



RADON-211

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Rn-211
Atomic number (Z): 86
Mass number (A): 211
Neutron number (N): 125

RADIOACTIVE DECAY

Decay modes: α , β^+ , Electron capture
Half-life: 14.6 [h]
Decay constant: 1.3188×10^{-5} [1/s]
Daughters: At-211 (72.6%), Po-207 (27.4%)
Radioactive daughters: At-211, Po-207

DOSIMETRIC CONSTANTS

Mean alpha energy: 1.6204 [MeV]
Mean electron energy: 0.06627 [MeV]
Mean photon energy: 1.87269 [MeV]
Air kerma rate constant, Γ_{10} : 7.886×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 7.887×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 2.702×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 2.596×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]

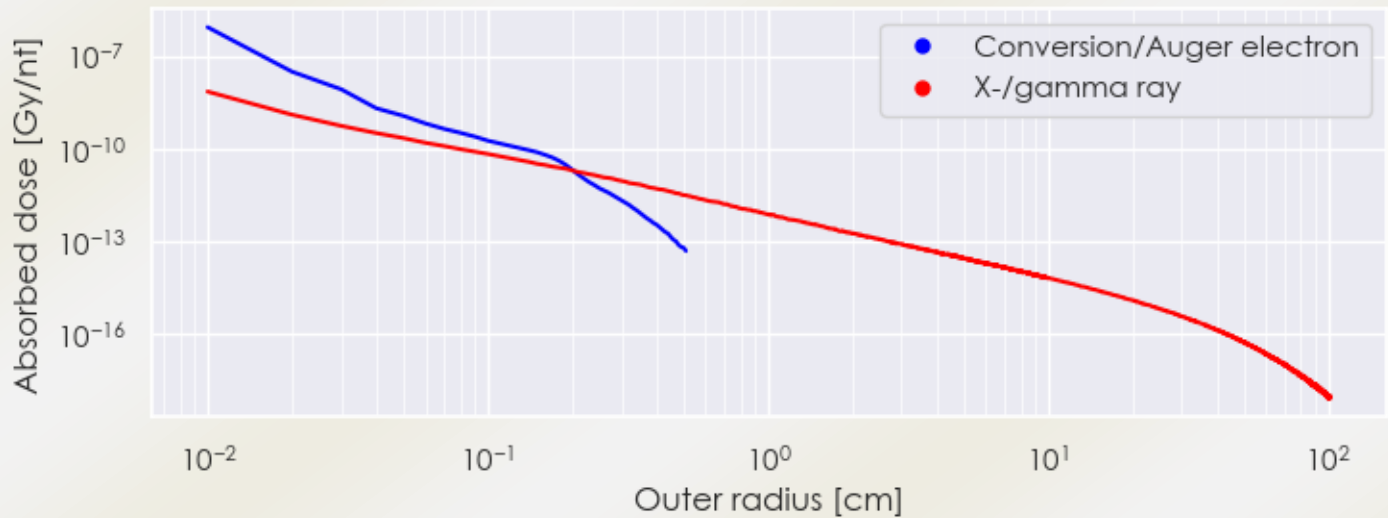
Equilibrium dose constant for betas/electrons, $\Delta_{\beta,\beta^+,e^-}$: 1.062×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 3.000×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

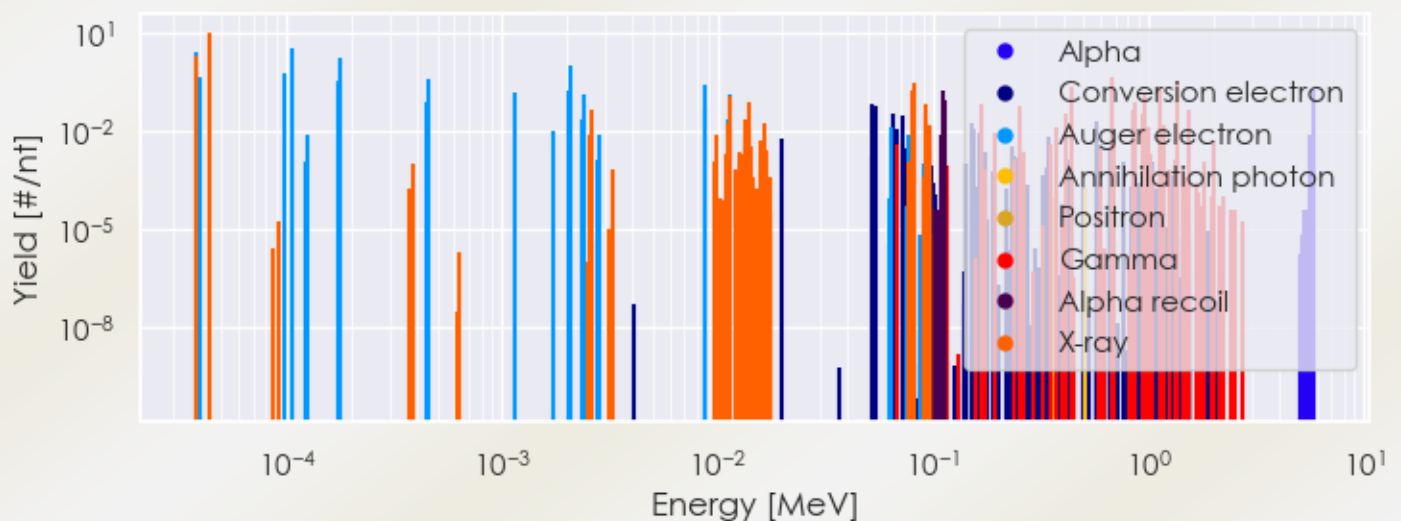
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Rn-211 DPK.csv

SUMMARY SPECTRA (PLOT)

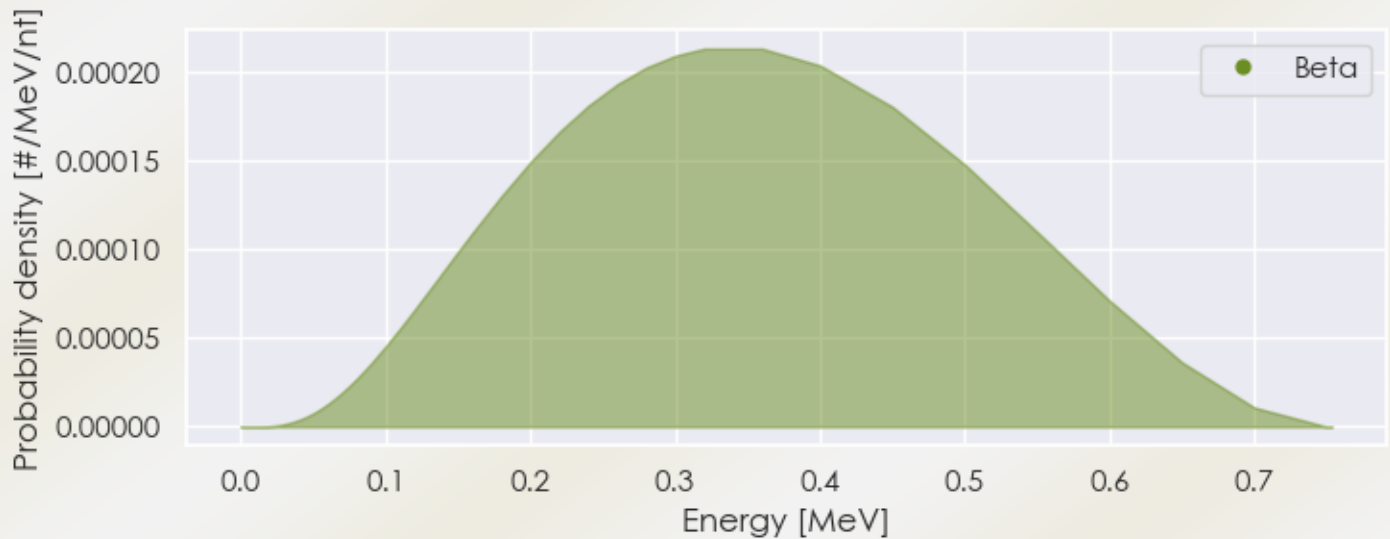
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Rn-211 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/Rn-211 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/Rn-211 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
3.84276e-05	1.947e+00	X-ray
4.42779e-05	1.069e+01	X-ray
2.62560e-03	4.761e-02	X-ray
1.11319e-02	1.853e-02	X-ray
1.13036e-02	1.392e-02	X-ray
1.14288e-02	1.225e-01	X-ray
1.34935e-02	2.351e-02	X-ray
1.37157e-02	2.423e-02	X-ray
1.39286e-02	8.095e-02	X-ray
1.63129e-02	1.709e-02	X-ray

7.92282e-02	1.782e-01	X-ray
8.18531e-02	2.952e-01	X-ray
9.20764e-02	3.326e-02	X-ray
9.26695e-02	6.454e-02	X-ray
9.53262e-02	1.595e-02	X-ray
1.68700e-01	6.718e-02	Gamma
2.50200e-01	5.996e-02	Gamma
3.70500e-01	1.353e-02	Gamma
4.16400e-01	3.472e-02	Gamma
4.42200e-01	2.299e-01	Gamma
6.74100e-01	4.508e-01	Gamma
6.78400e-01	2.885e-01	Gamma
8.53400e-01	4.599e-02	Gamma
8.66000e-01	7.890e-02	Gamma
9.34700e-01	3.652e-02	Gamma
9.46700e-01	4.959e-02	Gamma
9.47400e-01	1.623e-01	Gamma
9.92500e-01	1.353e-02	Gamma
1.12670e+00	2.209e-01	Gamma
1.18130e+00	1.443e-02	Gamma
1.36290e+00	3.246e-01	Gamma
1.53880e+00	4.689e-02	Gamma
3.80401e-05	2.652e+00	Auger electron
3.95726e-05	4.650e-01	Auger electron
9.73903e-05	6.066e-01	Auger electron
1.05034e-04	3.243e+00	Auger electron
1.75290e-04	3.299e-01	Auger electron
1.76679e-04	1.764e+00	Auger electron
4.44662e-04	7.696e-02	Auger electron
4.50569e-04	4.164e-01	Auger electron
1.14628e-03	1.503e-01	Auger electron
1.71322e-03	1.006e-02	Auger electron
2.02636e-03	1.745e-01	Auger electron
2.06631e-03	9.634e-01	Auger electron
2.32481e-03	2.418e-02	Auger electron
2.37770e-03	1.384e-01	Auger electron
8.67560e-03	5.085e-02	Auger electron
8.68158e-03	2.715e-01	Auger electron

1.12369e-02	2.330e-02	Auger electron
1.13245e-02	1.259e-01	Auger electron
1.39978e-02	1.390e-02	Auger electron
5.22030e-02	6.833e-02	Conversion electron
5.46830e-02	5.972e-02	Conversion electron
6.34792e-02	1.416e-02	Auger electron
6.52185e-02	3.466e-02	Conversion electron
6.85000e-02	1.104e-02	Conversion electron
7.26320e-02	3.087e-02	Conversion electron
9.57320e-02	1.471e-02	Conversion electron
1.51860e-01	1.820e-02	Conversion electron
1.54485e-01	1.102e-02	Conversion electron
5.78032e-01	1.906e-02	Conversion electron
5.78367e+00	1.731e-01	Alpha
5.85087e+00	9.341e-02	Alpha
1.11834e-01	1.731e-01	Alpha recoil
1.13134e-01	9.341e-02	Alpha recoil

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