

## Radionuclide Safety Data Sheet

**RADIONUCLIDE:** **Pb-203**

**FORMS:** Soluble

### PHYSICAL CHARACTERISTICS

**Half-life:** 51.92 hours

#### DECAY EMISSIONS

| Gammas / X-rays |       | Betas / Positrons (+) / Electrons |      | Alphas  |   |
|-----------------|-------|-----------------------------------|------|---------|---|
| E (keV)         | %     | E (keV, max)                      | %    | E (keV) | % |
| 279.20          | 80.94 | 5.242 - 15.312                    | 50.8 |         |   |
| 401.32          | 3.35  | 54.836 - 60.212                   | 1.77 |         |   |
| 71              | 58.84 |                                   |      |         |   |
| 83              | 32.6  |                                   |      |         |   |

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): ≤ 4.5 mCi - No DRS protocol required

B – level (moderate hazard): > 4.5 mCi and ≤ 9 mCi - DRS approval required for ceiling increase

A – level (high hazard): > 9 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: 5 mCi

Inhalation: 9 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:

4.4 mm Pb will decrease exposure by 90%.

#### Betas/electrons:

0.1 mm Lucite will stop all betas.

### DOSIMETRY AND BIOASSAY REQS

Dosimetry may be required when working with Pb-203. Fill out Dosimetry Evaluation Form, and DRS will determine if it is required.

Whole body count may be required after spills, contamination, or other abnormal occurrences.

### SPECIAL PRECAUTIONS:

1. Contamination monitoring for Pb-203 should be performed with a Sodium Iodide probe.
2. Pb-203 should be handled with remote tools when possible.
3. Ensure Pb-203 is properly shielded when in storage and use. Shield waste containers containing Pb-203 waste.
4. Always wear lab coat, gloves, and protective eyewear when handling Pb-203.
5. Source vials must be secured in a locked container when not in use.
6. Pb-203 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).

#### References:

- International Atomic Energy Agency. Live Chart of Nuclides.
- 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
- Nuclear Regulatory Commission. Varskin+ Version 1.0
- Smith, D., Stabin, M. Exposure Rate Constants and Lead Shielding Values for over 1,100 Radionuclides. Health Physics Journal. March 2012.
- Stanford Environmental Health and Safety. Safety Fact Sheets. <https://ehs.stanford.edu/safety-fact-sheets>