



FRANCIUM-224

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Fr-224
Atomic number (Z): 87
Mass number (A): 224
Neutron number (N): 137

RADIOACTIVE DECAY

Decay modes: β^-
Half-life: 3.33 [m]
Decay constant: $3.4692\text{e-}03$ [1/s]
Daughters: Ra-224 (100.0%)
Radioactive daughters: Ra-224

DOSIMETRIC CONSTANTS

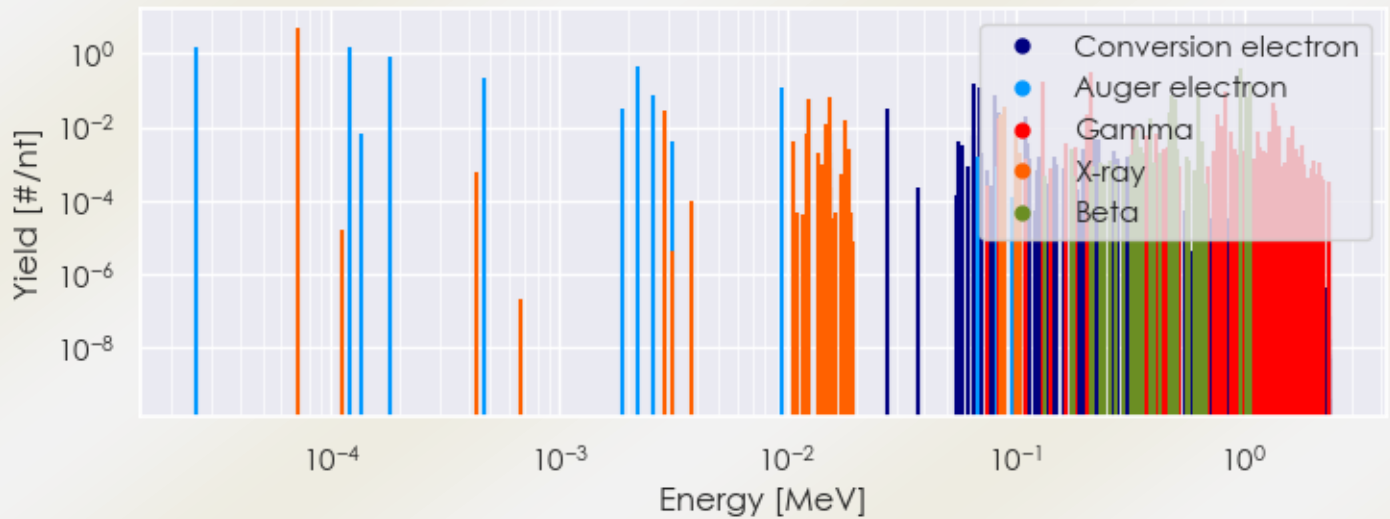
Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.87506 [MeV]
Mean photon energy: 0.5523 [MeV]
Air kerma rate constant, Γ_{10} : $2.397\text{e-}17$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Air kerma coefficient, K_{air} : $2.397\text{e-}17$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $1.402\text{e-}13$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for alphas, Δ_{α} : $0.000\text{e+}00$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]

Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta+, e-}$: 1.402e-13 [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 8.849e-14 [Gy·kg/Bq·s]

SUMMARY SPECTRA (PLOT)

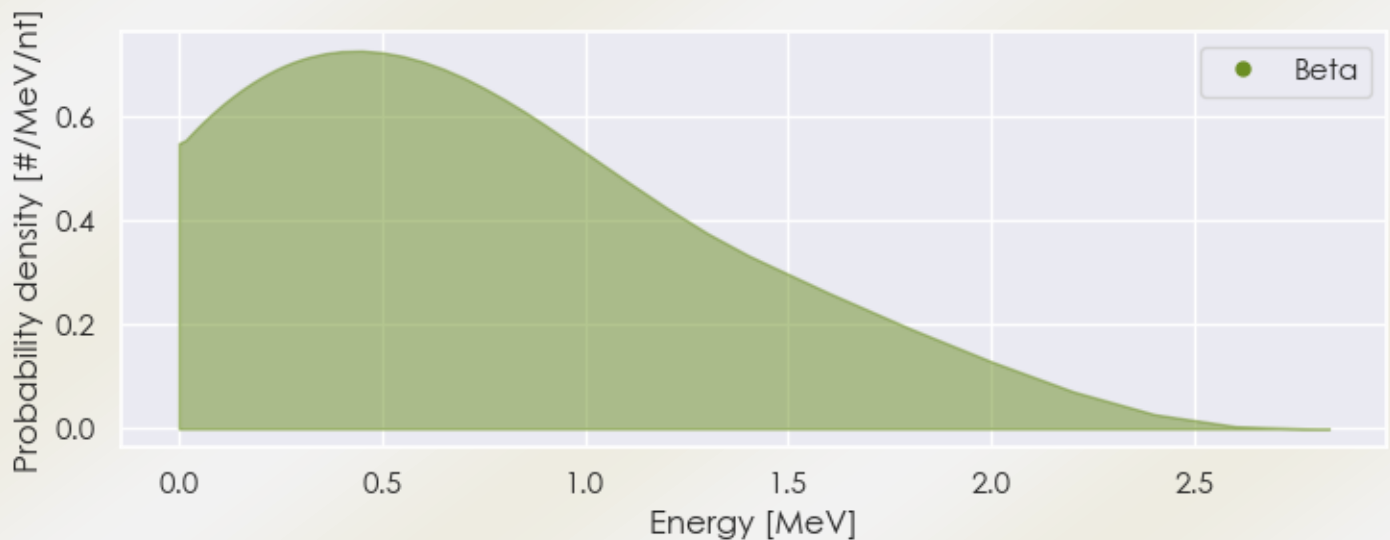
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Fr-224 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Fr-224%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/Fr-224 Beta Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Fr-224%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/Fr-224 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Fr-224%20Summary%20Spectrum.csv)

Energy [MeV]	Yield [#/(nt)] if > 0.01	Radiation type
7.12300e-05	5.275e+00	X-ray
2.89021e-03	2.692e-02	X-ray
1.23447e-02	5.829e-02	X-ray
1.48529e-02	1.184e-02	X-ray
1.53013e-02	6.814e-02	X-ray
1.79232e-02	1.484e-02	X-ray
8.43730e-02	1.793e-02	Gamma
8.57602e-02	2.125e-02	X-ray
8.88641e-02	3.470e-02	X-ray
1.31613e-01	1.630e-01	Gamma
2.05930e-01	2.282e-02	Gamma
2.15983e-01	3.309e-01	Gamma
3.35040e-01	1.004e-02	Gamma
7.62530e-01	2.233e-02	Gamma
7.99600e-01	1.027e-02	Gamma
8.36900e-01	9.780e-02	Gamma
1.34070e+00	4.792e-02	Gamma
1.37845e+00	2.983e-02	Gamma
1.43560e+00	1.027e-02	Gamma
1.65245e+00	1.092e-02	Gamma
3.91552e-01	1.781e-02	Beta
4.75294e-01	1.781e-02	Beta
4.75928e-01	2.474e-02	Beta
4.80039e-01	7.223e-02	Beta
4.98242e-01	1.781e-02	Beta
4.98471e-01	5.541e-02	Beta
6.28970e-01	9.895e-02	Beta
9.75170e-01	4.156e-01	Beta

1.03045e+00	6.927e-02	Beta
1.06596e+00	1.583e-01	Beta
2.57483e-05	1.449e+00	Auger electron
1.20675e-04	1.468e+00	Auger electron
1.81325e-04	8.347e-01	Auger electron
4.72050e-04	2.098e-01	Auger electron
1.88170e-03	3.209e-02	Auger electron
2.22450e-03	4.645e-01	Auger electron
2.59834e-03	7.489e-02	Auger electron
9.49535e-03	1.264e-01	Auger electron
1.24299e-02	6.137e-02	Auger electron
2.72930e-02	3.183e-02	Conversion electron
6.58130e-02	1.575e-01	Conversion electron
6.89170e-02	1.216e-01	Conversion electron
8.05993e-02	7.765e-02	Conversion electron
8.43730e-02	2.622e-02	Conversion electron
1.11663e-01	2.003e-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