



YTTRIUM-81

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Y-81
Atomic number (Z): 39
Mass number (A): 81
Neutron number (N): 42

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 70.4 [s]
Decay constant: 9.8458×10^{-3} [1/s]
Daughters: Sr-81 (100.0%)
Radioactive daughters: Sr-81

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 1.96581 [MeV]
Mean photon energy: 1.17016 [MeV]
Air kerma rate constant, Γ_{10} : 1.600×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 5.383×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 3.150×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000e+00 [Gy $\cdot$ kg/Bq $\cdot$ s]

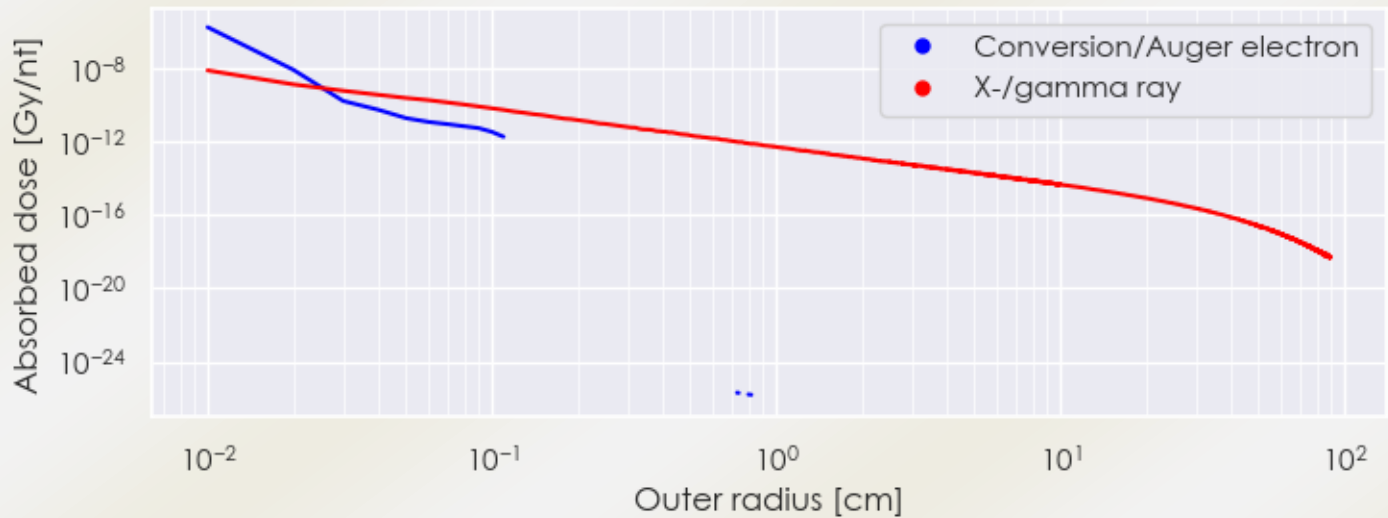
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta+, e^-}$: 3.150×10^{-13} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.875×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

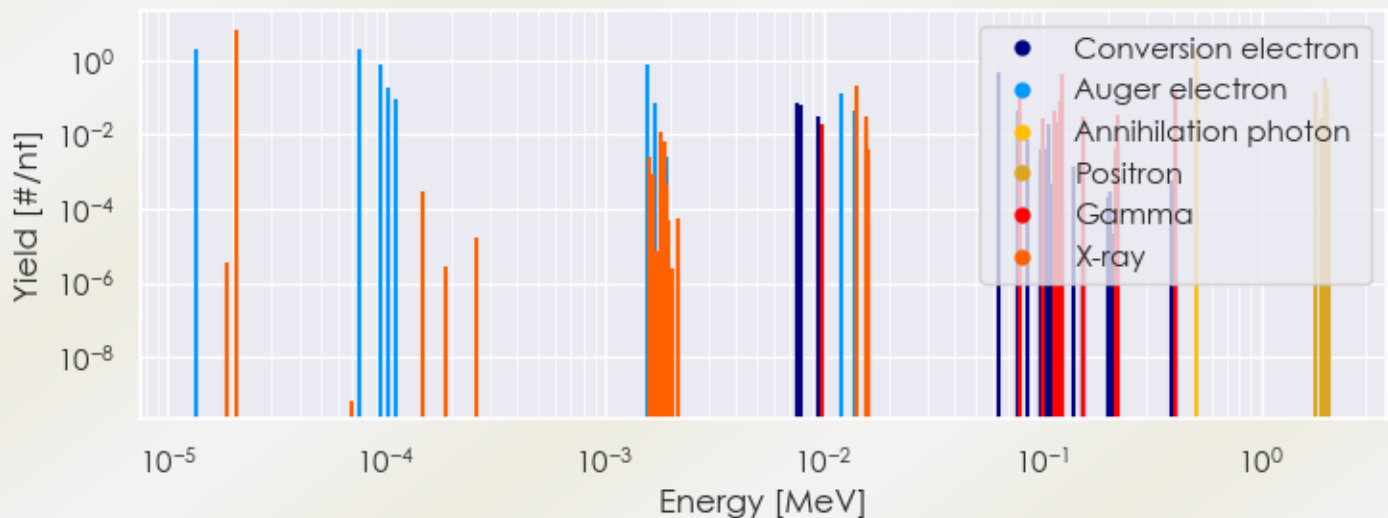
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Y-81 DPK.csv

SUMMARY SPECTRA (PLOT)

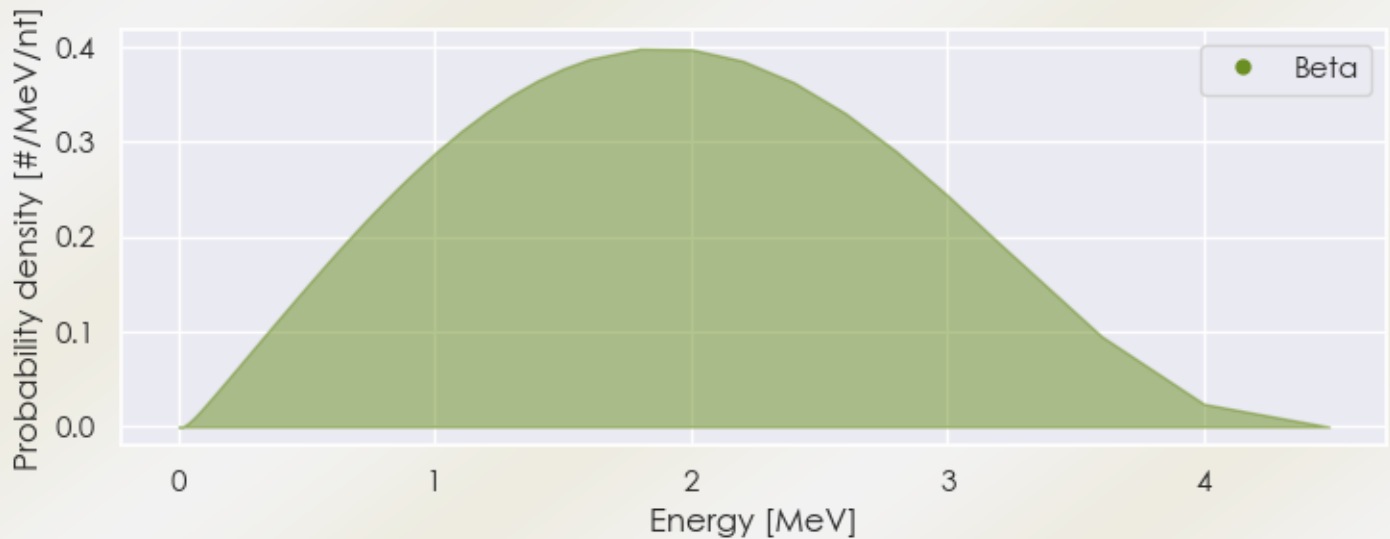
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Y-81 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/Y-81 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/Y-81 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
2.09289e-05	6.831e+00	X-ray
1.79939e-03	1.205e-02	X-ray
9.82000e-03	1.996e-02	Gamma
1.40549e-02	1.088e-01	X-ray
1.41246e-02	2.090e-01	X-ray
1.57867e-02	1.588e-02	X-ray
1.57975e-02	3.096e-02	X-ray
7.92300e-02	2.467e-01	Gamma
1.01050e-01	2.745e-02	Gamma
1.14340e-01	4.229e-02	Gamma

1.15390e-01	2.115e-02	Gamma
1.19760e-01	7.977e-02	Gamma
1.24160e-01	4.107e-01	Gamma
1.55200e-01	3.154e-02	Gamma
2.21000e-01	3.339e-02	Gamma
4.08180e-01	1.529e-01	Gamma
5.11000e-01	1.955e+00	Annihilation photon
1.77201e+00	1.468e-01	Positron
1.90402e+00	2.679e-02	Positron
1.95947e+00	4.465e-02	Positron
1.96784e+00	3.175e-01	Positron
1.99102e+00	3.175e-02	Positron
2.01285e+00	4.266e-02	Positron
2.02286e+00	1.786e-01	Positron
2.02759e+00	1.786e-01	Positron
1.36397e-05	1.906e+00	Auger electron
7.49779e-05	1.899e+00	Auger electron
9.38207e-05	8.046e-01	Auger electron
1.01575e-04	1.876e-01	Auger electron
1.09966e-04	9.205e-02	Auger electron
1.57412e-03	7.880e-01	Auger electron
1.71499e-03	7.019e-02	Auger electron
7.61990e-03	7.463e-02	Conversion electron
7.80790e-03	3.664e-02	Conversion electron
7.87760e-03	6.571e-02	Conversion electron
9.55047e-03	2.929e-02	Conversion electron
1.20238e-02	1.244e-01	Auger electron
1.37890e-02	4.215e-02	Auger electron
6.31630e-02	4.803e-01	Conversion electron
7.70299e-02	4.310e-02	Conversion electron
7.72179e-02	2.027e-02	Conversion electron
7.72876e-02	2.845e-02	Conversion electron
7.89605e-02	1.580e-02	Conversion electron
1.08093e-01	1.960e-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