



|                           |                           |                          |                                    |                          |                           |
|---------------------------|---------------------------|--------------------------|------------------------------------|--------------------------|---------------------------|
|                           |                           | VV-177<br>(132m)<br>ECB+ | VV-178<br>(21.6d)<br>EC            | VV-179<br>(37.05m)<br>EC |                           |
| Ta-172<br>(36.8m)<br>ECB+ | Ta-173<br>(3.14h)<br>ECB+ | Ta-174<br>(1.1h)<br>EC   | <b>Ta-175<br/>(10.5h)<br/>ECB+</b> | Ta-176<br>(8.0d)<br>EC   | Ta-177<br>(56.56h)<br>EC  |
|                           |                           |                          |                                    |                          | Ta-178<br>(9.31m)<br>ECB+ |
|                           |                           |                          |                                    |                          | Ta-179<br>(1.82y)<br>EC   |
| Hf-170<br>(16.01h)<br>C   |                           | Hf-172<br>(1.87y)<br>EC  | Hf-173<br>(23.6h)<br>ECB+          | Hf-174<br>(70d)<br>EC    | Hf-175<br>(70d)<br>EC     |
|                           |                           |                          |                                    | Hf-176<br>(STABLE)       | Hf-177<br>(STABLE)        |
|                           |                           |                          |                                    |                          | Hf-178<br>(STABLE)        |

# TANTALUM-175

## SUMMARY DATA

### GENERAL

### CLASSIFICATION

Isotope: Ta-175  
Atomic number (Z): 73  
Mass number (A): 175  
Neutron number (N): 102

### RADIOACTIVE DECAY

Decay modes:  $\beta^+$ , Electron capture  
Half-life: 10.5 [h]  
Decay constant:  $1.8337 \times 10^{-5}$  [1/s]  
Daughters: Hf-175 (100.0%)  
Radioactive daughters: Hf-175

### DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]  
Mean electron energy: 0.06632 [MeV]  
Mean photon energy: 1.11262 [MeV]  
Air kerma rate constant,  $\Gamma_{10}$ :  $3.929 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Air kerma coefficient,  $K_{\text{air}}$ :  $3.943 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Equilibrium dose constant for weakly-penetrating radiations ( $\alpha$  and/or electrons),  $\Delta_{\text{wp}}$ :  $1.063 \times 10^{-14}$  [Gy  $\cdot$  kg/Bq  $\cdot$  s]  
Equilibrium dose constant for alphas,  $\Delta_{\alpha}$ : 0.000e+00 [Gy  $\cdot$  kg/Bq  $\cdot$  s]

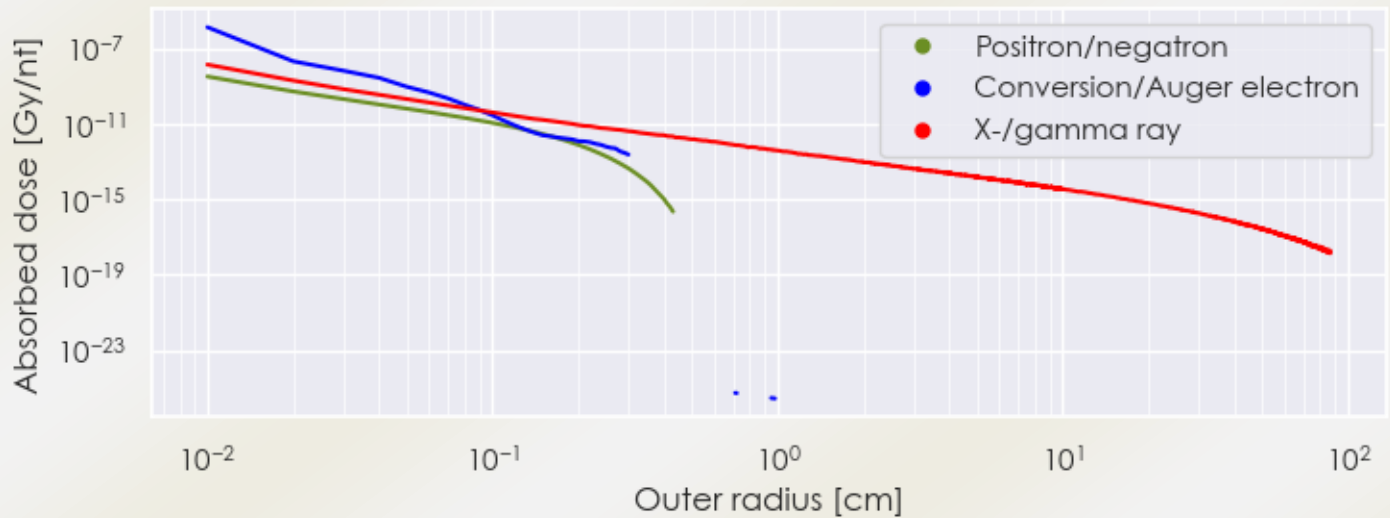
Equilibrium dose constant for betas/electrons,  $\Delta_{\beta-, \beta+, e-}$ :  $1.063 \times 10^{-14}$  [Gy·kg/Bq·s]

Equilibrium dose constant for photons,  $\Delta_p$ :  $1.783 \times 10^{-13}$  [Gy·kg/Bq·s]

## DOSE POINT KERNELS (PLOT)

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

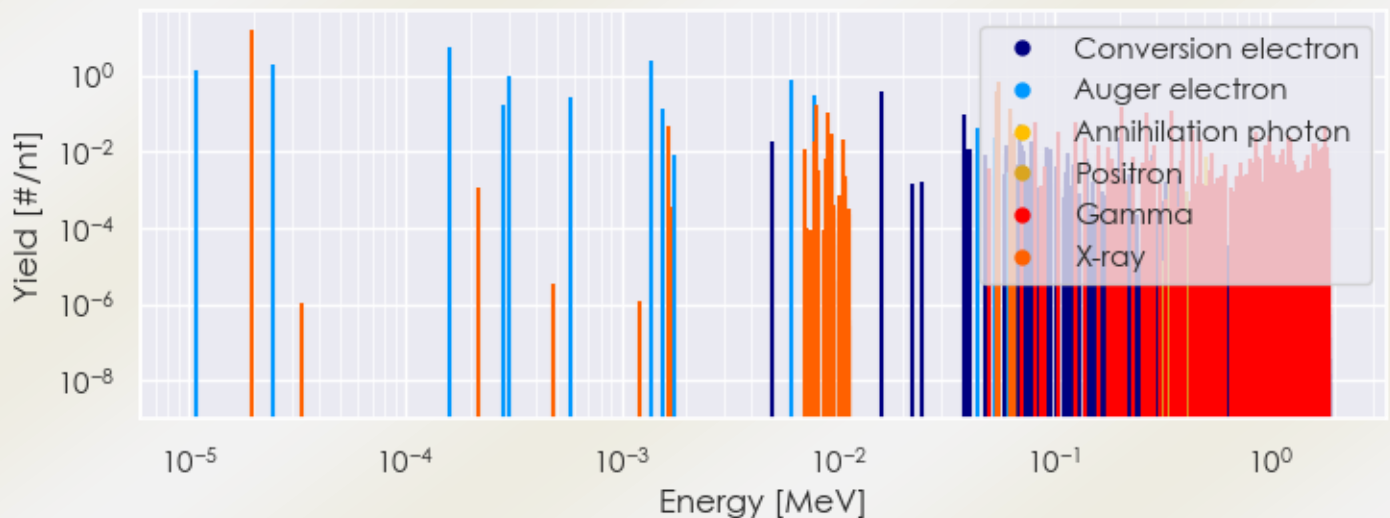
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: [www.mirdsoft.org/products/MIRDspecs/Ta-175 DPK.csv](http://www.mirdsoft.org/products/MIRDspecs/Ta-175 DPK.csv)

## SUMMARY SPECTRA (PLOT)

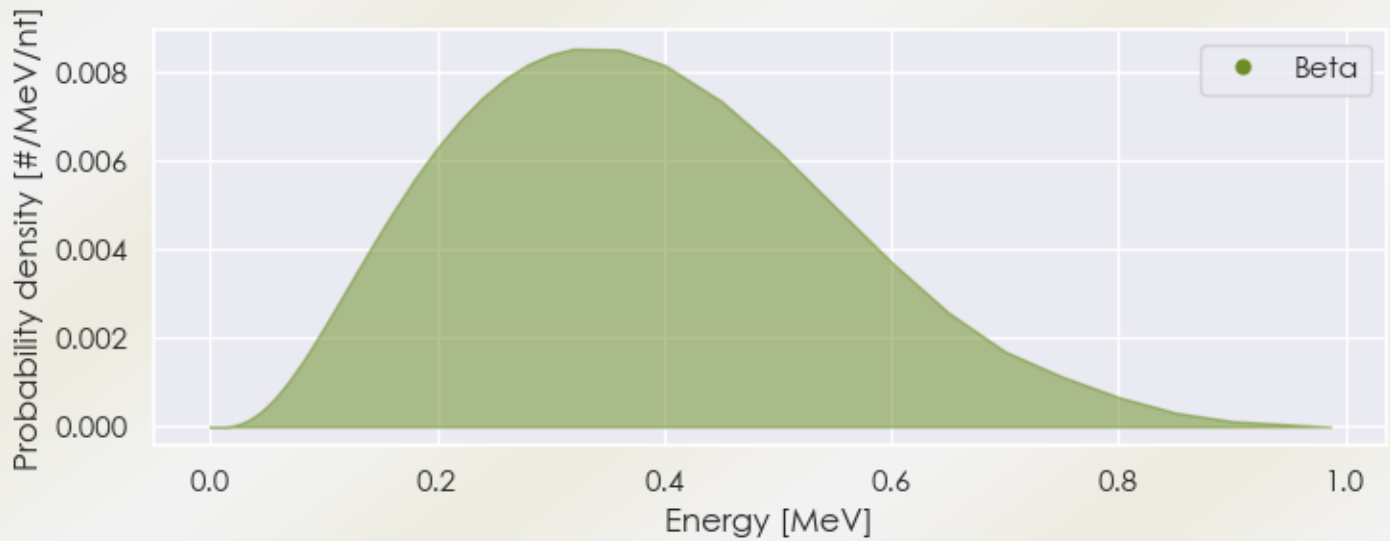
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Ta-175 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Ta-175 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-175 Beta Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Ta-175 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-175 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Ta-175 Summary Spectrum.csv)

| Energy [MeV] | Yield [# / nt] if > 0.01 | Radiation type |
|--------------|--------------------------|----------------|
| 1.94031e-05  | 1.601e+01                | X-ray          |
| 1.63759e-03  | 4.842e-02                | X-ray          |
| 6.98230e-03  | 1.173e-02                | X-ray          |
| 7.83282e-03  | 1.941e-02                | X-ray          |
| 7.88959e-03  | 1.713e-01                | X-ray          |
| 9.03750e-03  | 1.097e-01                | X-ray          |
| 9.34358e-03  | 2.977e-02                | X-ray          |
| 1.05374e-02  | 1.996e-02                | X-ray          |
| 5.47191e-02  | 3.806e-01                | X-ray          |
| 5.59237e-02  | 6.659e-01                | X-ray          |

|             |           |                |
|-------------|-----------|----------------|
| 6.31238e-02 | 7.089e-02 | X-ray          |
| 6.33831e-02 | 1.370e-01 | X-ray          |
| 6.50467e-02 | 1.594e-02 | X-ray          |
| 6.51063e-02 | 3.086e-02 | X-ray          |
| 8.15000e-02 | 6.000e-02 | Gamma          |
| 1.04300e-01 | 3.120e-02 | Gamma          |
| 1.25900e-01 | 5.800e-02 | Gamma          |
| 1.25900e-01 | 2.600e-02 | Gamma          |
| 1.40900e-01 | 2.320e-02 | Gamma          |
| 1.62500e-01 | 1.480e-02 | Gamma          |
| 1.79100e-01 | 1.280e-02 | Gamma          |
| 2.07400e-01 | 1.400e-01 | Gamma          |
| 2.66900e-01 | 1.080e-01 | Gamma          |
| 2.88900e-01 | 1.480e-02 | Gamma          |
| 3.48500e-01 | 1.200e-01 | Gamma          |
| 3.93200e-01 | 2.120e-02 | Gamma          |
| 4.36400e-01 | 3.800e-02 | Gamma          |
| 4.75000e-01 | 2.040e-02 | Gamma          |
| 8.57700e-01 | 3.200e-02 | Gamma          |
| 9.62100e-01 | 1.440e-02 | Gamma          |
| 9.98300e-01 | 2.560e-02 | Gamma          |
| 1.14410e+00 | 1.120e-02 | Gamma          |
| 1.22560e+00 | 2.480e-02 | Gamma          |
| 1.24980e+00 | 2.400e-02 | Gamma          |
| 1.58600e+00 | 1.600e-02 | Gamma          |
| 1.61820e+00 | 1.320e-02 | Gamma          |
| 1.63600e+00 | 1.680e-02 | Gamma          |
| 1.65920e+00 | 1.080e-02 | Gamma          |
| 1.71180e+00 | 1.160e-02 | Gamma          |
| 1.72180e+00 | 1.160e-02 | Gamma          |
| 1.74480e+00 | 1.360e-02 | Gamma          |
| 1.79310e+00 | 4.600e-02 | Gamma          |
| 1.82610e+00 | 1.240e-02 | Gamma          |
| 1.08362e-05 | 1.394e+00 | Auger electron |
| 2.44614e-05 | 1.977e+00 | Auger electron |
| 1.59740e-04 | 5.571e+00 | Auger electron |
| 2.83324e-04 | 1.756e-01 | Auger electron |
| 3.02067e-04 | 9.361e-01 | Auger electron |

|                    |           |                     |
|--------------------|-----------|---------------------|
| <b>5.84632e-04</b> | 2.710e-01 | Auger electron      |
| <b>1.36342e-03</b> | 2.430e+00 | Auger electron      |
| <b>1.54107e-03</b> | 1.277e-01 | Auger electron      |
| <b>5.01800e-03</b> | 1.845e-02 | Conversion electron |
| <b>6.15572e-03</b> | 7.827e-01 | Auger electron      |
| <b>7.77568e-03</b> | 2.903e-01 | Auger electron      |
| <b>9.42601e-03</b> | 2.716e-02 | Auger electron      |
| <b>1.60180e-02</b> | 3.572e-01 | Conversion electron |
| <b>3.88180e-02</b> | 9.248e-02 | Conversion electron |
| <b>3.92550e-02</b> | 1.189e-02 | Conversion electron |
| <b>3.97370e-02</b> | 1.152e-02 | Conversion electron |
| <b>4.09417e-02</b> | 1.166e-02 | Conversion electron |
| <b>4.45280e-02</b> | 4.220e-02 | Auger electron      |
| <b>5.31026e-02</b> | 2.185e-02 | Auger electron      |
| <b>6.04180e-02</b> | 1.478e-02 | Conversion electron |
| <b>7.02550e-02</b> | 5.055e-02 | Conversion electron |
| <b>7.07370e-02</b> | 1.426e-02 | Conversion electron |
| <b>7.19417e-02</b> | 1.013e-02 | Conversion electron |
| <b>7.94010e-02</b> | 1.745e-02 | Conversion electron |
| <b>9.30550e-02</b> | 1.306e-02 | Conversion electron |
| <b>9.70180e-02</b> | 1.171e-02 | Conversion electron |
| <b>2.01418e-01</b> | 2.391e-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](https://sites.snmmi.org/SNMMI-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6)