

RADIONUCLIDE SAFETY DATA SHEET

RADIONUCLIDE: H-3 (Tritium)

FORMS: Gas, Liquid, Powder

PHYSICAL CHARACTERISTICS

Half-life: 12.32 Years

DECAY EMISSIONS

Gammas / X-rays		Betas / Positrons (+) / Electrons		Alphas	
E (keV)	%	E (keV, max)	%	E (keV)	%
		18.6	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): ≤ 25 mCi - No RS protocol required

B – level (moderate hazard): > 25 mCi and ≤ 50 mCi - DRS approval required for ceiling increase

A – level (high hazard): > 50 mCi - RS 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 µCi/cm²

0 mrem/hr

INTERNAL RADIATION HAZARDS

Annual Limit on Intake:

Ingestion: 80 mCi

Inhalation: 80 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:

n/a

DOSIMETRY AND BIOASSAY REQS

No dosimetry required.

Urine bioassay may be required after spills, contamination, or other abnormal occurrences. Routine bioassay must be performed if handling activities greater than those found in Table 1 of NRC Regulatory Guide 8.32.

SPECIAL PRECAUTIONS:

1. Tritium cannot be reliably detected with handheld survey meter. Contamination monitoring must be done with smears counted in a liquid scintillation counter.
2. Some tritiated compounds can volatilize under certain conditions, to include exposure to air or prolonged storage. Ensure you know the behavior of the specific compound before use and use a proper fume hood if necessary.
3. Tritium can diffuse through storage containers. Periodically swipe the container to ensure it has not leaked out.
4. Tritium vials stored in lab freezers for a prolonged time may contaminate freezer ice. Use caution when defrosting.
5. Always wear lab coat, gloves, and protective eyewear when handling Tritium.
6. Source vials must be secured in a locked container when not in use.
7. Tritium 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.
- Nuclear Regulatory Commission, Regulatory Guide 8.32 - Criteria for Establishing a Tritium Bioassay Program, July 1988 -
- ehs.stanford.edu/reference Radionuclide Fact Sheets