

RADIONUCLIDE SAFETY DATA SHEET

RADIONUCLIDE: Br-76

FORMS: Soluble

PHYSICAL CHARACTERISTICS

Half-life: 16.2 hours

DECAY EMISSIONS

Gammas / X-rays		Betas / Positrons (+) / Electrons		Alphas	
E (keV)	%	E (keV, max)	%	E (keV)	%
511	109	990 (+)	5.2		
559.1	74	3941 (+)	6.0		
657.0	15.9	871 (+)	6.3		
1853.7	14.7	3382 (+)	25.8		

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): ≤ 3 mCi - No DRS protocol required

B – level (moderate hazard): > 3 mCi and ≤ 6 mCi - DRS approval required for ceiling increase

A – level (high hazard): > 6 mCi - DRS protocol required

EXTERNAL RADIATION HAZARDS

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

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

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

INTERNAL RADIATION HAZARDS

Annual Limit on Intake:

Ingestion: 4 mCi

Inhalation: 4 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:

42.6 mm Pb will decrease exposure by 90%.

Betas/electrons:

17.5 mm Lucite will stop all betas. Lead may be needed if Bremsstrahlung is detectable through plastic shielding.

DOSIMETRY AND BIOASSAY REQS

Dosimetry may be required when working with Br-76. Fill out Dosimetry Evaluation Form, and DRS will determine if it is required.

Thyroid scan may be required after spills, contamination, or other abnormal occurrences.

Routine scan must be performed on a case by case basis depending on activities and conditions of handling.

SPECIAL PRECAUTIONS:

1. Contamination monitoring for Br-76 should be performed with a Pancake GM probe. Typical GM probe efficiency is 9%.
2. Br-76 should be handled with remote tools when possible.
3. Ensure Br-76 is properly shielded when in storage and use. Shield waste containers containing Br-76 waste.
4. Always wear lab coat, gloves, and protective eyewear when handling Br-76.
5. Source vials and sealed sources must be secured in a locked container when not in use.
6. Br-76 waste must be segregated from long half-life radionuclides (> 120 days). Multi-hazard waste must be segregated from medium and long half-life radionuclides (> 30 days but ≤ 120 days and > 120 days respectively).
7. Volatile bromine solutions should only be used in a proper fume hood. Contact DRS for monitoring requirements.
8. NIH Hazard Category activities are for bound forms only. Any amount of unbound Br-76 requires a protocol.

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.
- 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
- Smith, D., Stabin, M. Exposure Rate Constants and Lead Shielding Values for over 1,100 Radionuclides. Health Physics Journal. March 2012.
- Nuclear Regulatory Commission. Varskin+ Version 1.0
- Ehs.stanford.edu/reference Radionuclide Fact Sheets