



YTTERBIUM-163

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Yb-163
Atomic number (Z): 70
Mass number (A): 163
Neutron number (N): 93

RADIOACTIVE DECAY

Decay modes: β^+ , Electron capture
Half-life: 11.05 [m]
Decay constant: 1.0455×10^{-3} [1/s]
Daughters: Tm-163 (100.0%)
Radioactive daughters: Tm-163

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.27183 [MeV]
Mean photon energy: 0.72773 [MeV]
Air kerma rate constant, Γ_{10} : 1.740×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 2.642×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 4.355×10^{-14} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000×10^0 [Gy $\cdot$ kg/Bq $\cdot$ s]

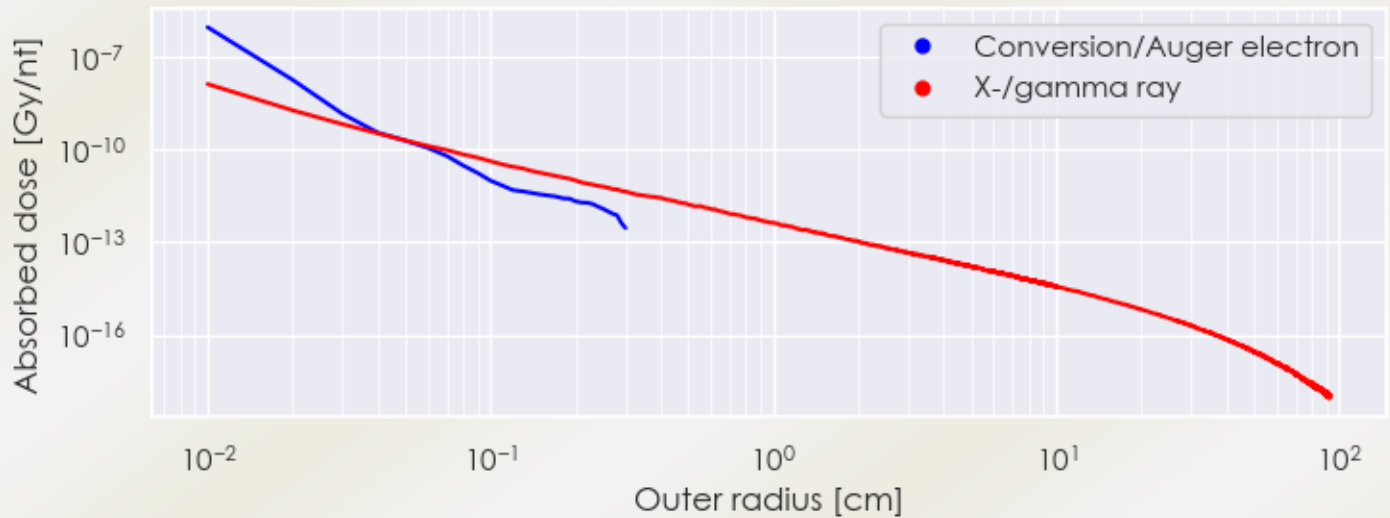
Equilibrium dose constant for betas/electrons, $\Delta_{\beta,\beta^+,e^-}$: 4.355e-14 [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 1.166e-13 [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

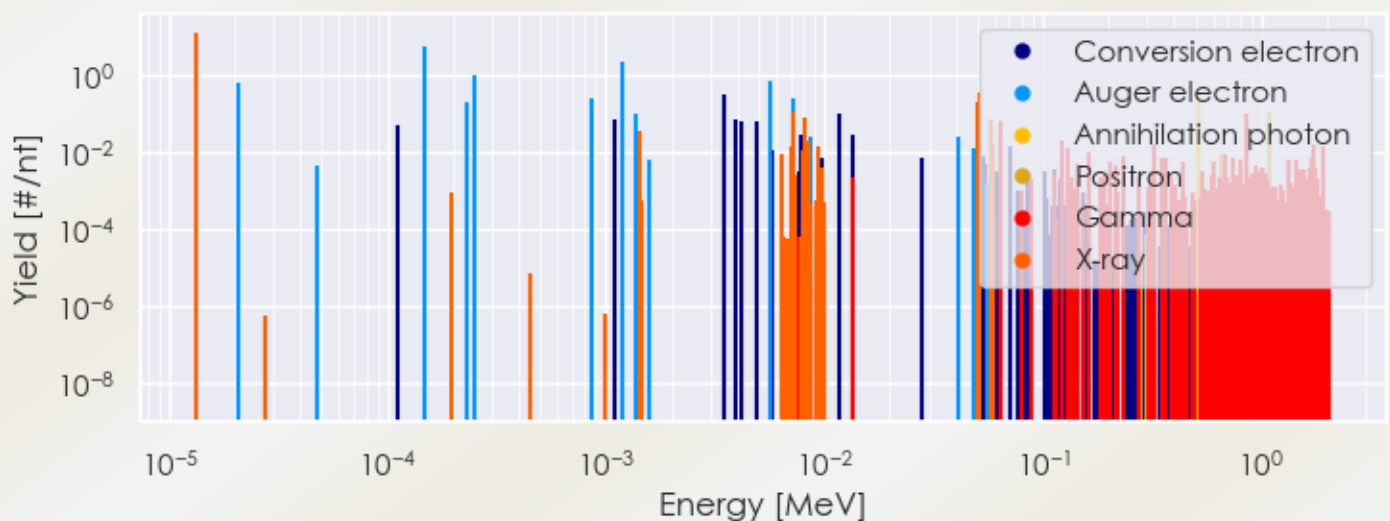
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Yb-163 DPK.csv

SUMMARY SPECTRA (PLOT)

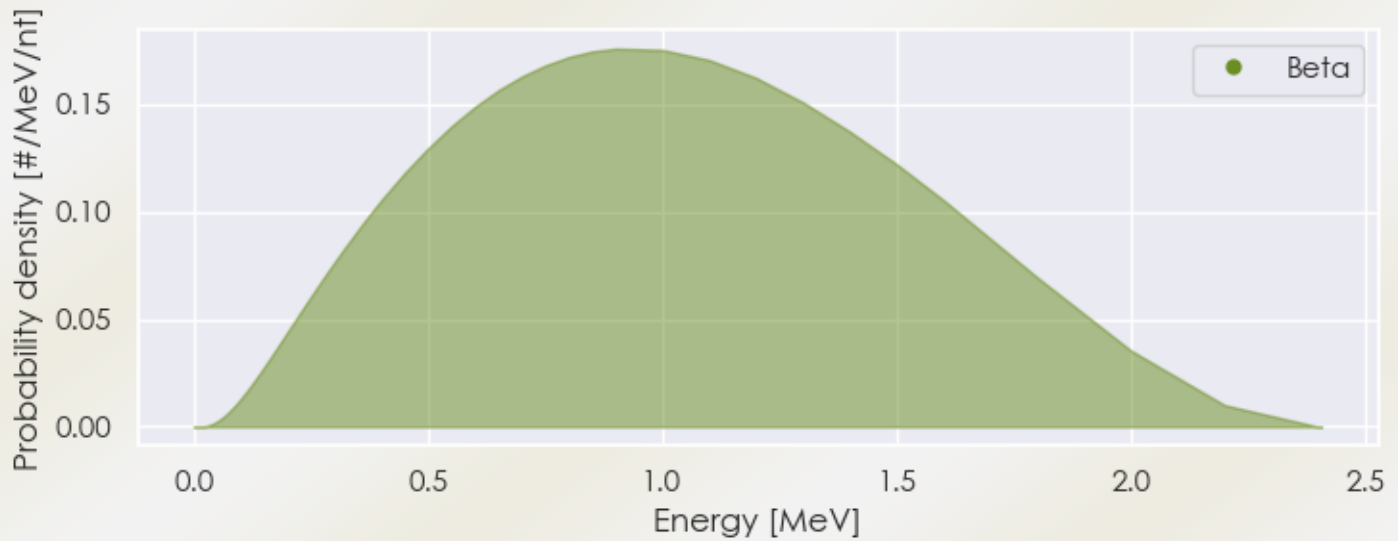
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Yb-163 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/Yb-163 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/Yb-163 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.33689e-05	1.352e+01	X-ray
1.43696e-03	3.509e-02	X-ray
7.12210e-03	1.379e-02	X-ray
7.16830e-03	1.218e-01	X-ray
8.00581e-03	1.180e-02	X-ray
8.11340e-03	8.510e-02	X-ray
8.21590e-03	1.584e-02	X-ray
8.45978e-03	2.074e-02	X-ray
9.44244e-03	1.511e-02	X-ray
4.98586e-02	2.104e-01	X-ray

5.08500e-02	3.720e-01	X-ray
5.74128e-02	3.898e-02	X-ray
5.76229e-02	7.534e-02	X-ray
5.91642e-02	1.673e-02	X-ray
6.36200e-02	6.464e-02	Gamma
1.23210e-01	1.980e-02	Gamma
1.30860e-01	1.323e-02	Gamma
1.61490e-01	1.071e-02	Gamma
3.26200e-01	1.565e-02	Gamma
5.11000e-01	4.661e-01	Annihilation photon
8.60280e-01	1.010e-01	Gamma
1.74668e+00	1.717e-02	Gamma
1.90784e+00	1.535e-02	Gamma
1.08135e+00	9.036e-02	Positron
1.08746e+00	1.104e-01	Positron
2.06752e-05	6.371e-01	Auger electron
1.10600e-04	4.996e-02	Conversion electron
1.47906e-04	6.025e+00	Auger electron
2.28859e-04	1.982e-01	Auger electron
2.50387e-04	1.086e+00	Auger electron
8.62866e-04	2.629e-01	Auger electron
1.10190e-03	7.108e-02	Conversion electron
1.19654e-03	2.250e+00	Auger electron
1.37531e-03	1.073e-01	Auger electron
3.44900e-03	3.126e-01	Conversion electron
3.90060e-03	7.423e-02	Conversion electron
4.13200e-03	6.565e-02	Conversion electron
4.89190e-03	6.563e-02	Conversion electron
5.69916e-03	7.494e-01	Auger electron
5.81490e-03	1.177e-02	Conversion electron
7.14013e-03	2.695e-01	Auger electron
7.87490e-03	2.899e-02	Conversion electron
8.61509e-03	2.455e-02	Auger electron
1.16649e-02	1.026e-01	Conversion electron
1.35300e-02	2.839e-02	Conversion electron
4.07026e-02	2.652e-02	Auger electron
4.84128e-02	1.349e-02	Auger electron
6.37220e-02	2.820e-02	Conversion electron

7.13720e-02

1.473e-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