

Radionuclide Safety Data Sheet

RADIONUCLIDE: **I-131**

FORMS: Soluble

PHYSICAL CHARACTERISTICS

Half-life: 8.02 Days

DECAY EMISSIONS

Gammas / X-rays		Betas / Positrons (+) / Electrons		Alphas	
E (keV)	%	E (keV, max)	%	E (keV)	%
722.9	1.77	606.3	89.6		
637	7.17	333.8	7.23		
364.5	81.7	329.9	1.55		
284.3	6.14	247.9	2.08		

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): ≤ 1.5 mCi - No DRS protocol required

B – level (moderate hazard): > 1.5 mCi and ≤ 3 mCi - DRS approval required for ceiling increase

A – level (high hazard): > 3 mCi - DRS protocol required

EXTERNAL RADIATION HAZARDS

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

2.7 mrem/hr

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

320 mrem/hr

Contamination skin dose, uniform deposit of 1 µCi/cm²

6000 mrem/hr

INTERNAL RADIATION HAZARDS

Annual Limit on Intake:

Ingestion: 30 µCi

Inhalation: 50 µCi

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:

11 mm Pb will decrease exposure by 90%

Betas/electrons:

2 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 I-131. 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 if handling activities greater than those found in Table 2 of NRC Regulatory Guide 8.20.

SPECIAL PRECAUTIONS:

1. Contamination monitoring for I-131 should be performed with a pancake GM probe. Typical probe efficiency is 12%.
2. I-131 should be handled with remote tools when possible.
3. Ensure I-131 is properly shielded when in storage and use. Shield waste containers containing I-131 waste.
4. Always wear lab coat, gloves, and protective eyewear when handling I-131.
5. Source vials must be secured in a locked container when not in use.
6. I-131 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 iodine 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 I-131 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
- Delacroix, D., Guerre, J. P., Leblanc, P., Hickman, C., Radionuclide and Radiation Protection Data Handbook 2002.
- Nuclear Regulatory Commission. Varskin+ Version 1.0
- Stanford Environmental Health and Safety. Safety Fact Sheets. <https://ehs.stanford.edu/safety-fact-sheets>