

Radioactive Material Safety Data Sheet

This data sheet presents information on radioisotopes only. This document is not subject to WHMIS requirements. For information on chemical compounds incorporating this radionuclide, see the relevant Material Safety Data Sheet.

Cadmium-109

Part 1 – Radioactive Material Identification

Common Names: Cadmium-109	Chemical Symbol: Cd-109 or ^{109}Cd
Atomic Number: 48	Mass Number: 109 (61neutrons)
Chemical Form: Cadmium metal	Physical Form: Cadmium metal electrodeposited on a silver disc and sealed in a welded monel capsule.

Part 2 – Radiation Characteristics

Physical half-life: 462.6 days **Specific Activity (GBq/g):** 95,534

Principle Emissions	E_{Max} (keV)	E_{eff} (keV)	Dose Rate (mSv/h/GBq at 1m)	Shielding Required
Beta* (β)	-	-	-	-
Gamma (γ) / X-Rays	22.1 (54.5%) 21.9 (28.9%) 24.9 (13.7%) 88.0 (3.6 %)	-	49.8 ^a	HVL Lead: < 0.01 cm
Alpha (α)	-	-	-	-
Neutron (n)	-	-	-	-

* Where Beta radiation is present, Bremsstrahlung radiation will be produced. Shielding may be required.

^a *The Health Physics and Radiological Health Handbook*, Scintra, Inc., Revised Edition, 1992

Progeny: Silver-109 (Ag-109)

Part 3 – Detection and Measurement

Methods of detection (in order of preference)

1. A radiation survey meter equipped with an energy-compensated Geiger Mueller detector.
2. A radiation survey meter equipped with a low energy gamma scintillator. The scintillator must be calibrated for Cd-109 before using it for a dose assessment survey.
3. A radiation contamination monitor equipped with a Geiger Mueller pancake detector.

Dosimetry

Whole Body Skin Extremity Neutron

Internal: Sealed sources pose no internal radiation hazard. However, in the event of loss of containment by the sealed source, all precautions should be taken to prevent inhalation or ingestion of the material.

Critical Organ(s): Kidney; if inhaled as dust particles, lung tissues

Annual dose limits: *Non-nuclear energy workers:* 1mSv per year
Nuclear energy workers: a) 50 mSv in one year
 b) 100 mSv total over five years
Pregnant nuclear energy workers: 4 mSv over the balance of the pregnancy

Part 4 – Preventive Measures

Always use the principles of time, distance and shielding to minimize dose

Engineering Controls: Sealed radioactive sources used in industrial applications should always be within a protective source housing to minimize radiation dose and to protect the source capsule from damage.

Personal Protective Equipment *(for normal handling of unsealed sources only. Always wear disposable gloves, safety glasses, personal protective equipment and clothing as appropriate to the material handled).*
 No special PPE required.

Special Storage Requirements: None

Part 5 – Control Levels

Oral Ingestion	Inhalation	
ALI (kBq)	ALI (kBq)	DAC (Bq/ml)
11,100	1,480	3.7×10^{-4}
Exemption Quantity (EQ):	1,000,000 Bq	

Part 6 – Non-Radiological Hazards

Probably carcinogenic to humans – although the dose has not been established. Cumulative damage to kidneys and lung tissues has been observed.

OSHA Permissible Exposure Level (PEL):
 TWA 5 ug/m³, Action Level 2.5 ug/m³

Part 7 - Emergency Procedures

*The following is a guide for first responders. The following actions, including remediation, should be carried out by qualified individuals. In cases where life-threatening injury has resulted, **first** treat the injury, **second** deal with personal decontamination.*

Personal Decontamination Techniques

- Wash well with soap and water and monitor skin
- Do not abrade skin, only blot dry
- Decontamination of clothing and surfaces are covered under operating and emergency procedures

Spill and Leak Control

- Alert everyone in the area
- Confine the problem or emergency (includes the use of absorbent material)
- Clear area
- Summon Aid

Damage to Sealed Radioactive Source Holder

- Evacuate the immediate vicinity around the source holder
- Place a barrier at a safe distance from the source holder (min. 5 meters)
- Identify area as a radiation hazard
- Contact emergency number posted on local warning sign

Suggested Emergency Protective Equipment

- Gloves
- Footwear Covers
- Safety Glasses
- Outer layer or easily removed protective clothing (as situation requires)

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