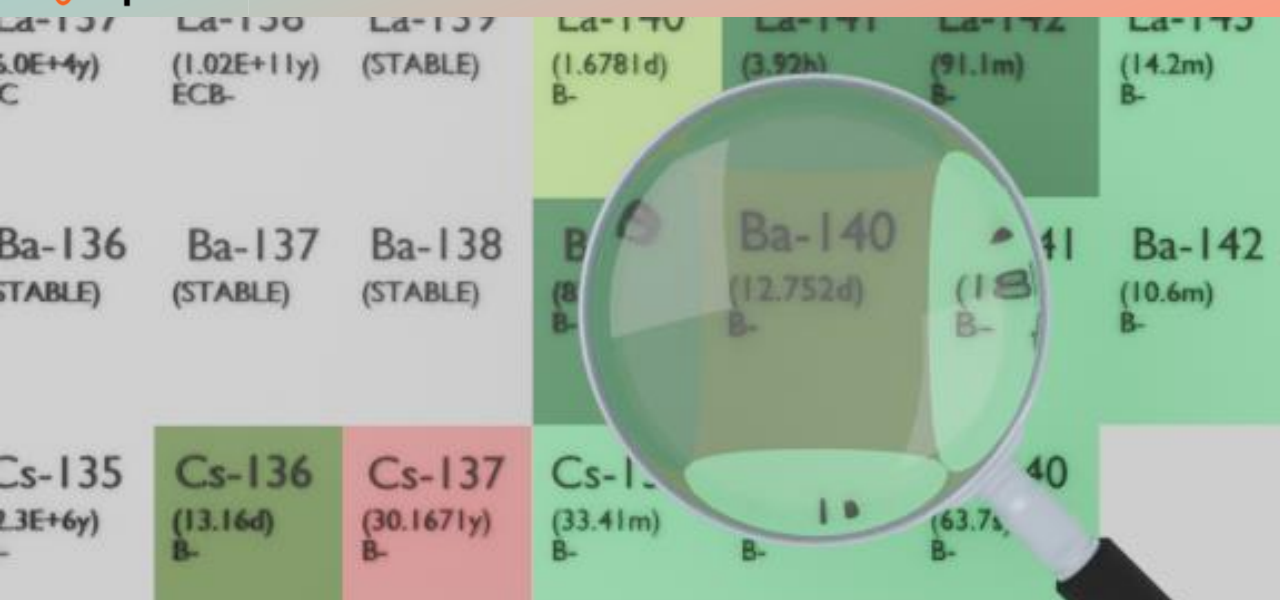




BARIUM-140

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Ba-140
Atomic number (Z): 56
Mass number (A): 140
Neutron number (N): 84

RADIOACTIVE DECAY

Decay modes: β^-
Half-life: 12.75 [d]
Decay constant: $6.2912\text{e-}07$ [1/s]
Daughters: La-140 (100.0%)
Radioactive daughters: La-140

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.32022 [MeV]
Mean photon energy: 0.18264 [MeV]
Air kerma rate constant, Γ_{10} : $7.898\text{e-}18$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Air kerma coefficient, K_{air} : $7.898\text{e-}18$ [$\text{Gy} \cdot \text{m}^2/\text{Bq} \cdot \text{s}$]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $5.131\text{e-}14$ [$\text{Gy} \cdot \text{kg}/\text{Bq} \cdot \text{s}$]
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, $\Delta_{\beta-, \beta+, e^-}$: 5.131×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 2.926×10^{-14} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

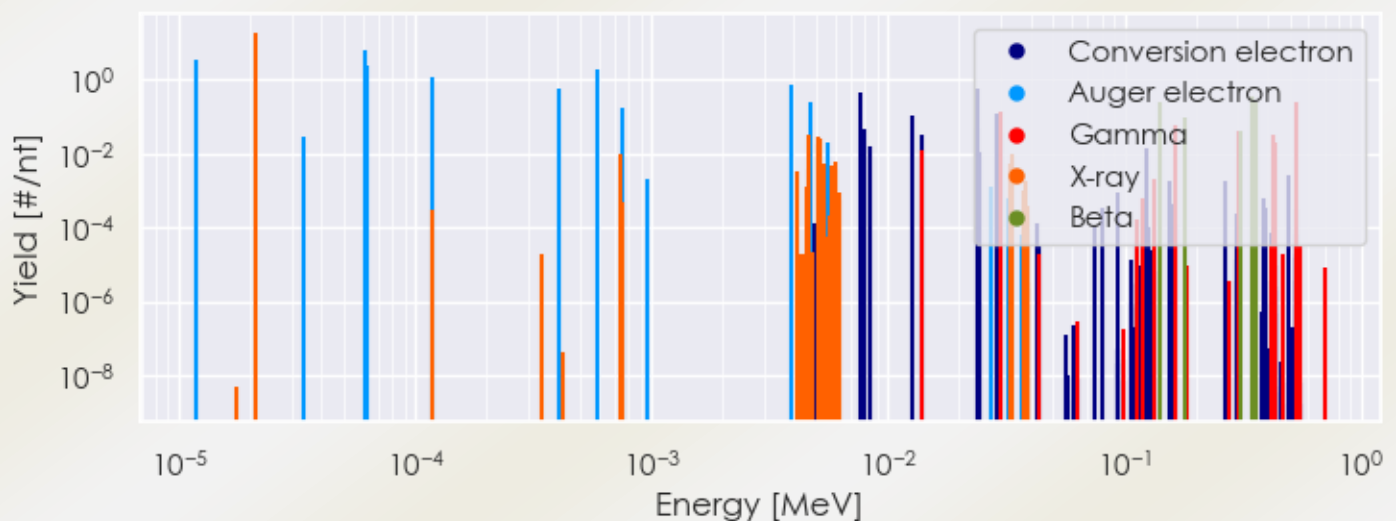
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Ba-140 DPK.csv

SUMMARY SPECTRA (PLOT)

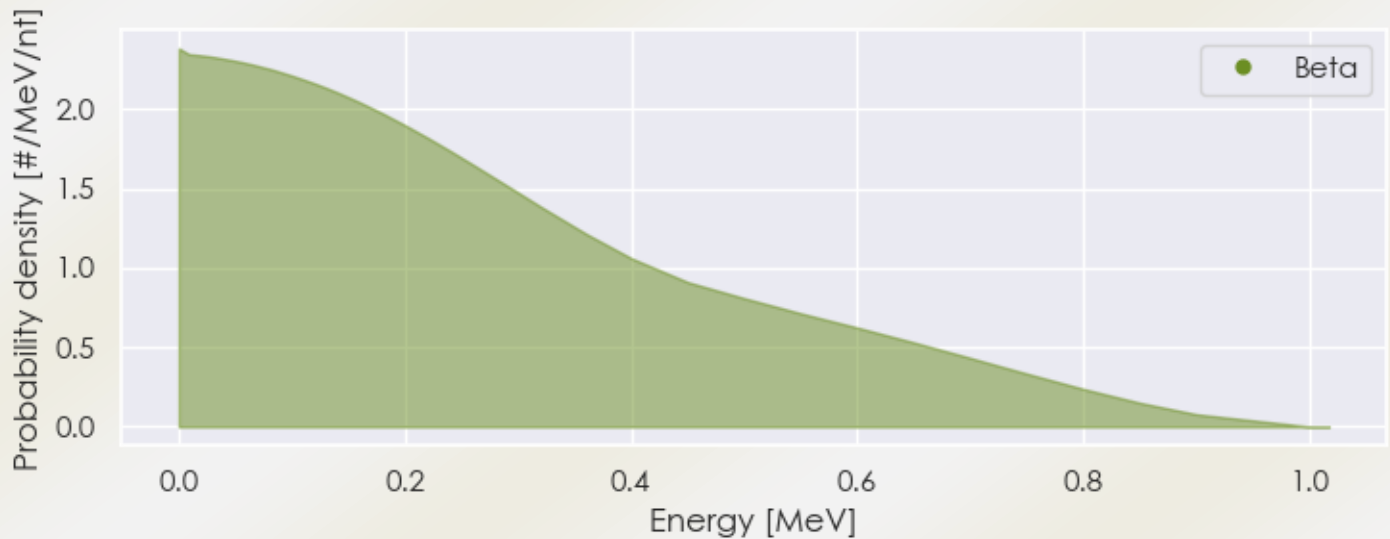
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Ba-140 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/Ba-140 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/Ba-140 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
2.10428e-05	1.951e+01	X-ray
4.63652e-03	3.495e-02	X-ray
5.03700e-03	1.726e-02	X-ray
5.03753e-03	2.872e-02	X-ray
5.11912e-03	2.648e-02	X-ray
1.38460e-02	1.219e-02	Gamma
2.99660e-02	1.410e-01	Gamma
3.34591e-02	1.044e-02	X-ray
1.62660e-01	6.219e-02	Gamma
3.04849e-01	4.293e-02	Gamma

4.23722e-01	3.151e-02	Gamma
4.37575e-01	1.929e-02	Gamma
5.37261e-01	2.439e-01	Gamma
1.40640e-01	2.391e-01	Beta
1.80919e-01	9.345e-02	Beta
3.10206e-01	4.441e-02	Beta
3.44481e-01	3.818e-01	Beta
3.61551e-01	2.412e-01	Beta
1.18532e-05	3.444e+00	Auger electron
3.33700e-05	2.837e-02	Auger electron
6.13190e-05	6.676e+00	Auger electron
6.24412e-05	2.324e+00	Auger electron
1.17058e-04	1.146e+00	Auger electron
4.05109e-04	6.167e-01	Auger electron
5.86607e-04	1.973e+00	Auger electron
7.46032e-04	1.740e-01	Auger electron
3.86287e-03	7.686e-01	Auger electron
4.69511e-03	2.574e-01	Auger electron
5.57132e-03	2.097e-02	Auger electron
7.60420e-03	4.803e-01	Conversion electron
7.94350e-03	4.772e-02	Conversion electron
8.36220e-03	1.635e-02	Conversion electron
1.27233e-02	1.135e-01	Conversion electron
1.38460e-02	3.140e-02	Conversion electron
2.37242e-02	5.603e-01	Conversion electron
2.40635e-02	4.842e-02	Conversion electron
2.44822e-02	1.177e-02	Conversion electron
2.88433e-02	1.292e-01	Conversion electron
2.99660e-02	3.578e-02	Conversion electron
1.23717e-01	1.497e-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