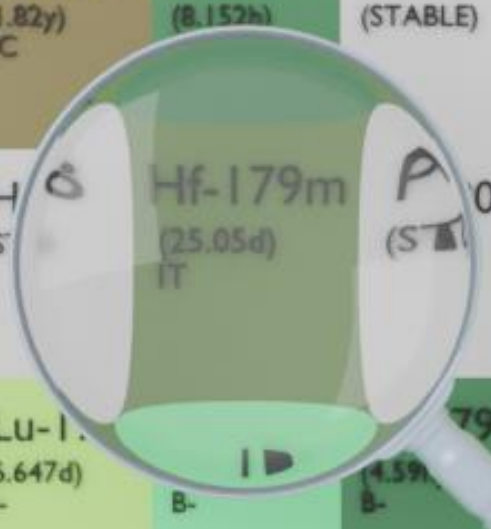




Ta-176 (3.09h) CB+	Ta-177 (56.56h) EC	Ta-178 (9.31m) ECB+	Ta-179 (1.82y) EC	Ta-180 (8.152h) IT	Ta-181 (STABLE)	Ta-182 (114.43d) B-	Ta-183 (5.1d) B-	Ta-184 (8.7h) B-
Hf-175 (70d) C	Hf-176 (STABLE)	Hf-177 (STABLE)	Hf-178 (STABLE)	Hf-179m (25.05d) IT	Hf-180 (STABLE)	Hf-181 (42.39d) B-	Hf-182 (9E+6y) B-	Hf-183 (1.067h) B-
Lu-174 (3.31y) CB+	Lu-175 (STABLE)	Lu-176 (3.85E+10y) B-	Lu-177 (6.647d) B-	Lu-178 (4.59h) B-	Lu-179 (STABLE)	Lu-180 (5.7m) B-	Lu-181 (3.5m) B-	Lu-182 (STABLE)

HAFNIUM-179M

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Hf-179m
Atomic number (Z): 72
Mass number (A): 179
Neutron number (N): 107

RADIOACTIVE DECAY

Decay modes: Internal transition
Half-life: 25.05 [d]
Decay constant: 3.2026×10^{-7} [1/s]
Daughters: Hf-179 (100.0%)
Radioactive daughters: None

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.18969 [MeV]
Mean photon energy: 0.92069 [MeV]
Air kerma rate constant, Γ_{10} : 3.532×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 3.532×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 3.039×10^{-14} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000e+00 [Gy $\cdot$ kg/Bq $\cdot$ s]

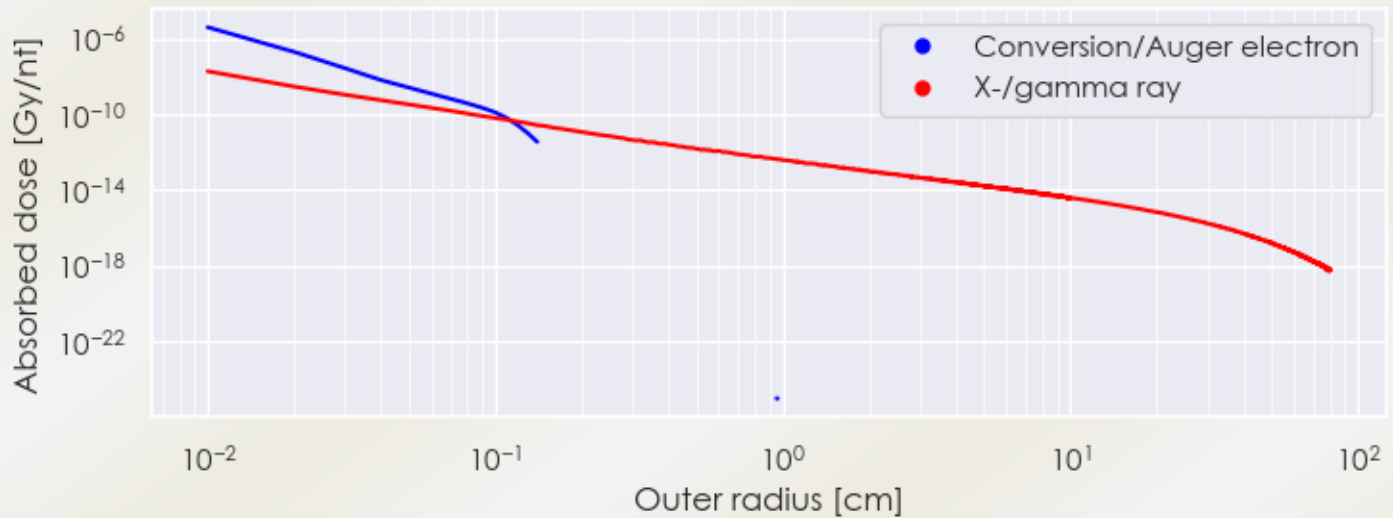
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta+, e-}$: 3.039×10^{-14} [Gy · kg/Bq · s]

Equilibrium dose constant for photons, Δ_p : 1.475×10^{-13} [Gy · kg/Bq · s]

DOSE POINT KERNELS (PLOT)

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

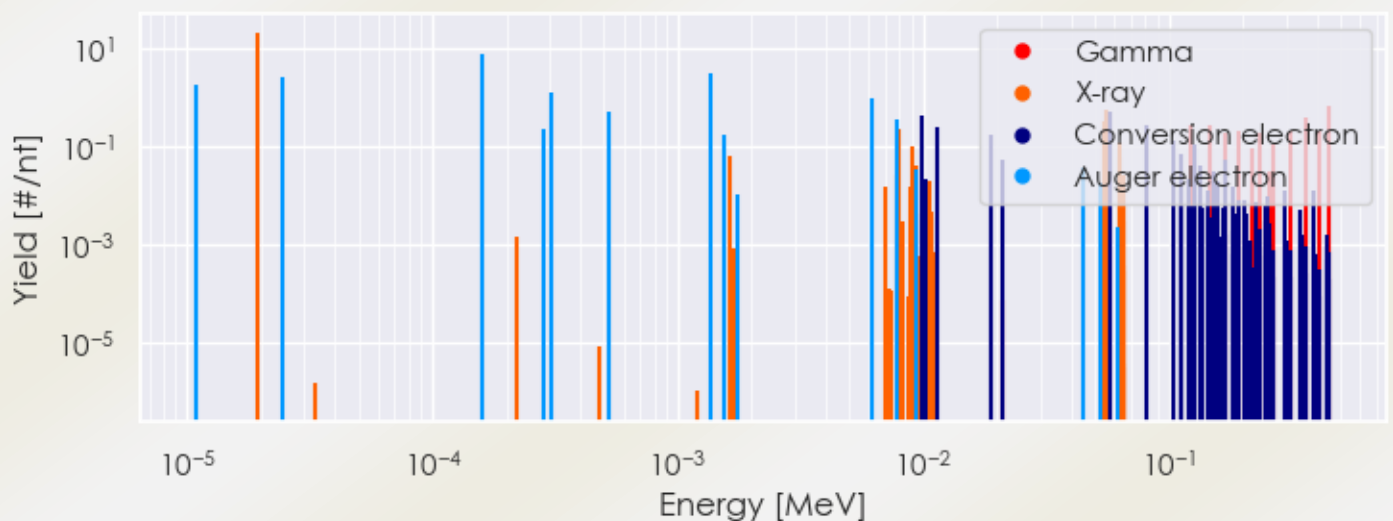
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Hf-179m 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/Hf-179m 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/Hf-179m Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Hf-179m%20Summary%20Spectrum.csv)

Energy [MeV]	Yield [#/(nt)] if > 0.01	Radiation type
1.93602e-05	2.179e+01	X-ray
1.63738e-03	6.511e-02	X-ray
6.98230e-03	1.582e-02	X-ray
7.83281e-03	2.618e-02	X-ray
7.88959e-03	2.310e-01	X-ray
8.88688e-03	1.512e-02	X-ray
9.03750e-03	1.071e-01	X-ray
9.14599e-03	1.950e-02	X-ray
9.34358e-03	4.014e-02	X-ray
1.05374e-02	1.948e-02	X-ray
5.47191e-02	3.279e-01	X-ray
5.59237e-02	5.736e-01	X-ray
6.31238e-02	6.107e-02	X-ray
6.33831e-02	1.180e-01	X-ray
6.50467e-02	1.373e-02	X-ray
6.51063e-02	2.659e-02	X-ray
1.22700e-01	2.758e-01	Gamma
1.46150e-01	2.697e-01	Gamma
1.69780e-01	1.933e-01	Gamma
1.92660e-01	2.143e-01	Gamma
2.17040e-01	8.991e-02	Gamma
2.36480e-01	1.873e-01	Gamma
2.57380e-01	3.245e-02	Gamma
2.68850e-01	1.122e-01	Gamma
3.15930e-01	2.021e-01	Gamma
3.62550e-01	3.948e-01	Gamma
4.09720e-01	2.143e-01	Gamma

4.53590e-01	6.760e-01	Gamma
1.09267e-05	1.912e+00	Auger electron
2.44622e-05	2.705e+00	Auger electron
1.59568e-04	7.574e+00	Auger electron
2.85761e-04	2.410e-01	Auger electron
3.03256e-04	1.296e+00	Auger electron
5.27583e-04	5.252e-01	Auger electron
1.36244e-03	3.271e+00	Auger electron
1.54088e-03	1.721e-01	Auger electron
1.76480e-03	1.069e-02	Auger electron
6.13714e-03	1.015e+00	Auger electron
7.75895e-03	3.762e-01	Auger electron
9.41233e-03	3.523e-02	Auger electron
9.78500e-03	4.304e-01	Conversion electron
1.02670e-02	2.275e-02	Conversion electron
1.14717e-02	2.483e-01	Conversion electron
1.89310e-02	1.844e-01	Conversion electron
2.10300e-02	5.324e-02	Conversion electron
4.45280e-02	3.636e-02	Auger electron
5.31026e-02	1.882e-02	Auger electron
5.72180e-02	5.082e-01	Conversion electron
8.06680e-02	2.886e-01	Conversion electron
1.04298e-01	1.393e-01	Conversion electron
1.11455e-01	7.162e-02	Conversion electron
1.11937e-01	1.345e-02	Conversion electron
1.20601e-01	2.118e-02	Conversion electron
1.27178e-01	1.114e-01	Conversion electron
1.34905e-01	4.052e-02	Conversion electron
1.44051e-01	1.287e-02	Conversion electron
1.51558e-01	3.223e-02	Conversion electron
1.58535e-01	1.956e-02	Conversion electron
1.70998e-01	5.442e-02	Conversion electron
1.81415e-01	1.562e-02	Conversion electron
2.97068e-01	1.322e-02	Conversion electron
3.88108e-01	1.287e-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/SNMML-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6