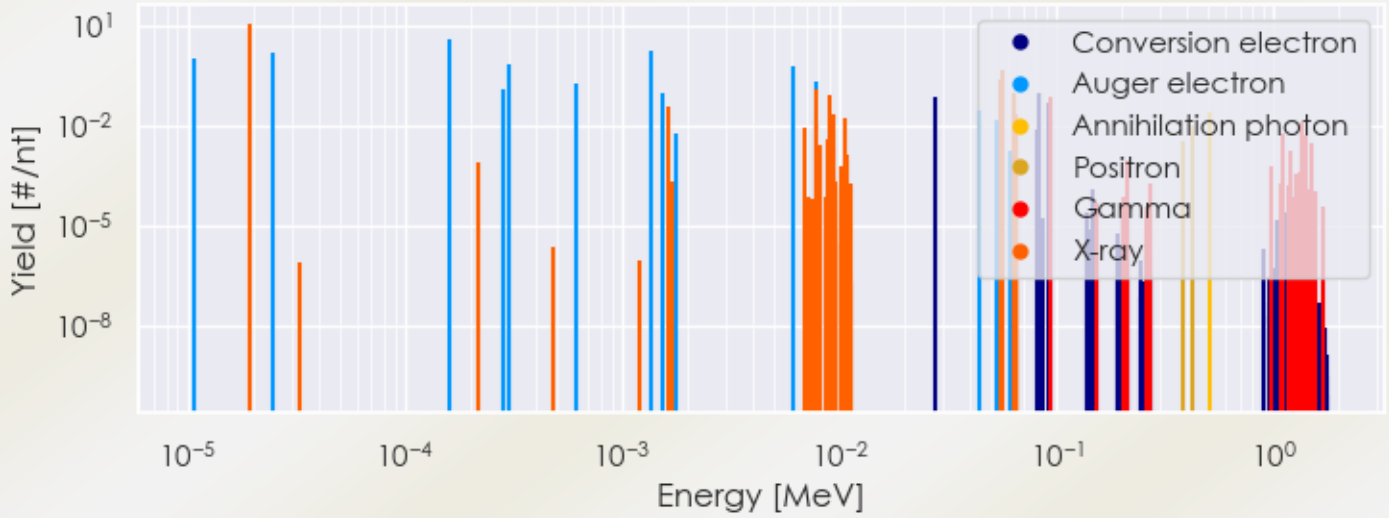
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Ta-178 DPK.csv

SUMMARY SPECTRA (PLOT)

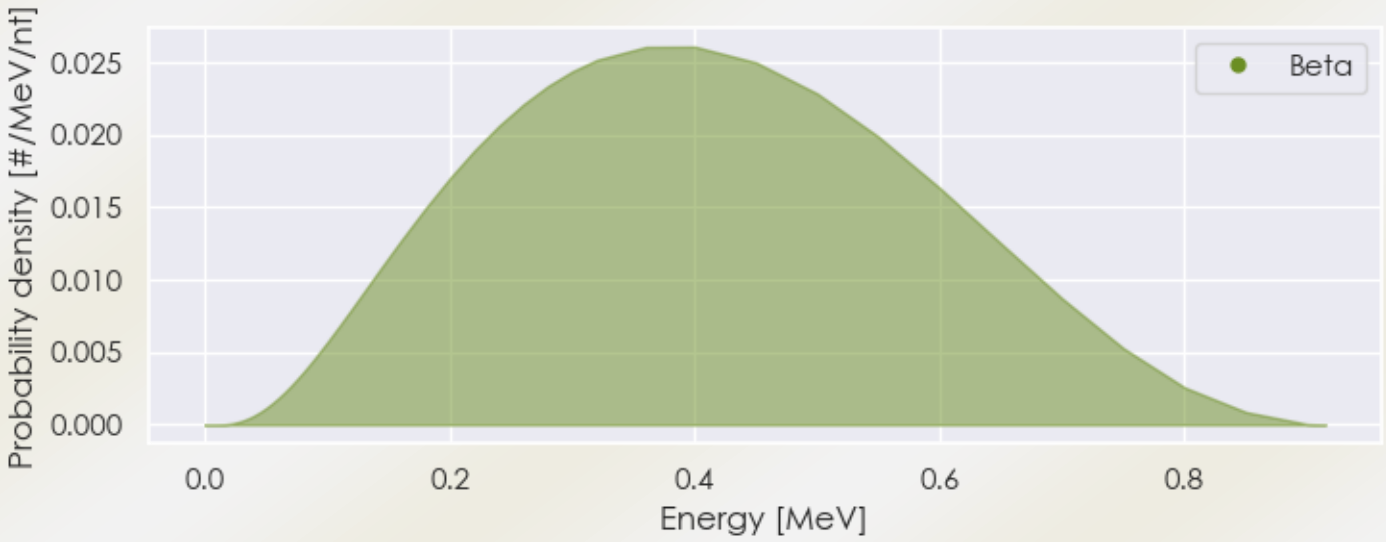
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Ta-178 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/Ta-178 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/Ta-178 Summary Spectrum.csv

Energy [MeV]	Yield [#/nt] if > 0.01	Radiation type
1.94109e-05	1.124e+01	X-ray
1.63788e-03	3.403e-02	X-ray
7.83282e-03	1.350e-02	X-ray
7.88959e-03	1.191e-01	X-ray
9.03750e-03	8.293e-02	X-ray
9.34358e-03	2.070e-02	X-ray
1.05374e-02	1.509e-02	X-ray
5.47191e-02	2.432e-01	X-ray
5.59237e-02	4.255e-01	X-ray
6.31238e-02	4.530e-02	X-ray

6.33831e-02	8.756e-02	X-ray
6.50467e-02	1.019e-02	X-ray
6.51064e-02	1.972e-02	X-ray
9.31300e-02	6.576e-02	Gamma
5.11000e-01	2.474e-02	Annihilation photon
1.34085e+00	1.027e-02	Gamma
1.35055e+00	1.176e-02	Gamma
1.08108e-05	9.773e-01	Auger electron
2.44612e-05	1.387e+00	Auger electron
1.59791e-04	3.912e+00	Auger electron
2.82865e-04	1.232e-01	Auger electron
3.02201e-04	6.582e-01	Auger electron
6.08946e-04	1.690e-01	Auger electron
1.36403e-03	1.707e+00	Auger electron
1.54196e-03	8.983e-02	Auger electron
6.16345e-03	5.522e-01	Auger electron
7.78316e-03	2.048e-01	Auger electron
9.43303e-03	1.916e-02	Auger electron
2.76480e-02	7.216e-02	Conversion electron
4.45280e-02	2.697e-02	Auger electron
5.31026e-02	1.396e-02	Auger electron
8.23670e-02	9.070e-02	Conversion electron
8.35717e-02	8.537e-02	Conversion electron
9.10310e-02	4.592e-02	Conversion electron
9.31300e-02	1.244e-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