



|                           |                          |                           |                          |                           |                          |                    |                           |                    |
|---------------------------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|--------------------|---------------------------|--------------------|
| U-198<br>(2.4h)<br>EC     | U-199<br>(90m)<br>ECB+   | U-200<br>(21.5h)<br>EC    | U-201<br>(9.33h)<br>ECB+ | U-202<br>(5.25E+4y)<br>EC | U-203<br>(51.873h)<br>EC | U-204<br>(STABLE)  | U-205<br>(1.53E+7y)<br>EC | U-206<br>(STABLE)  |
| TI-197<br>(2.84h)<br>ECB+ | TI-198<br>(5.3h)<br>ECB+ | TI-199<br>(7.42h)<br>ECB+ | TI-200<br>(2.1h)<br>EC   | TI-201<br>(72.912h)<br>EC | TI-202<br>(1.1h)<br>EC   | TI-203<br>(STABLE) | TI-204<br>(3.78y)<br>B-EC | TI-205<br>(STABLE) |
| Hg-196<br>(STABLE)        | Hg-197<br>(64.94h)<br>EC | Hg-198<br>(STABLE)        | Hg-199<br>(STABLE)       | Hg-200<br>(STABLE)        | Hg-201<br>(STABLE)       | Hg-202<br>(STABLE) | Hg-203<br>(46.612d)<br>B- | Hg-204<br>(STABLE) |

# THALLIUM-201

## SUMMARY DATA

### GENERAL

### CLASSIFICATION

Isotope: TI-201  
Atomic number (Z): 81  
Mass number (A): 201  
Neutron number (N): 120

### RADIOACTIVE DECAY

Decay modes: Electron capture  
Half-life: 72.91 [h]  
Decay constant:  $2.6407 \times 10^{-6}$  [1/s]  
Daughters: Hg-201 (100.0%)  
Radioactive daughters: None

### DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]  
Mean electron energy: 0.04469 [MeV]  
Mean photon energy: 0.09381 [MeV]  
Air kerma rate constant,  $\Gamma_{10}$ :  $1.152 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Air kerma coefficient,  $K_{\text{air}}$ :  $1.152 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Equilibrium dose constant for weakly-penetrating radiations ( $\alpha$  and/or electrons),  $\Delta_{\text{wp}}$ :  $7.160 \times 10^{-15}$  [Gy  $\cdot$  kg/Bq  $\cdot$  s]  
Equilibrium dose constant for alphas,  $\Delta_{\alpha}$ : 0.000e+00 [Gy  $\cdot$  kg/Bq  $\cdot$  s]

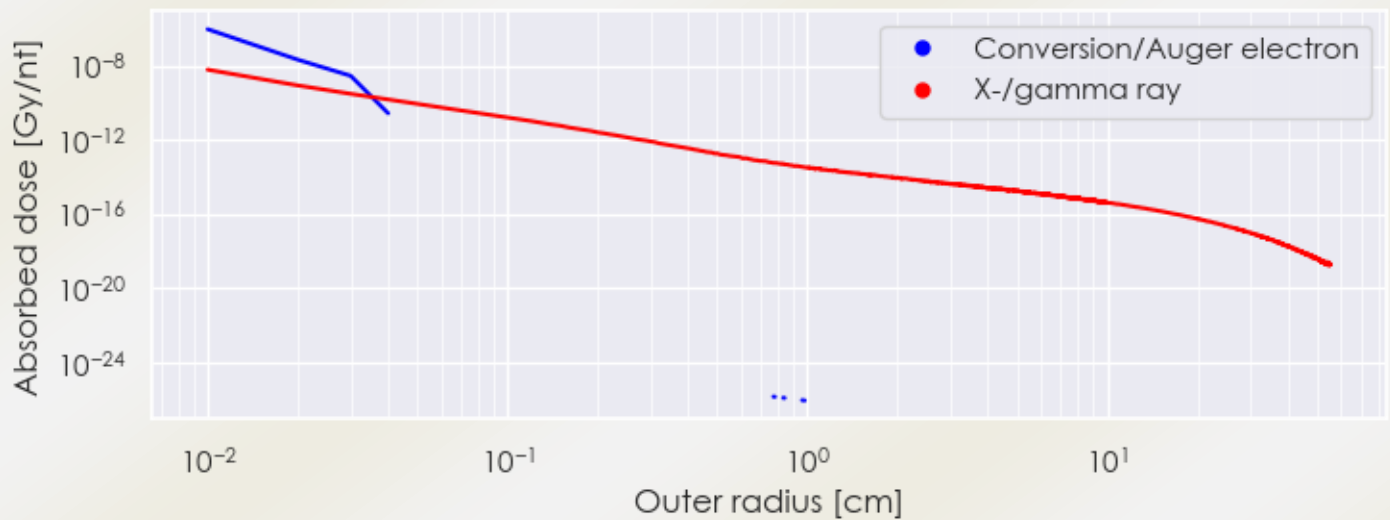
Equilibrium dose constant for betas/electrons,  $\Delta_{\beta, \beta^+, e^-}$ :  $7.160 \times 10^{-15}$  [Gy·kg/Bq·s]

Equilibrium dose constant for photons,  $\Delta_p$ :  $1.503 \times 10^{-14}$  [Gy·kg/Bq·s]

### DOSE POINT KERNELS (PLOT)

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

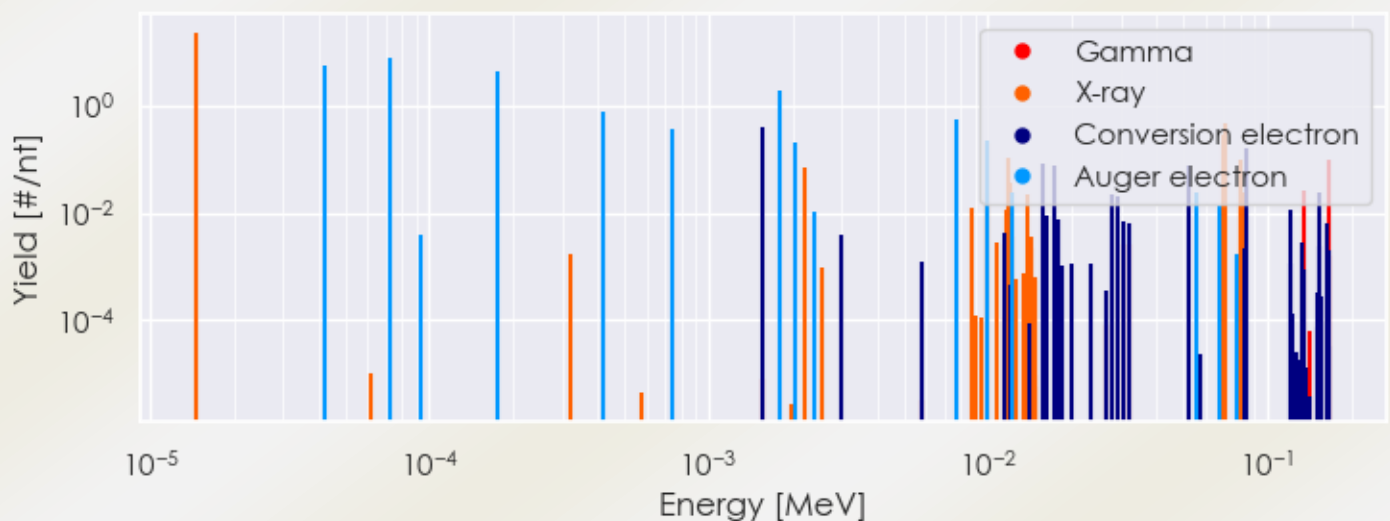
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: [www.mirdsoft.org/products/MIRDspecs/TI-201\\_DPK.csv](http://www.mirdsoft.org/products/MIRDspecs/TI-201_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-201\\_Summary\\_Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/TI-201_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/TI-201 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/TI-201%20Summary%20Spectrum.csv)

| Energy [MeV] | Yield [#/(nt)] if > 0.01 | Radiation type      |
|--------------|--------------------------|---------------------|
| 1.47014e-05  | 2.281e+01                | X-ray               |
| 2.22251e-03  | 6.729e-02                | X-ray               |
| 8.75019e-03  | 1.220e-02                | X-ray               |
| 9.89221e-03  | 2.129e-02                | X-ray               |
| 9.98620e-03  | 1.875e-01                | X-ray               |
| 1.15521e-02  | 1.163e-02                | X-ray               |
| 1.18592e-02  | 1.055e-01                | X-ray               |
| 1.19286e-02  | 3.539e-02                | X-ray               |
| 1.19891e-02  | 1.318e-02                | X-ray               |
| 1.38758e-02  | 2.108e-02                | X-ray               |
| 6.90989e-02  | 2.736e-01                | X-ray               |
| 7.10661e-02  | 4.637e-01                | X-ray               |
| 8.00792e-02  | 5.122e-02                | X-ray               |
| 8.05161e-02  | 9.914e-02                | X-ray               |
| 8.26796e-02  | 1.208e-02                | X-ray               |
| 8.27860e-02  | 2.365e-02                | X-ray               |
| 1.35340e-01  | 2.565e-02                | Gamma               |
| 1.67430e-01  | 1.000e-01                | Gamma               |
| 4.20807e-05  | 5.339e+00                | Auger electron      |
| 7.23727e-05  | 7.402e+00                | Auger electron      |
| 1.75987e-04  | 4.156e+00                | Auger electron      |
| 4.17962e-04  | 7.762e-01                | Auger electron      |
| 7.43508e-04  | 3.529e-01                | Auger electron      |
| 1.56500e-03  | 3.800e-01                | Conversion electron |
| 1.80687e-03  | 1.846e+00                | Auger electron      |
| 2.03933e-03  | 2.038e-01                | Auger electron      |
| 2.39401e-03  | 1.006e-02                | Auger electron      |

|             |           |                                |
|-------------|-----------|--------------------------------|
| 7.65921e-03 | 5.292e-01 | <a href="#">Auger electron</a> |
| 9.87109e-03 | 2.263e-01 | <a href="#">Auger electron</a> |
| 1.21137e-02 | 2.339e-02 | <a href="#">Auger electron</a> |
| 1.57740e-02 | 8.522e-02 | Conversion electron            |
| 1.73640e-02 | 7.477e-02 | Conversion electron            |
| 2.77631e-02 | 2.220e-02 | Conversion electron            |
| 2.93531e-02 | 1.957e-02 | Conversion electron            |
| 5.19870e-02 | 7.337e-02 | Conversion electron            |
| 5.57212e-02 | 2.429e-02 | <a href="#">Auger electron</a> |
| 6.69357e-02 | 1.315e-02 | <a href="#">Auger electron</a> |
| 8.40770e-02 | 1.560e-01 | Conversion electron            |
| 1.20514e-01 | 1.123e-02 | Conversion electron            |
| 1.52604e-01 | 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)