



VANADIUM-50

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: V-50
Atomic number (Z): 23
Mass number (A): 50
Neutron number (N): 27

RADIOACTIVE DECAY

Decay modes: β^- , Electron capture
Half-life: $1.5\text{e}+17$ [y]
Decay constant: $1.4643\text{e}-25$ [1/s]
Daughters: Ti-50 (83.0%), Cr-50 (17.0%)
Radioactive daughters: None

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.0158 [MeV]
Mean photon energy: 1.42351 [MeV]
Air kerma rate constant, Γ_{10} : $4.657\text{e}-17$ [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : $4.657\text{e}-17$ [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : $2.531\text{e}-15$ [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : $0.000\text{e}+00$ [Gy $\cdot$ kg/Bq $\cdot$ s]

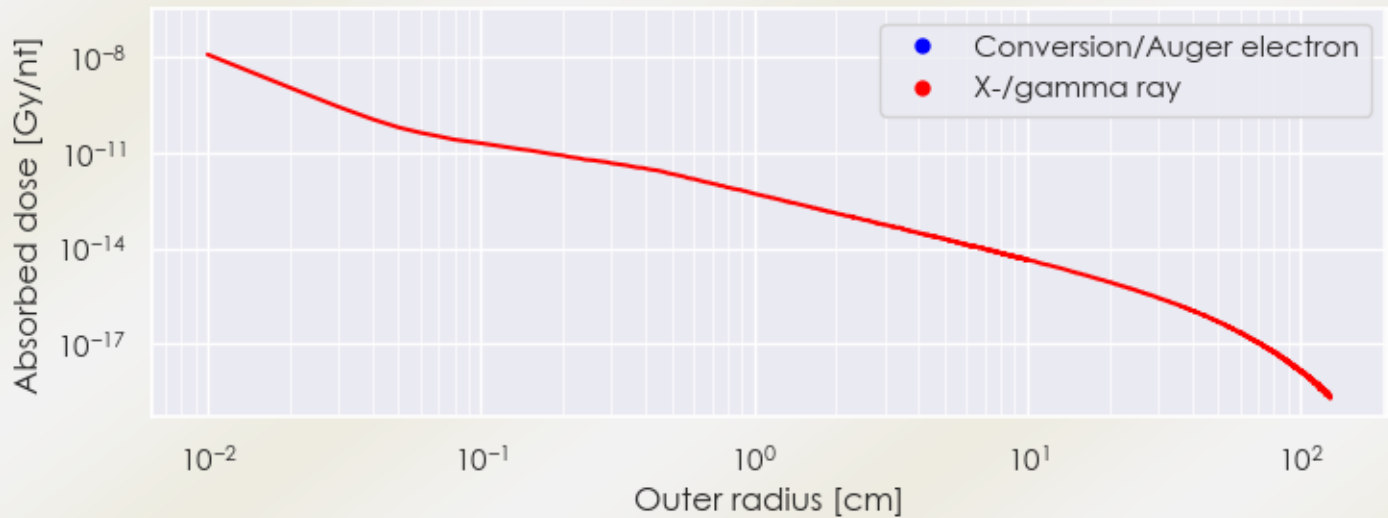
Equilibrium dose constant for betas/electrons, $\Delta_{\beta-, \beta+, e-}$: 2.531×10^{-15} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 2.281×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

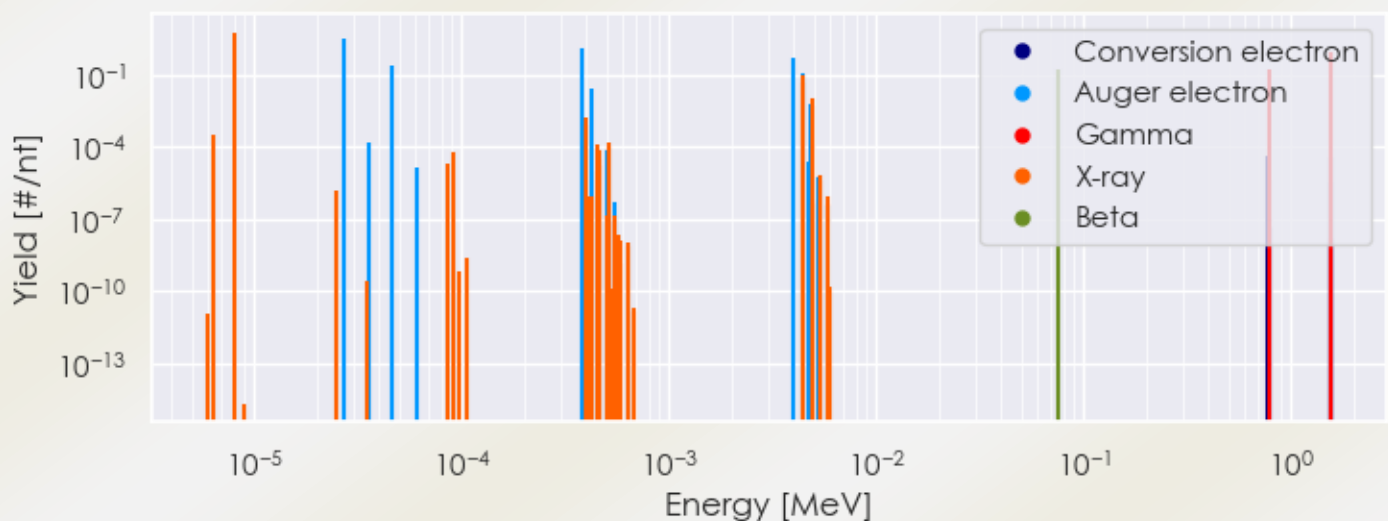
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/V-50 DPK.csv

SUMMARY SPECTRA (PLOT)

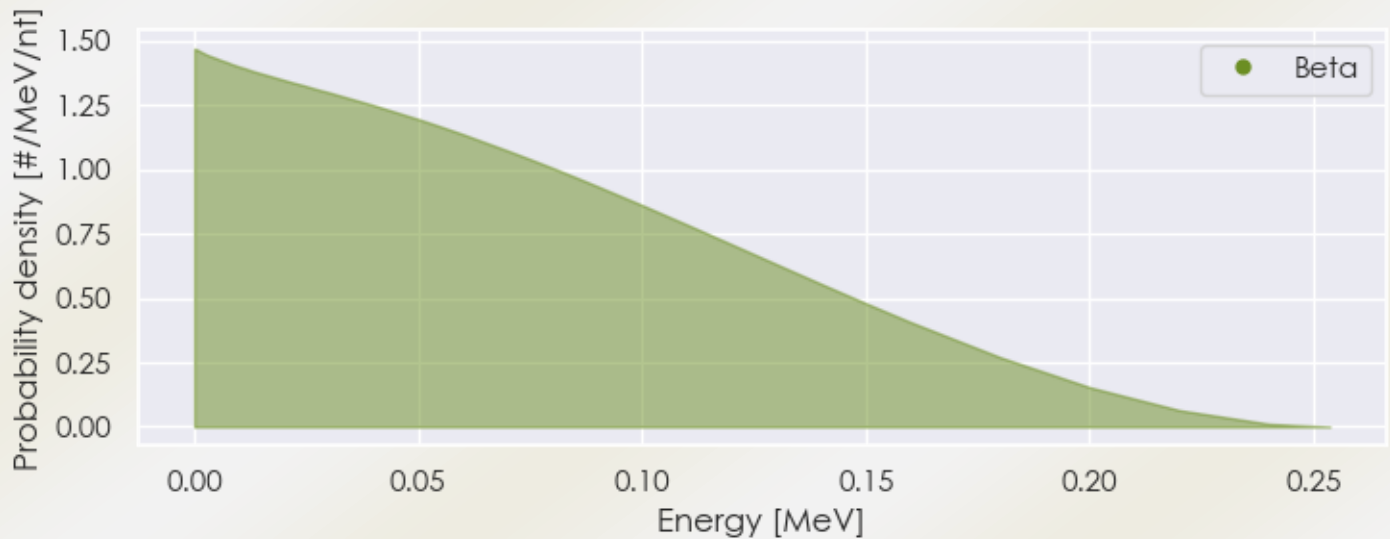
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/V-50 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/V-50 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/V-50 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
7.99519e-06	5.976e+00	X-ray
4.46937e-03	4.779e-02	X-ray
4.47537e-03	9.406e-02	X-ray
4.89619e-03	1.071e-02	X-ray
7.83290e-01	1.699e-01	Gamma
1.55377e+00	8.300e-01	Gamma
7.51411e-02	1.700e-01	Beta
2.71402e-05	3.038e+00	Auger electron
4.64525e-05	2.659e-01	Auger electron
3.80978e-04	1.231e+00	Auger electron

4.25248e-04	2.877e-02	Auger electron
3.96720e-03	4.673e-01	Auger electron
4.40251e-03	1.082e-01	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