



IODINE-133

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: I-133
Atomic number (Z): 53
Mass number (A): 133
Neutron number (N): 80

RADIOACTIVE DECAY

Decay modes: β^-
Half-life: 20.8 [h]
Decay constant: 9.2568×10^{-6} [1/s]
Daughters: Xe-133 (97.1%), Xe-133m (2.88%)
Radioactive daughters: Xe-133, Xe-133m

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.41415 [MeV]
Mean photon energy: 0.612 [MeV]
Air kerma rate constant, Γ_{10} : 2.289×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 2.289×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 6.635×10^{-14} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000e+00 [Gy $\cdot$ kg/Bq $\cdot$ s]

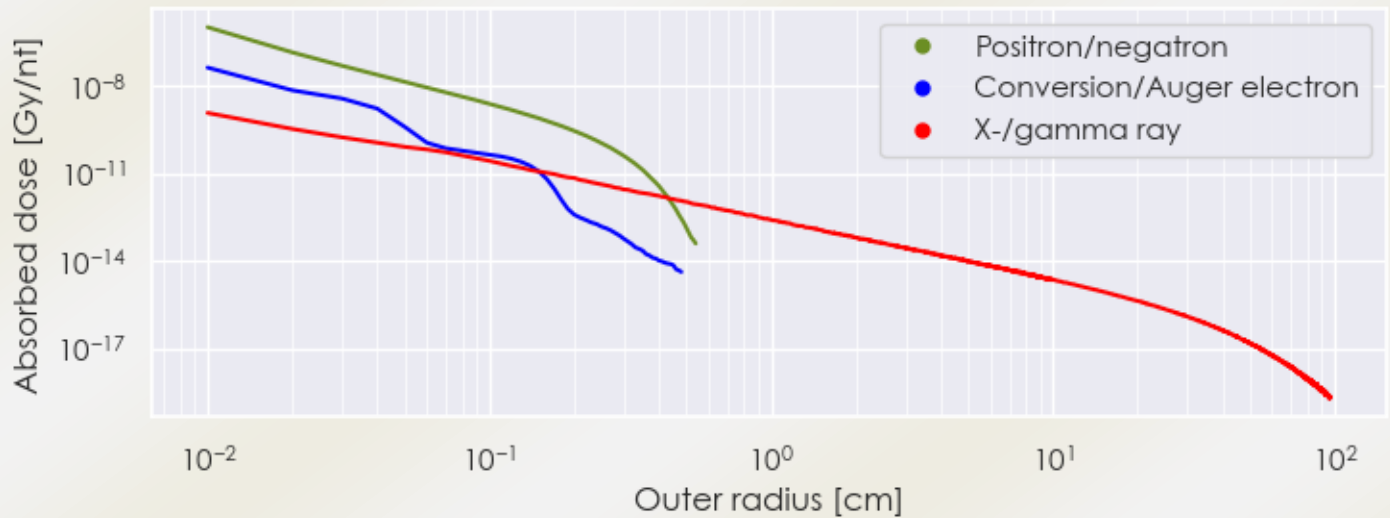
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 6.635×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 9.805×10^{-14} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

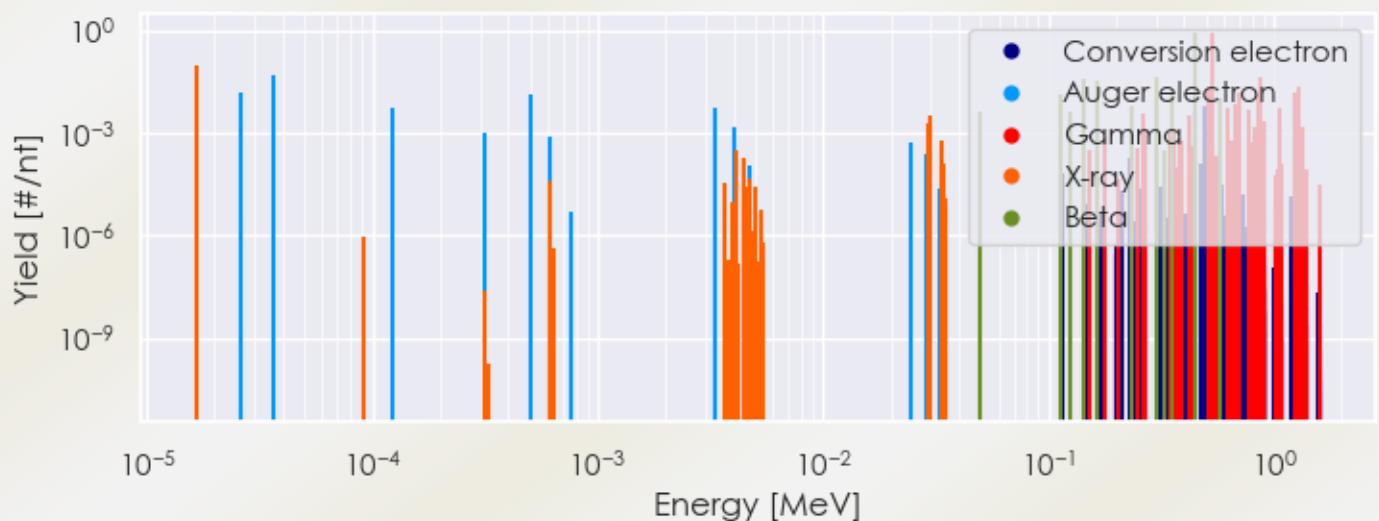
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/I-133 DPK.csv

SUMMARY SPECTRA (PLOT)

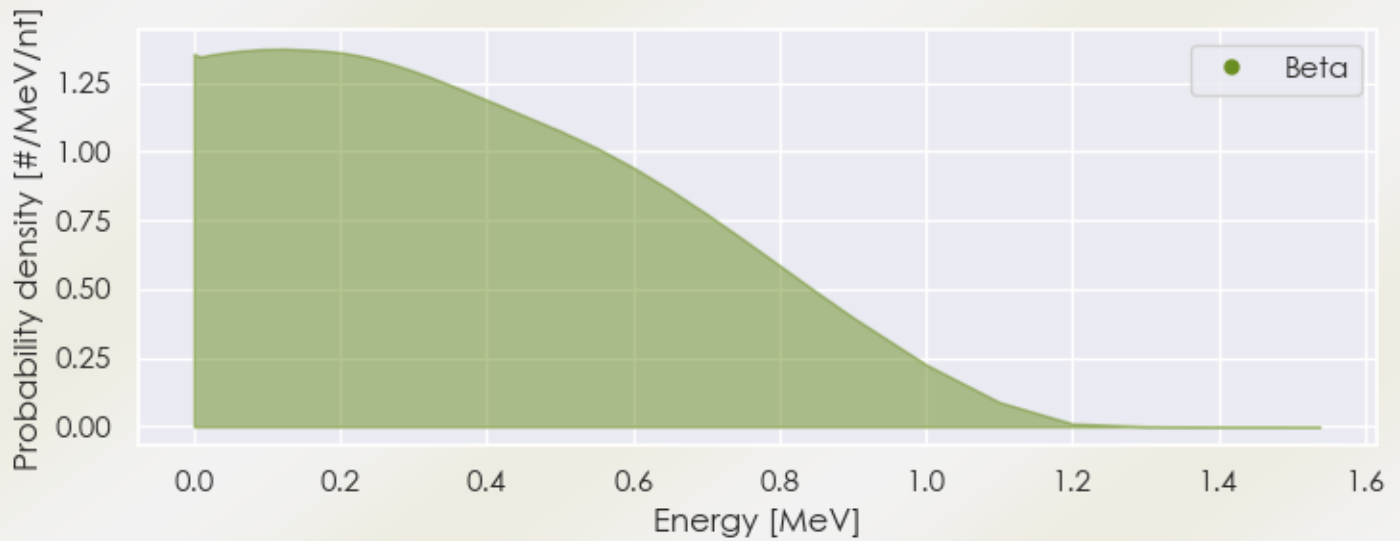
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/I-133 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/I-133 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/I-133 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.66175e-05	9.710e-02	X-ray
5.10530e-01	1.827e-02	Gamma
5.29872e-01	8.700e-01	Gamma
7.06578e-01	1.505e-02	Gamma
8.56278e-01	1.244e-02	Gamma
8.75329e-01	4.507e-02	Gamma
1.23644e+00	1.505e-02	Gamma
1.29822e+00	2.349e-02	Gamma
1.13448e-01	1.262e-02	Beta
1.43544e-01	3.807e-02	Beta

1.65430e-01	3.206e-02	Beta
3.02890e-01	4.208e-02	Beta
3.56117e-01	1.833e-02	Beta
4.45228e-01	8.316e-01	Beta
5.77790e-01	1.042e-02	Beta
2.61450e-05	1.511e-02	Auger electron
3.62355e-05	4.619e-02	Auger electron
5.05008e-04	1.269e-02	Auger 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