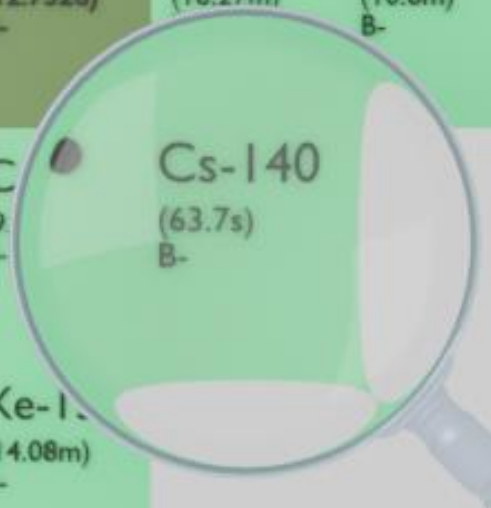




Ba-137 (STABLE)	Ba-138 (STABLE)	Ba-139 (83.06m) B-	Ba-140 (12.752d) B-	Ba-141 (18.27m) B-	Ba-142 (10.6m) B-
Cs-136 (13.16d) B-	Cs-137 (30.1671y) B-	Cs-138 (33.41m) B-	Cs-140 (63.7s) B-		
Xe-135 (9.14h) B-		Xe-137 (3.818m) B-	Xe-140 (14.08m) B-		

CESIUM-140

SUMMARY DATA

GENERAL

CLASSIFICATION

Isotope: Cs-140
Atomic number (Z): 55
Mass number (A): 140
Neutron number (N): 85

RADIOACTIVE DECAY

Decay modes: β^-
Half-life: 63.7 [s]
Decay constant: 1.0881×10^{-2} [1/s]
Daughters: Ba-140 (100.0%)
Radioactive daughters: Ba-140

DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]
Mean electron energy: 1.93612 [MeV]
Mean photon energy: 1.76923 [MeV]
Air kerma rate constant, Γ_{10} : 5.585×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Air kerma coefficient, K_{air} : 5.585×10^{-17} [Gy $\cdot$ m²/Bq $\cdot$ s]
Equilibrium dose constant for weakly-penetrating radiations (α and/or electrons), Δ_{wp} : 3.102×10^{-13} [Gy $\cdot$ kg/Bq $\cdot$ s]
Equilibrium dose constant for alphas, Δ_{α} : 0.000e+00 [Gy $\cdot$ kg/Bq $\cdot$ s]

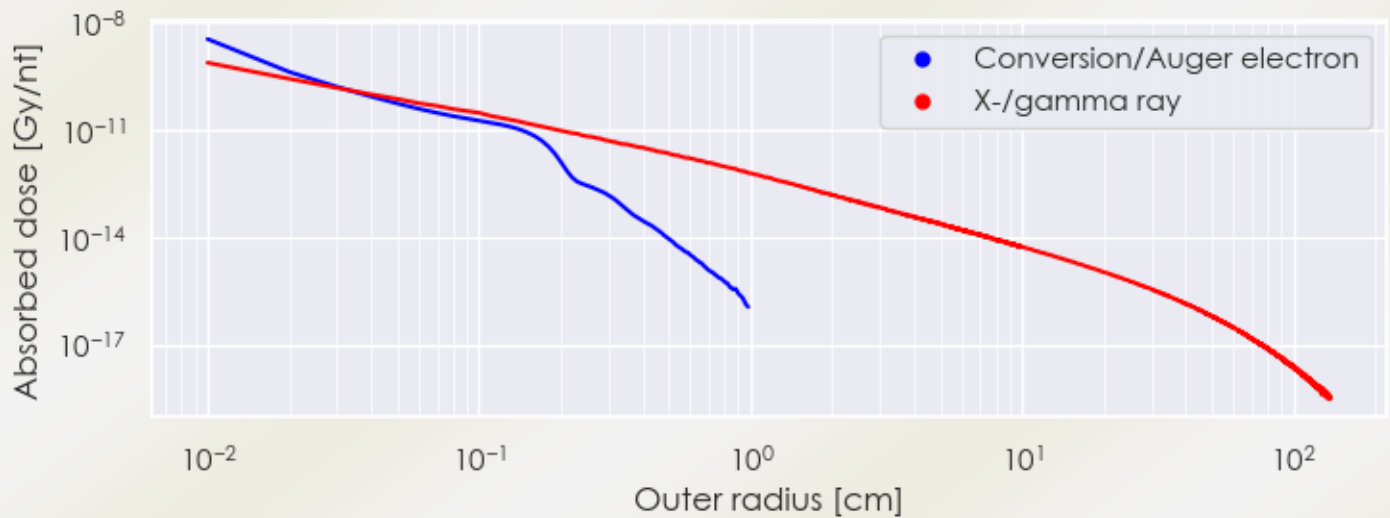
Equilibrium dose constant for betas/electrons, $\Delta_{\beta, \beta^+, e^-}$: 3.102×10^{-13} [Gy·kg/Bq·s]

Equilibrium dose constant for photons, Δ_p : 2.835×10^{-13} [Gy·kg/Bq·s]

DOSE POINT KERNELS (PLOT)

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

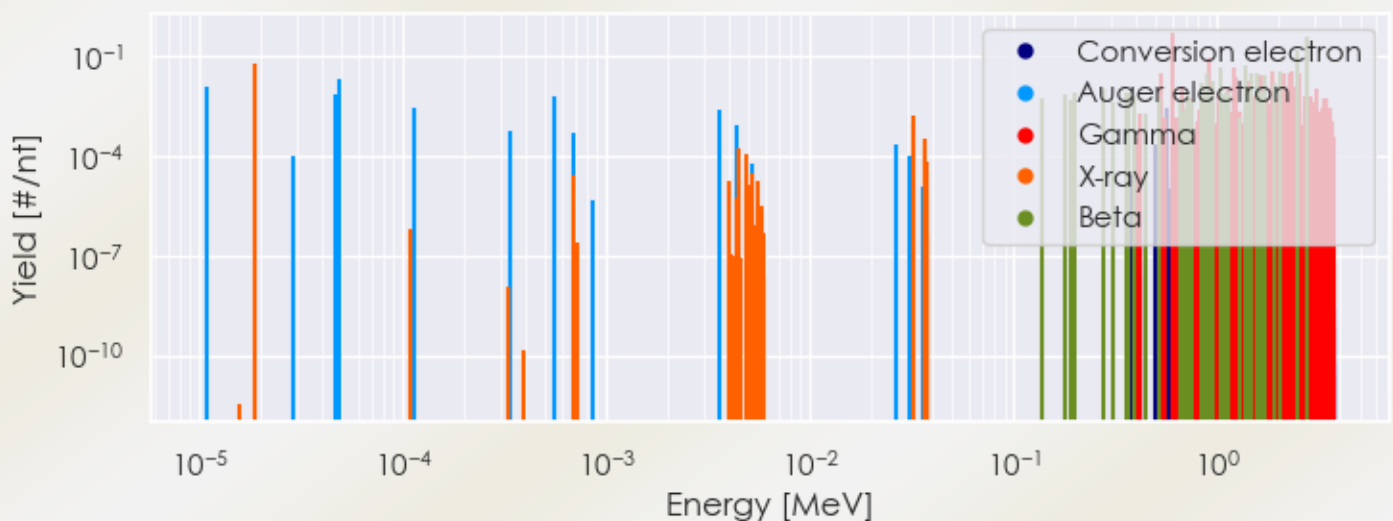
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: www.mirdsoft.org/products/MIRDspecs/Cs-140 DPK.csv

SUMMARY SPECTRA (PLOT)

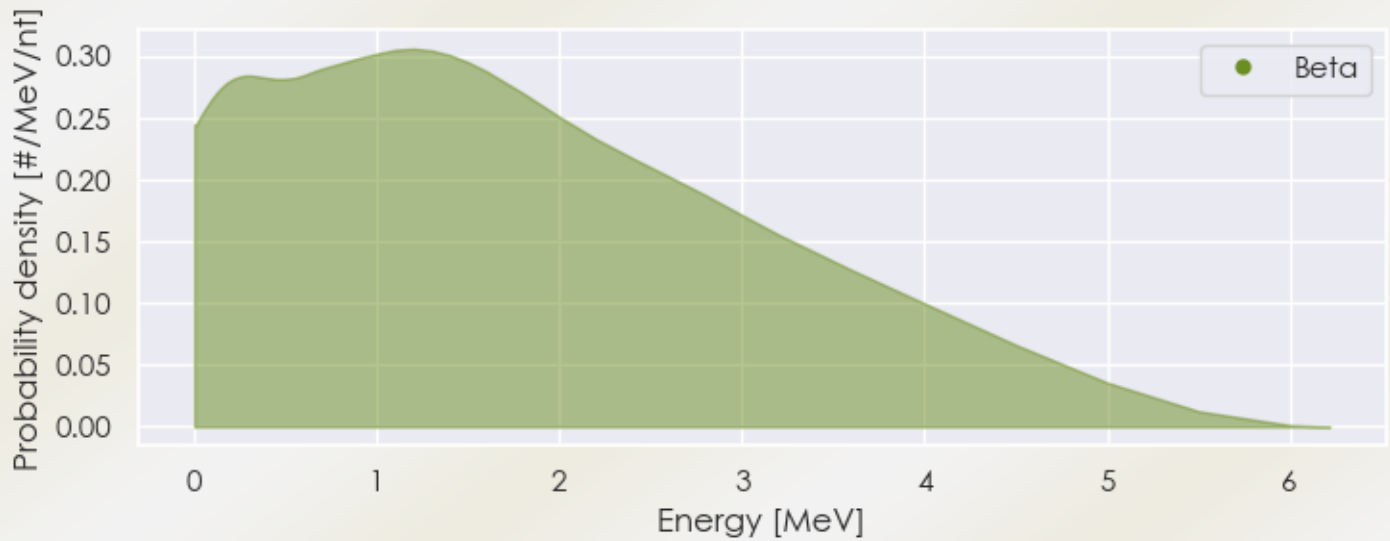
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: www.mirdsoft.org/products/MIRDspecs/Cs-140 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/Cs-140 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/Cs-140 Summary Spectrum.csv

Energy [MeV]	Yield [# / nt] if > 0.01	Radiation type
1.85958e-05	5.666e-02	X-ray
5.28250e-01	2.898e-02	Gamma
6.02350e-01	5.250e-01	Gamma
6.72100e-01	1.139e-02	Gamma
9.08250e-01	8.557e-02	Gamma
1.12965e+00	1.208e-02	Gamma
1.12965e+00	1.208e-02	Gamma
1.20030e+00	4.720e-02	Gamma
1.22140e+00	2.363e-02	Gamma
1.39125e+00	1.843e-02	Gamma

1.63490e+00	2.515e-02	Gamma
1.70740e+00	1.265e-02	Gamma
1.85340e+00	3.465e-02	Gamma
2.10170e+00	3.003e-02	Gamma
2.23730e+00	2.940e-02	Gamma
2.26830e+00	1.187e-02	Gamma
2.33050e+00	3.685e-02	Gamma
2.42960e+00	1.192e-02	Gamma
2.52190e+00	3.202e-02	Gamma
3.05330e+00	1.124e-02	Gamma
8.37914e-01	1.480e-02	Beta
8.57216e-01	1.184e-02	Beta
8.86209e-01	2.861e-02	Beta
9.41738e-01	1.677e-02	Beta
1.03082e+00	4.538e-02	Beta
1.36496e+00	5.228e-02	Beta
1.47132e+00	3.255e-02	Beta
1.55630e+00	2.959e-02	Beta
1.59939e+00	1.184e-02	Beta
1.68925e+00	2.664e-02	Beta
1.88281e+00	1.578e-02	Beta
2.02962e+00	3.650e-02	Beta
2.45591e+00	1.480e-01	Beta
2.73859e+00	3.640e-01	Beta
1.08630e-05	1.210e-02	Auger electron
4.88039e-05	1.916e-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