

PG-101 (1.47h) CB+	PG-102 (STABLE)	PG-103 (16.991d) EC	PG-104 (STABLE)	PG-105 (STABLE)	PG-106 (STABLE)	PG-107 (6.5E+6y) B-	PG-108 (STABLE)	PG-109 (13.7012h) B-
Rh-100 (20.8h) CB+	Rh-101 (3.3y) EC	Rh-102 (207d) ECB+B-	Rh-103 (5.01y) EC	Rh-104m (4.34m) ITB-	Rh-105 (3.93h) B-	Rh-106 (29.80s) B-	Rh-107 (21.7m) B-	Rh-108 (16.8s) B-
Ru-99 (STABLE)	Ru-100 (STABLE)	Ru-101 (STABLE)	Ru-102 (STABLE)	Ru-103 (STABLE)	Ru-104 (STABLE)	Ru-105 (4.44h) B-	Ru-106 (373.59d) B-	Ru-107 (3.75m) B-

RHODIUM-104M

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Rh-104m
Atomic number (Z): 45
Mass number (A): 104
Neutron number (N): 59

RADIOACTIVE DECAY

Decay modes: β^- , Internal transition
Half-life: 4.34 [m]
Decay constant: 2.6619×10^{-3} [1/s]
Daughters: Rh-104 (99.9%), Pd-104 (0.13%)
Radioactive daughters: Rh-104

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 0.08461 [MeV]
Mean photon energy: 0.04409 [MeV]
Air kerma rate constant, Γ_{10} : 9.989×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 9.989×10^{-18} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 1.356×10^{-14} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000×10^0 [Gy $\cdot$ kg/Bq $\cdot$ s]

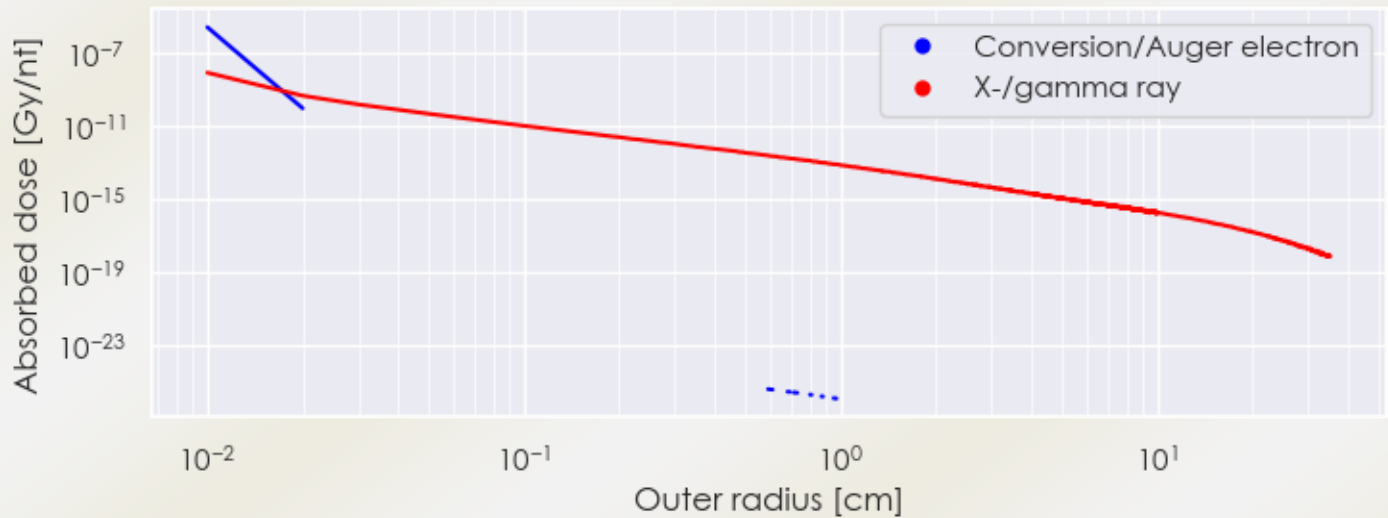
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta+, e-}$: 1.356×10^{-14} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 7.064×10^{-15} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

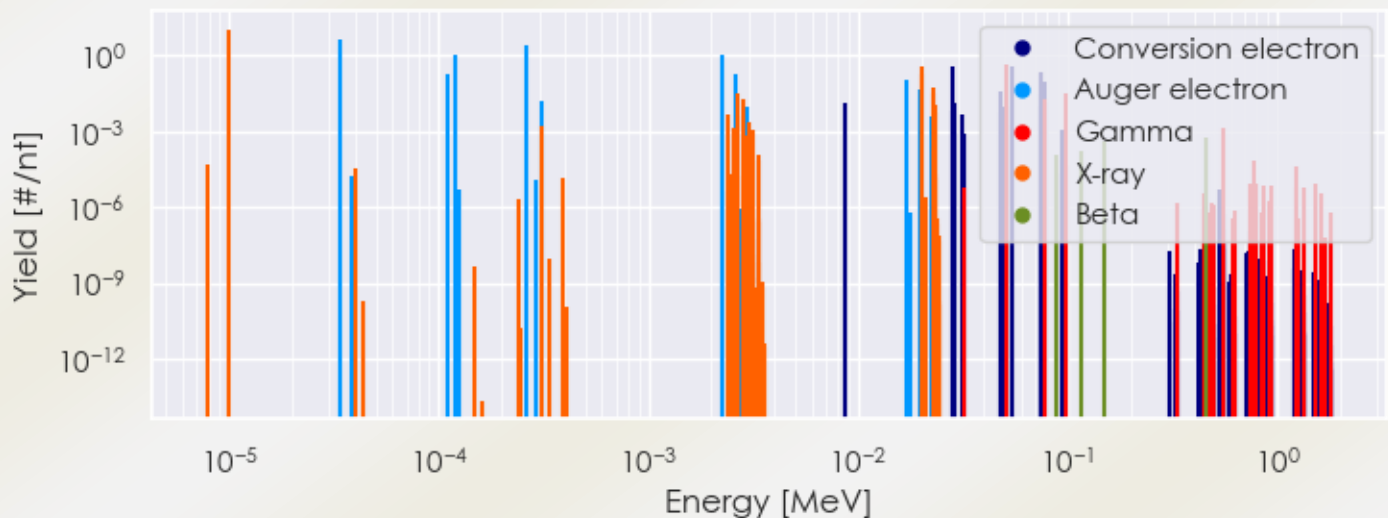
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Rh-104m DPK.csv

SUMMARY SPECTRA (PLOT)

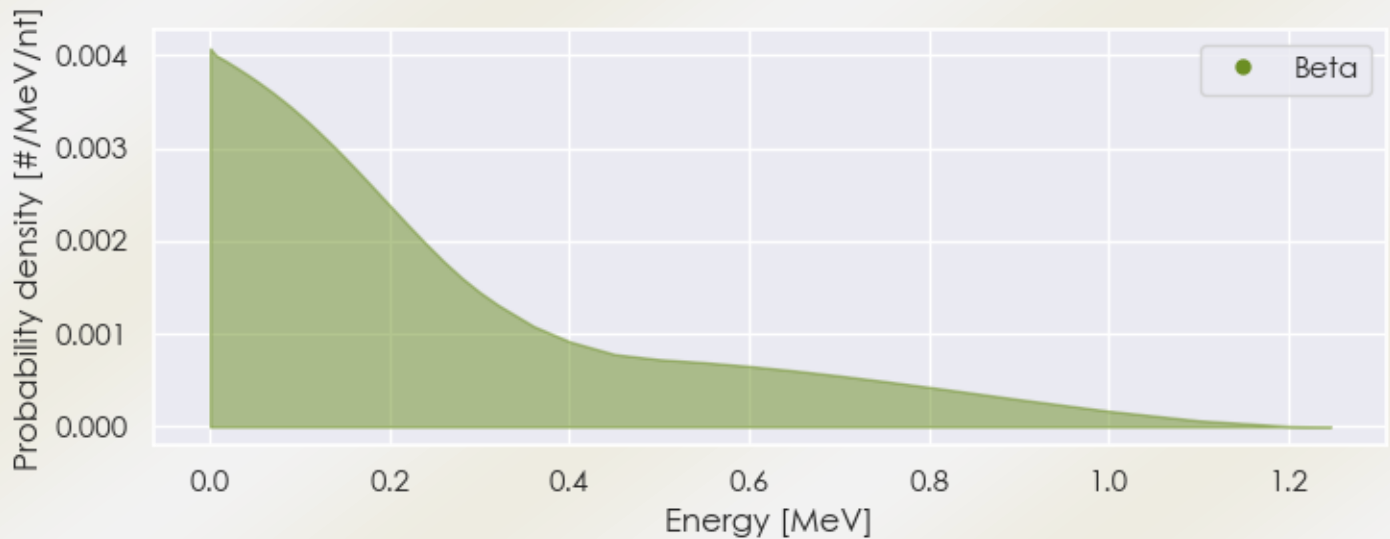
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Rh-104m 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/Rh-104m 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/Rh-104m Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
9.95906e-06	1.128e+01	X-ray
2.68654e-03	3.295e-02	X-ray
2.82847e-03	1.865e-02	X-ray
2.00395e-02	1.902e-01	X-ray
2.01865e-02	3.600e-01	X-ray
2.26708e-02	3.062e-02	X-ray
2.26963e-02	5.953e-02	X-ray
2.31362e-02	1.176e-02	X-ray
5.14225e-02	4.828e-01	Gamma

7.75330e-02	2.076e-02	Gamma
9.71137e-02	2.993e-02	Gamma
3.35597e-05	4.459e+00	Auger electron
1.09589e-04	1.848e-01	Auger electron
1.19213e-04	1.104e+00	Auger electron
2.60255e-04	2.666e+00	Auger electron
3.06591e-04	1.732e-02	Auger electron
2.26810e-03	1.050e+00	Auger electron
2.60868e-03	1.946e-01	Auger electron
8.65100e-03	1.282e-02	Conversion electron
1.69094e-02	1.095e-01	Auger electron
1.95952e-02	4.287e-02	Auger electron
2.82315e-02	4.075e-01	Conversion electron
2.88375e-02	1.267e-02	Conversion electron
4.80313e-02	3.720e-02	Conversion electron
5.43420e-02	3.849e-01	Conversion electron
7.41418e-02	2.982e-02	Conversion electron
7.43815e-02	1.824e-01	Conversion electron
7.45285e-02	2.235e-01	Conversion electron
7.70383e-02	8.754e-02	Conversion electron
7.75330e-02	1.445e-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