



# DYSPROSIUM-151

## SUMMARY DATA

### GENERAL

### CLASSIFICATION

Isotope: Dy-151  
Atomic number (Z): 66  
Mass number (A): 151  
Neutron number (N): 85

### RADIOACTIVE DECAY

Decay modes:  $\alpha$ ,  $\beta^+$ , Electron capture  
Half-life: 17.9 [m]  
Decay constant:  $6.4539 \times 10^{-4}$  [1/s]  
Daughters: Tb-151 (53.4%), Tb-151m (41.0%), Gd-147 (5.6%)  
Radioactive daughters: Tb-151, Tb-151m, Gd-147

### DOSIMETRIC CONSTANTS

Mean alpha energy: 0.234 [MeV]  
Mean electron energy: 0.06526 [MeV]  
Mean photon energy: 1.37232 [MeV]  
Air kerma rate constant,  $\Gamma_{10}$ :  $4.828 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Air kerma coefficient,  $K_{\text{air}}$ :  $4.942 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Equilibrium dose constant for weakly-penetrating radiations ( $\alpha$  and/or electrons),  $\Delta_{\text{wp}}$ :  $4.795 \times 10^{-14}$  [Gy  $\cdot$  kg/Bq  $\cdot$  s]  
Equilibrium dose constant for alphas,  $\Delta_{\alpha}$ :  $3.749 \times 10^{-14}$  [Gy  $\cdot$  kg/Bq  $\cdot$  s]

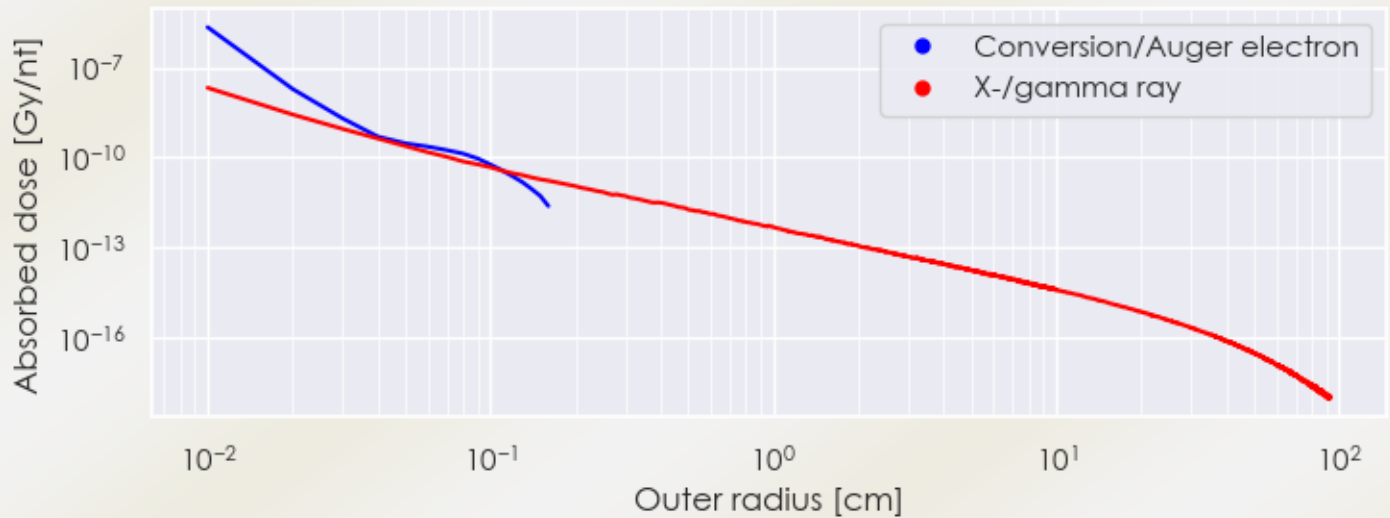
Equilibrium dose constant for betas/electrons,  $\Delta_{\beta-, \beta+, e-}$ : 1.046e-14 [Gy·kg/Bq·s]

Equilibrium dose constant for photons,  $\Delta_p$ : 2.199e-13 [Gy·kg/Bq·s]

## DOSE POINT KERNELS (PLOT)

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

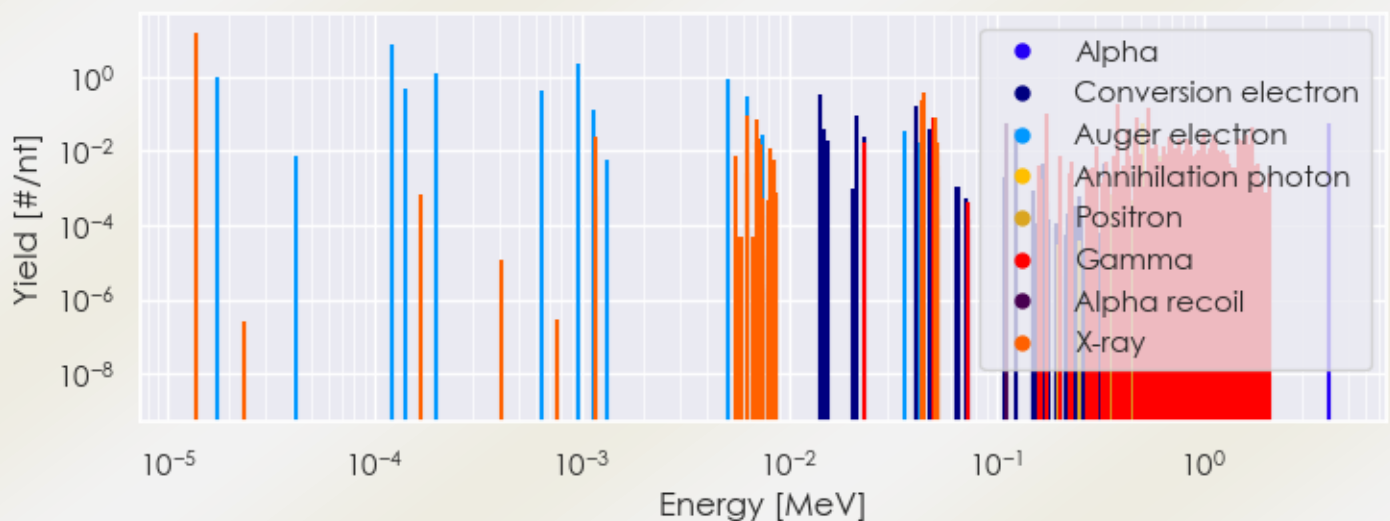
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: [www.mirdsoft.org/products/MIRDspecs/Dy-151 DPK.csv](http://www.mirdsoft.org/products/MIRDspecs/Dy-151 DPK.csv)

## SUMMARY SPECTRA (PLOT)

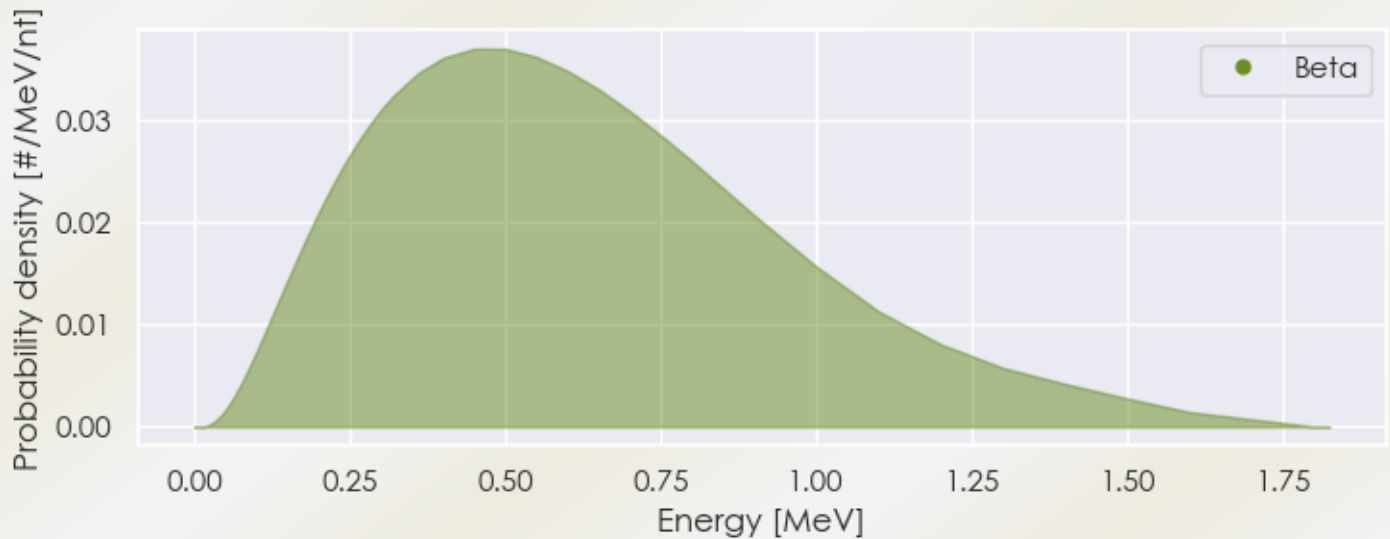
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Dy-151 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Dy-151 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/Dy-151 Beta Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Dy-151 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/Dy-151 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Dy-151 Summary Spectrum.csv)

| Energy [MeV] | Yield [# / nt] if > 0.01 | Radiation type |
|--------------|--------------------------|----------------|
| 1.38705e-05  | 1.577e+01                | X-ray          |
| 1.16457e-03  | 2.526e-02                | X-ray          |
| 6.22630e-03  | 1.046e-02                | X-ray          |
| 6.26069e-03  | 9.249e-02                | X-ray          |
| 6.91969e-03  | 1.600e-02                | X-ray          |
| 6.98190e-03  | 6.800e-02                | X-ray          |
| 7.07629e-03  | 2.257e-02                | X-ray          |
| 7.35101e-03  | 1.561e-02                | X-ray          |
| 8.10032e-03  | 1.188e-02                | X-ray          |
| 2.29200e-02  | 1.728e-02                | Gamma          |

|             |           |                     |
|-------------|-----------|---------------------|
| 4.37992e-02 | 2.214e-01 | X-ray               |
| 4.45546e-02 | 3.968e-01 | X-ray               |
| 4.94600e-02 | 8.077e-02 | Gamma               |
| 5.03066e-02 | 4.058e-02 | X-ray               |
| 5.04632e-02 | 7.850e-02 | X-ray               |
| 5.17791e-02 | 1.726e-02 | X-ray               |
| 1.76400e-01 | 1.060e-01 | Gamma               |
| 3.03000e-01 | 1.355e-02 | Gamma               |
| 3.86100e-01 | 1.937e-01 | Gamma               |
| 4.32160e-01 | 4.030e-02 | Gamma               |
| 4.63200e-01 | 2.397e-02 | Gamma               |
| 4.76560e-01 | 7.999e-02 | Gamma               |
| 5.11000e-01 | 5.895e-02 | Annihilation photon |
| 5.46310e-01 | 1.433e-01 | Gamma               |
| 5.70700e-01 | 1.120e-02 | Gamma               |
| 5.83900e-01 | 1.042e-02 | Gamma               |
| 5.96770e-01 | 1.572e-02 | Gamma               |
| 6.39500e-01 | 1.364e-02 | Gamma               |
| 6.89170e-01 | 2.527e-02 | Gamma               |
| 7.00320e-01 | 1.798e-02 | Gamma               |
| 7.12000e-01 | 1.199e-02 | Gamma               |
| 7.12000e-01 | 1.199e-02 | Gamma               |
| 7.45400e-01 | 1.216e-02 | Gamma               |
| 7.55570e-01 | 2.032e-02 | Gamma               |
| 8.14100e-01 | 1.016e-02 | Gamma               |
| 8.33900e-01 | 2.206e-02 | Gamma               |
| 8.45460e-01 | 2.006e-02 | Gamma               |
| 8.55840e-01 | 1.303e-02 | Gamma               |
| 8.70360e-01 | 1.407e-02 | Gamma               |
| 9.36270e-01 | 1.068e-02 | Gamma               |
| 9.83730e-01 | 2.058e-02 | Gamma               |
| 1.01040e+00 | 3.057e-02 | Gamma               |
| 1.06250e+00 | 1.007e-02 | Gamma               |
| 1.07060e+00 | 1.233e-02 | Gamma               |
| 1.09610e+00 | 1.763e-02 | Gamma               |
| 1.11430e+00 | 2.666e-02 | Gamma               |
| 1.12980e+00 | 1.129e-02 | Gamma               |
| 1.12980e+00 | 2.284e-02 | Gamma               |

|             |           |                     |
|-------------|-----------|---------------------|
| 1.14180e+00 | 2.015e-02 | Gamma               |
| 1.25610e+00 | 1.086e-02 | Gamma               |
| 1.47570e+00 | 2.136e-02 | Gamma               |
| 1.52510e+00 | 1.494e-02 | Gamma               |
| 1.53810e+00 | 1.980e-02 | Gamma               |
| 1.59310e+00 | 2.605e-02 | Gamma               |
| 1.65210e+00 | 1.433e-02 | Gamma               |
| 1.70160e+00 | 4.568e-02 | Gamma               |
| 1.73725e-05 | 9.648e-01 | Auger electron      |
| 1.21723e-04 | 7.227e+00 | Auger electron      |
| 1.39860e-04 | 4.520e-01 | Auger electron      |
| 1.99095e-04 | 1.226e+00 | Auger electron      |
| 6.44175e-04 | 4.247e-01 | Auger electron      |
| 9.64571e-04 | 2.294e+00 | Auger electron      |
| 1.14588e-03 | 1.320e-01 | Auger electron      |
| 5.04875e-03 | 8.264e-01 | Auger electron      |
| 6.26772e-03 | 2.904e-01 | Auger electron      |
| 7.52593e-03 | 2.567e-02 | Auger electron      |
| 1.42469e-02 | 3.298e-01 | Conversion electron |
| 1.46591e-02 | 4.033e-02 | Conversion electron |
| 1.54147e-02 | 1.925e-02 | Conversion electron |
| 2.13232e-02 | 8.551e-02 | Conversion electron |
| 2.29200e-02 | 2.397e-02 | Conversion electron |
| 3.58945e-02 | 3.295e-02 | Auger electron      |
| 4.07869e-02 | 1.588e-01 | Conversion electron |
| 4.11991e-02 | 1.804e-02 | Conversion electron |
| 4.25487e-02 | 1.639e-02 | Auger electron      |
| 4.78632e-02 | 4.049e-02 | Conversion electron |
| 4.94600e-02 | 1.132e-02 | Conversion electron |
| 1.24340e-01 | 3.731e-02 | Conversion electron |
| 4.06881e+00 | 5.600e-02 | Alpha               |
| 1.10788e-01 | 5.600e-02 | Alpha recoil        |

## 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)