TECHNETIUM-99M

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Tc-99m
Atomic number (Z): 43
Mass number (A): 99
Neutron number (N): 56

RADIOACTIVE DECAY

Decay modes: β-, Internal transition
Half-life: 6.015 [h]
Decay constant: 3.2010e-05 [1/s]
Daughters: Tc-99 (100.0%), Ru-99 (0.0037%)
Radioactive daughters: Tc-99

DOSIMETRIC CONSTANTS

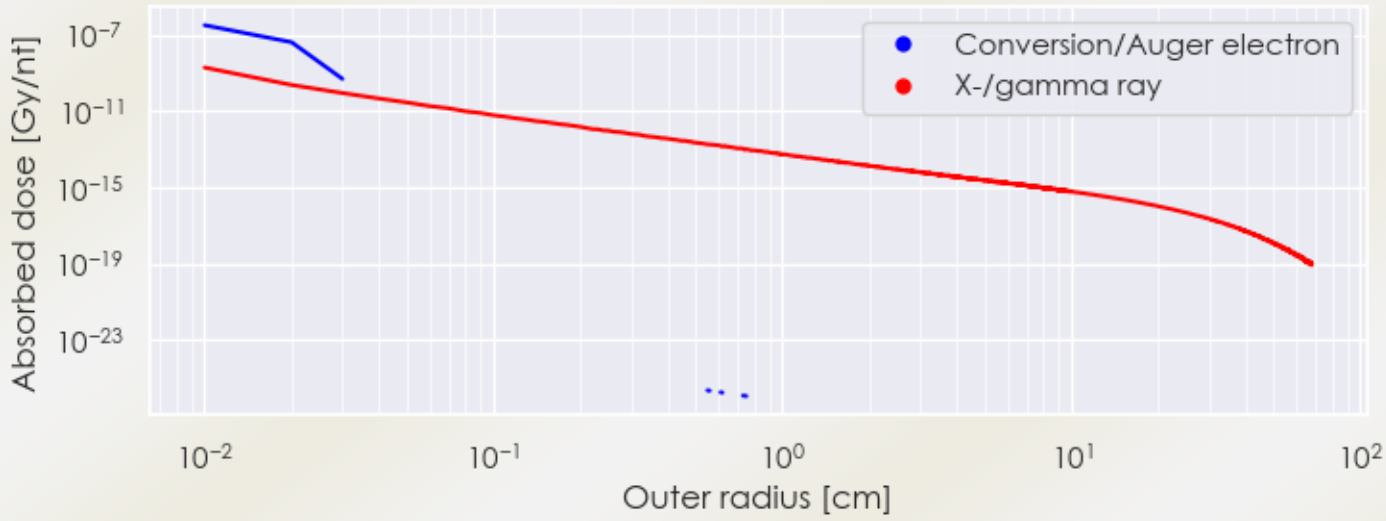
Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.01618 [MeV]
Mean photon energy: 0.12659 [MeV]
Air kerma rate constant, Γ_{10}: 5.109e-18 [Gy·m^2/Bq·s]
Air kerma coefficient, K_{air}: 5.109e-18 [Gy·m^2/Bq·s]
Equilibrium dose constant for weakly-penetrating radiations (a and/or electrons), Δ_{wp}: 2.592e-15 [Gy·kg/Bq·s]
Equilibrium dose constant for alphas, Δ_{a}: 0.000e+00 [Gy·kg/Bq·s]

Equilibrium dose constant for betas/electrons, $\Delta_{\beta-,\beta+,e-}$: 2.592e-15 [Gy·kg/Bq·s]
Equilibrium dose constant for photons, Δ_{p}: 2.028e-14 [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

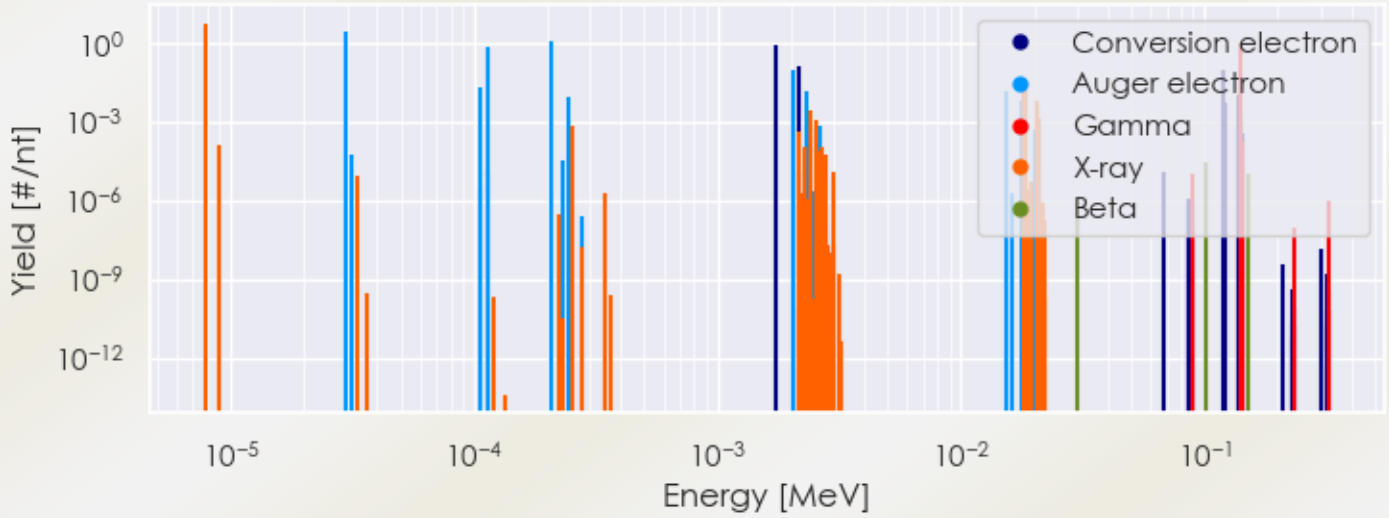
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Tc-99m DPK.csv

SUMMARY SPECTRA (PLOT)

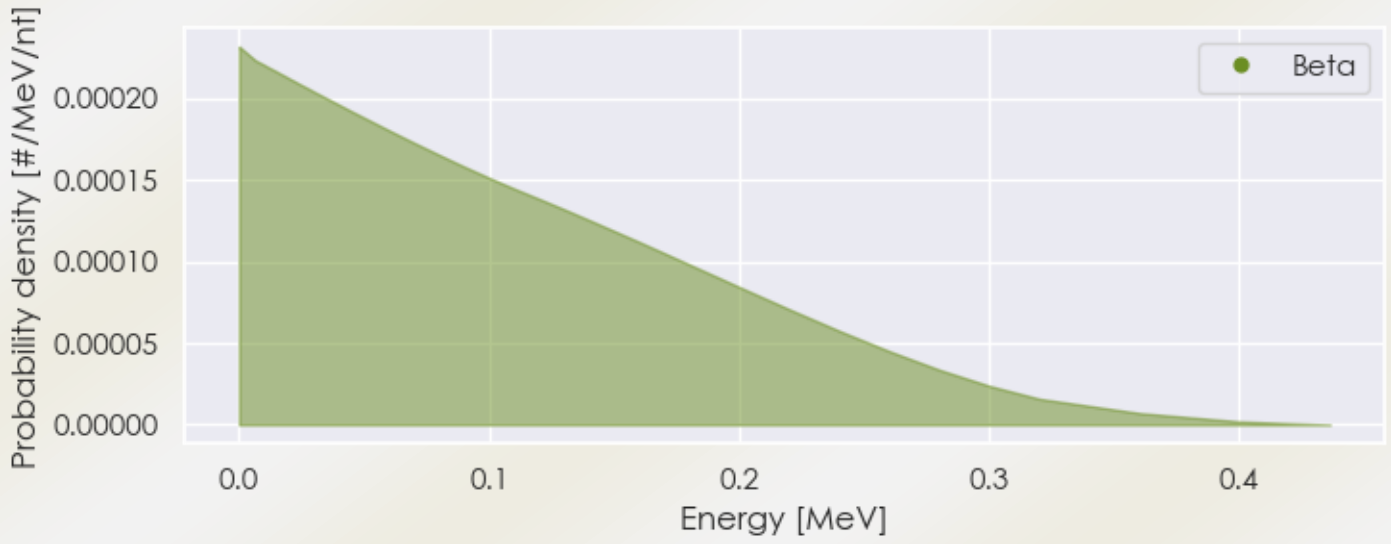
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Tc-99m 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/Tc-99m 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/Tc-99m Summary Spectrum.csv

Energy [MeV]	Yield [#/nt] if > 0.01	Radiation type
7.87678e-06	5.497e+00	X-ray
1.82141e-02	2.135e-02	X-ray
1.83344e-02	4.059e-02	X-ray
1.40511e-01	8.906e-01	Gamma
2.96081e-05	2.466e+00	Auger electron
1.06317e-04	2.075e-02	Auger electron
1.14154e-04	7.088e-01	Auger electron
2.06128e-04	1.084e+00	Auger electron
1.74765e-03	8.625e-01	Conversion electron
2.05392e-03	9.032e-02	Auger electron

2.17260e-03	1.296e-01	Conversion electron
2.33269e-03	1.407e-02	Auger electron
1.54229e-02	1.479e-02	Auger electron
1.19499e-01	8.916e-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/SNMMI-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6