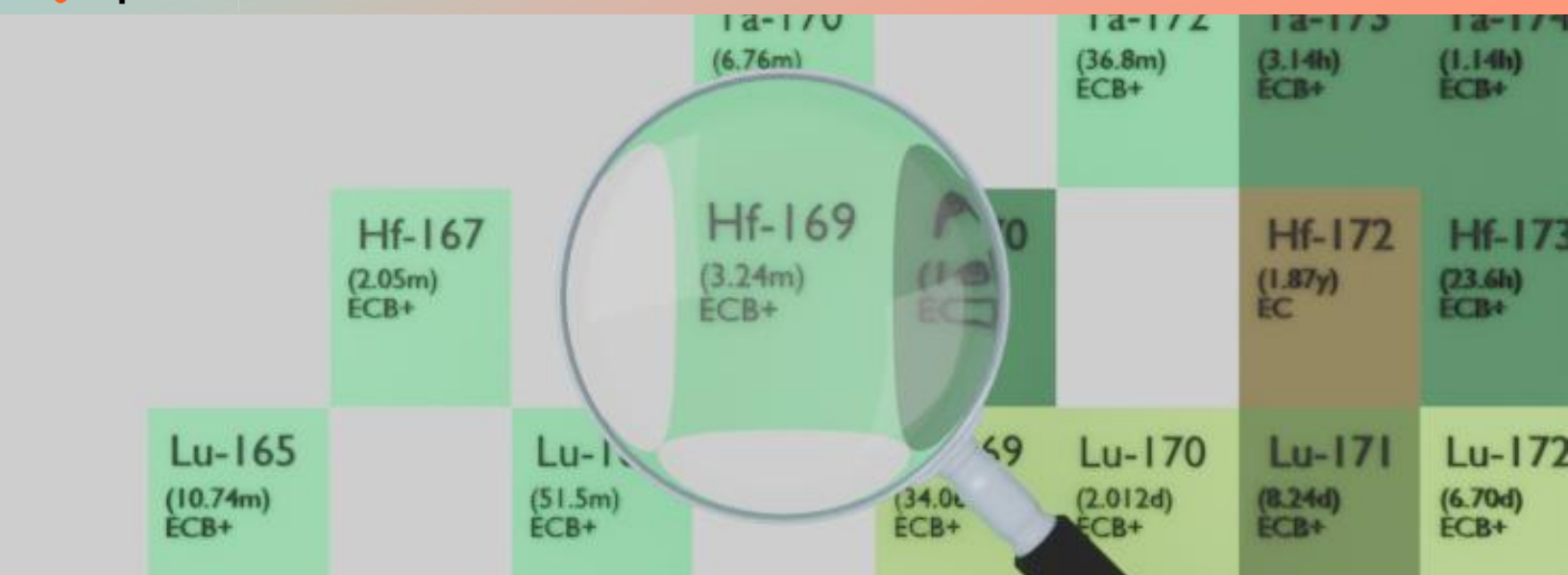




HAFNIUM-169

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Hf-169
Atomic number (Z): 72
Mass number (A): 169
Neutron number (N): 97

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 3.24 [m]
Decay constant: 3.5656×10^{-3} [1/s]
Daughters: Lu-169 (96.9%), Lu-169m (3.1%)
Radioactive daughters: Lu-169, Lu-169m

DOSIMETRIC CONSTANTS

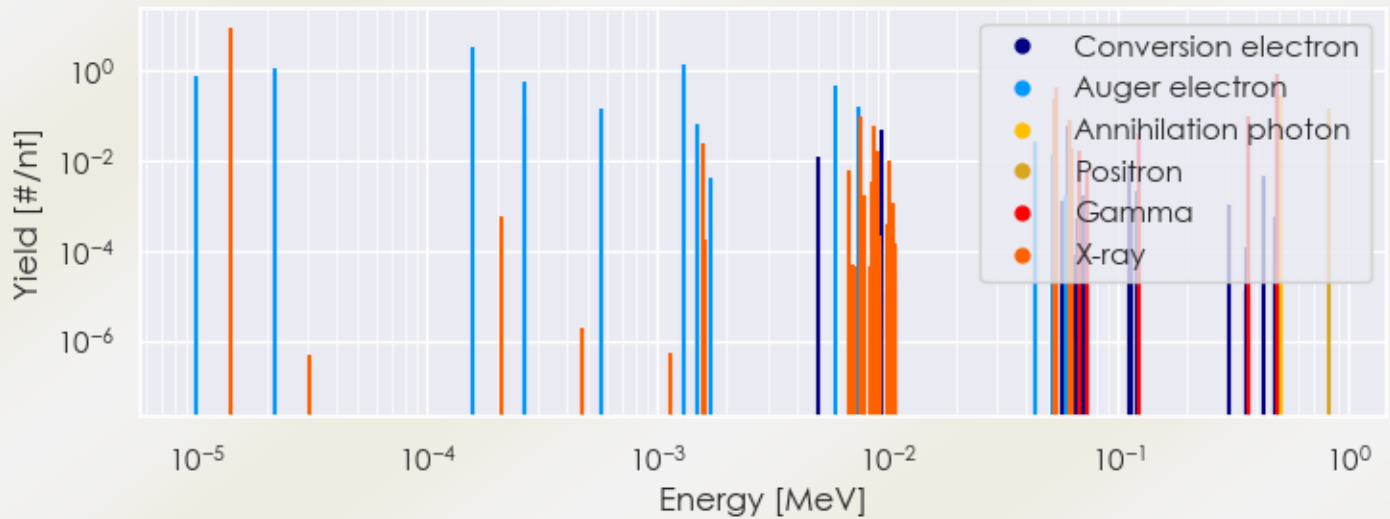
Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.13089 [MeV]
Mean photon energy: 0.64161 [MeV]
Air kerma rate constant, Γ_{10} : 1.989×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 2.517×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 2.097×10^{-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, $\Delta_{\beta,\beta^+,e^-}$: 2.097e-14 [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.028e-13 [Gy·kg/Bq·s]

SUMMARY SPECTRA (PLOT)

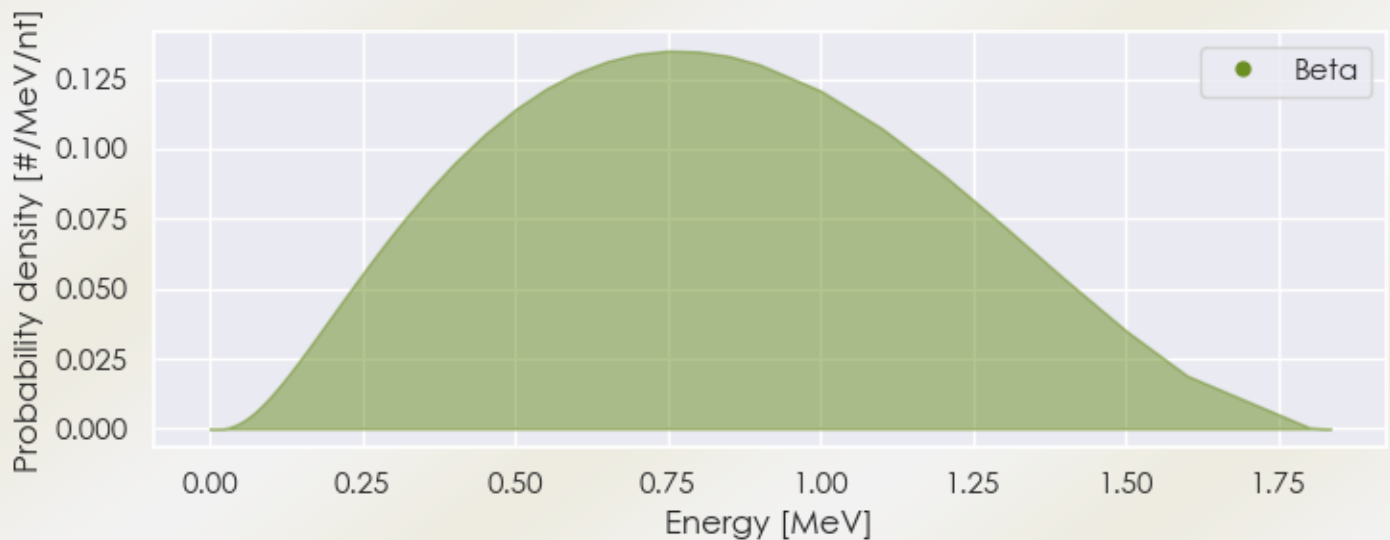
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Hf-169 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Hf-169%20Summary%20Spectrum.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/Hf-169 Beta Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Hf-169%20Beta%20Spectrum.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-169 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Hf-169%20Summary%20Spectrum.csv)

Energy [MeV]	Yield [#/(nt)] if > 0.01	Radiation type
1.40161e-05	9.096e+00	X-ray
1.56946e-03	2.506e-02	X-ray
7.59237e-03	1.049e-02	X-ray
7.64540e-03	9.262e-02	X-ray
8.72221e-03	5.721e-02	X-ray
9.04392e-03	1.594e-02	X-ray
1.01636e-02	1.030e-02	X-ray
5.30692e-02	2.296e-01	X-ray
5.41988e-02	4.032e-01	X-ray
6.11839e-02	4.273e-02	X-ray
6.14258e-02	8.256e-02	X-ray
6.30870e-02	1.847e-02	X-ray
6.84000e-02	1.596e-02	Gamma
1.23600e-01	3.864e-02	Gamma
3.69500e-01	9.744e-02	Gamma
4.92860e-01	8.400e-01	Gamma
5.11000e-01	2.727e-01	Annihilation photon
8.31050e-01	1.364e-01	Positron
9.96729e-06	7.909e-01	Auger electron
2.16358e-05	1.121e+00	Auger electron
1.56517e-04	3.247e+00	Auger electron
2.64872e-04	9.827e-02	Auger electron
2.66416e-04	5.797e-01	Auger electron
5.64913e-04	1.454e-01	Auger electron
1.30969e-03	1.366e+00	Auger electron
1.48434e-03	6.569e-02	Auger electron
4.95800e-03	1.212e-02	Conversion electron
5.97125e-03	4.459e-01	Auger electron

7.52564e-03	1.629e-01	Auger electron
9.11022e-03	1.508e-02	Auger electron
9.45801e-03	4.675e-02	Conversion electron
4.32341e-02	2.655e-02	Auger electron
5.15128e-02	1.366e-02	Auger electron
6.01580e-02	5.801e-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