

|                           |                            |                           |                            |                              |                           |                             |                          |
|---------------------------|----------------------------|---------------------------|----------------------------|------------------------------|---------------------------|-----------------------------|--------------------------|
| III-103<br>(60s)<br>ECB+  | III-103<br>(5.07m)<br>ECB+ | III-106<br>(6.2m)         | III-107<br>(32.4m)<br>ECB+ | III-108<br>(58.0m)<br>ECB+   | III-109<br>(4.2h)<br>ECB+ | III-110<br>(4.9h)<br>ECB+   |                          |
| Cd-101<br>(1.36m)<br>CB+  | Cd-102<br>(5.5m)<br>ECB+   | Cd-103<br>(7.3m)<br>ECB+  | Cd-105<br>(55.5m)<br>ECB+  | Cd-106<br>(5.27m)<br>ECB+    | Cd-107<br>(6.50h)<br>ECB+ | Cd-108<br>(STABLE)<br>EC    | Cd-109<br>(461.4d)<br>EC |
| Ag-101<br>(11.1m)<br>ECB+ | Ag-102<br>(12.9m)<br>ECB+  | Ag-103<br>(65.7m)<br>ECB+ | Ag-105<br>(41.2s)<br>EC    | Ag-106<br>(23.96m)<br>ECB+B- | Ag-107<br>(STABLE)<br>EC  | Ag-108<br>(2.37m)<br>B-ECB+ |                          |

# CADMIUM-105

## SUMMARY DATA

### GENERAL

### CLASSIFICATION

Isotope: Cd-105  
Atomic number (Z): 48  
Mass number (A): 105  
Neutron number (N): 57

### RADIOACTIVE DECAY

Decay modes:  $\beta^+$ , Electron capture  
Half-life: 55.5 [m]  
Decay constant:  $2.0815 \times 10^{-4}$  [1/s]  
Daughters: Ag-105m (83.0%), Ag-105 (17.0%)  
Radioactive daughters: Ag-105m, Ag-105

### DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]  
Mean electron energy: 0.21667 [MeV]  
Mean photon energy: 1.29945 [MeV]  
Air kerma rate constant,  $\Gamma_{10}$ :  $3.836 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Air kerma coefficient,  $K_{\text{air}}$ :  $4.920 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Equilibrium dose constant for weakly-penetrating radiations ( $\alpha$  and/or electrons),  $\Delta_{\text{wp}}$ :  $3.471 \times 10^{-14}$  [Gy  $\cdot$  kg/Bq  $\cdot$  s]  
Equilibrium dose constant for alphas,  $\Delta_{\alpha}$ : 0.000e+00 [Gy  $\cdot$  kg/Bq  $\cdot$  s]

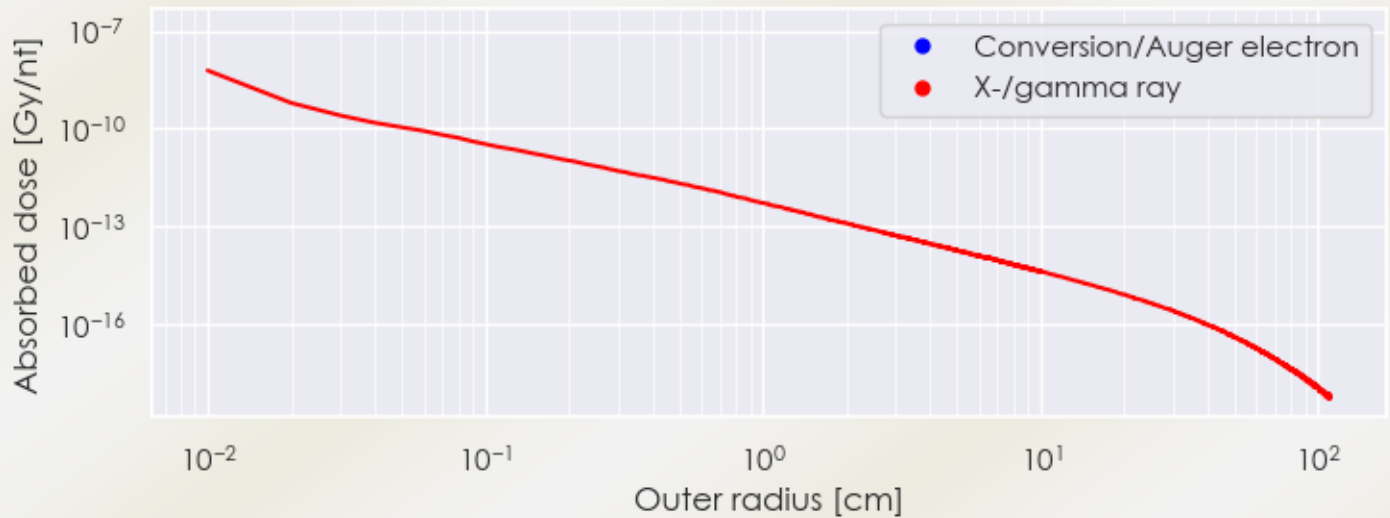
Equilibrium dose constant for betas/electrons,  $\Delta_{\beta,\beta^+,e^-}$ :  $3.471 \times 10^{-14}$  [Gy·kg/Bq·s]

Equilibrium dose constant for photons,  $\Delta_p$ :  $2.082 \times 10^{-13}$  [Gy·kg/Bq·s]

## DOSE POINT KERNELS (PLOT)

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

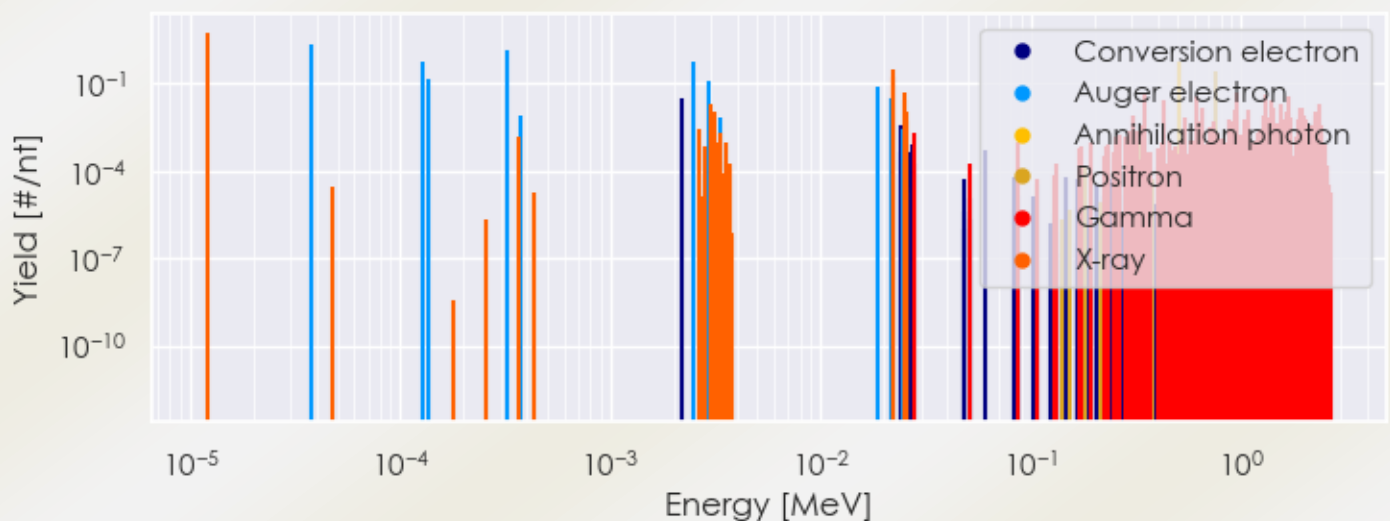
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: [www.mirdsoft.org/products/MIRDspecs/Cd-105 DPK.csv](http://www.mirdsoft.org/products/MIRDspecs/Cd-105 DPK.csv)

## SUMMARY SPECTRA (PLOT)

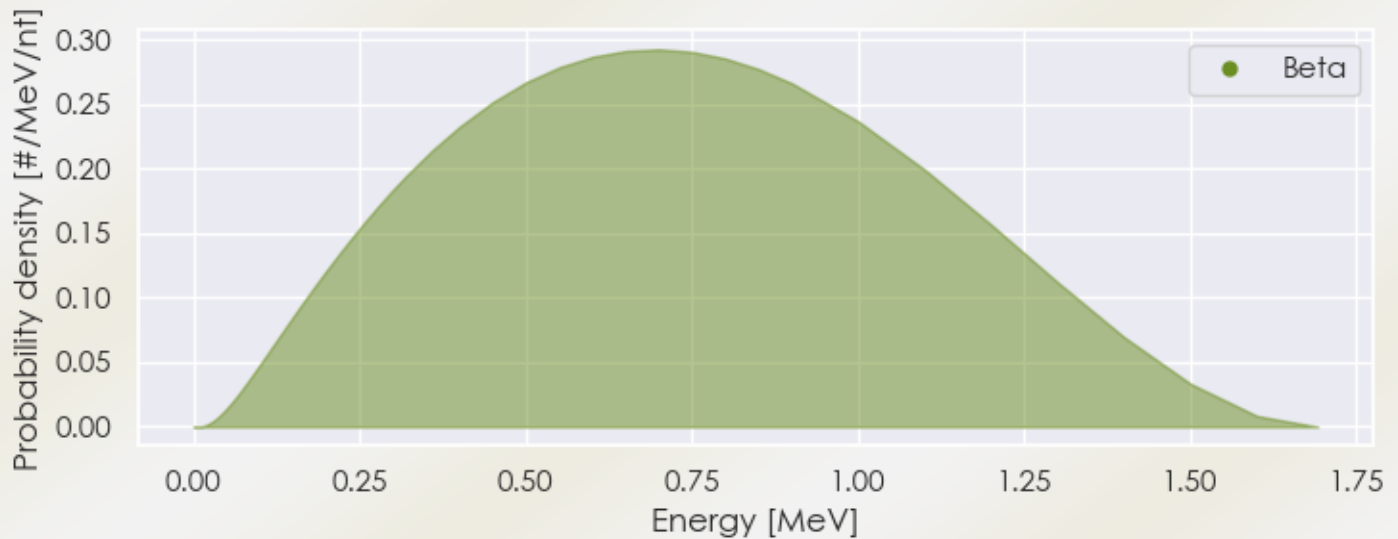
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Cd-105 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Cd-105 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/Cd-105 Beta Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Cd-105 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/Cd-105 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Cd-105 Summary Spectrum.csv)

| Energy [MeV] | Yield [# / nt] if > 0.01 | Radiation type |
|--------------|--------------------------|----------------|
| 1.20774e-05  | 5.878e+00                | X-ray          |
| 2.97345e-03  | 2.112e-02                | X-ray          |
| 3.14510e-03  | 1.025e-02                | X-ray          |
| 2.19609e-02  | 1.570e-01                | X-ray          |
| 2.21389e-02  | 2.959e-01                | X-ray          |
| 2.48888e-02  | 2.580e-02                | X-ray          |
| 2.49204e-02  | 5.013e-02                | X-ray          |
| 2.54258e-02  | 1.014e-02                | X-ray          |
| 3.46870e-01  | 4.202e-02                | Gamma          |
| 4.33240e-01  | 2.814e-02                | Gamma          |

|             |           |                     |
|-------------|-----------|---------------------|
| 5.11000e-01 | 5.599e-01 | Annihilation photon |
| 6.07220e-01 | 3.743e-02 | Gamma               |
| 6.48490e-01 | 1.571e-02 | Gamma               |
| 6.48490e-01 | 1.571e-02 | Gamma               |
| 9.34140e-01 | 1.271e-02 | Gamma               |
| 9.61840e-01 | 4.690e-02 | Gamma               |
| 1.07165e+00 | 1.280e-02 | Gamma               |
| 1.30246e+00 | 3.977e-02 | Gamma               |
| 1.38848e+00 | 2.697e-02 | Gamma               |
| 1.41610e+00 | 1.454e-02 | Gamma               |
| 1.55784e+00 | 2.050e-02 | Gamma               |
| 1.63581e+00 | 1.046e-02 | Gamma               |
| 1.69334e+00 | 3.541e-02 | Gamma               |
| 1.89752e+00 | 1.445e-02 | Gamma               |
| 1.93311e+00 | 1.590e-02 | Gamma               |
| 2.27285e+00 | 1.032e-02 | Gamma               |
| 2.33326e+00 | 1.979e-02 | Gamma               |
| 7.54224e-01 | 2.786e-01 | Positron            |
| 3.78136e-05 | 2.142e+00 | Auger electron      |
| 1.26884e-04 | 5.945e-01 | Auger electron      |
| 1.34902e-04 | 1.346e-01 | Auger electron      |
| 3.19047e-04 | 1.448e+00 | Auger electron      |
| 2.18100e-03 | 3.278e-02 | Conversion electron |
| 2.49425e-03 | 5.526e-01 | Auger electron      |
| 2.90232e-03 | 1.198e-01 | Auger electron      |
| 1.84718e-02 | 7.589e-02 | Auger electron      |
| 2.14605e-02 | 3.066e-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](https://sites.snmmi.org/SNMMI-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6)