

RADIONUCLIDE SAFETY DATA SHEET

RADIONUCLIDE: C-14

FORMS: Soluble

PHYSICAL CHARACTERISTICS

Half-life: 5,

DECAY EMISSIONS

Gammas / X-rays		Betas / Positrons (+) / Electrons		Alphas	
E (keV)	%	E (keV, max)	%	E (keV)	%
		156.5	100		

Only the four most likely emissions of each type are included. Emission must be > 10 keV and > 1% frequency.

NIH HAZARD CATEGORY

C – level (low hazard): ≤ 12 mCi - No DRS protocol required

B – level (moderate hazard): > 12 mCi and ≤ 24 mCi - DRS approval required for ceiling increase

A – level (high hazard): > 24 mCi - DRS protocol required

EXTERNAL RADIATION HAZARDS

Gamma dose rate, point source @ 1 foot, 1 mCi:

n/a

Beta dose rate to skin, point source @ 1 foot, 1 mCi:

0 mrem/hr

Contamination skin dose, uniform deposit of $1 \mu\text{Ci}/\text{cm}^2$

1200 mrem/hr

INTERNAL RADIATION HAZARDS

Annual Limit of Intake:

Ingestion: 2 mCi

Inhalation: 2 mCi

The value(s) above indicate the activity taken into the body that would result in either 5 rem to the whole body (CEDE) or 50 rem to an organ or tissue (CDE).

SHIELDING

Gammas/X-rays:

n/a

Betas/electrons:

0.3 mm Lucite will stop all betas.

DOSIMETRY AND BIOASSAY REQS

No dosimetry required.

Urine bioassay may be required after spills, contamination, or other abnormal occurrences.

SPECIAL PRECAUTIONS:

1. Detection efficiency of C-14 with a pancake GM probe is very low ($< 2\%$). Contamination monitoring should be done with smears counted in a liquid scintillation counter.
2. Always wear lab coat, gloves, and protective eyewear when handling C-14.
3. Source vials must be secured in a locked container when not in use.
4. C-14 waste must be segregated from short half-life radionuclides (≤ 120 days). Multi-hazard waste must be segregated from short and medium half-life radionuclides (≤ 30 days and > 30 days but ≤ 120 days respectively).

References:

- Brookhaven National Laboratory, National Nuclear Data Center, Decay Radiation Search, Version 3/25/2022.
- National Institutes of Health Division of Radiation Safety, DRS-214 Form - Activity Control System - Cumulative Inventory Ceilings, Revised 10/4/2021.
- Delacroix, D., Guerre, J. P., Leblanc, P., Hickman, C., Radionuclide and Radiation Protection Data Handbook 2002.
- Nuclear Regulatory Commission, 10 Code of Federal Regulation Part 20 Appendix B.
- National Institute of Standards and Technology, ESTAR: Stopping Power and Range Tables for Electrons, July 2017
- Stanford Environmental Health and Safety. Safety Fact Sheets. <https://ehs.stanford.edu/safety-fact-sheets>
- [ehs.stanford.edu/reference Radionuclide Fact Sheets](https://ehs.stanford.edu/reference/Radionuclide%20Fact%20Sheets)