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Radioactive Material Safety Data Sheet

This data sheet presents information on radioisotopes only.

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 ¹⁰⁹Cd

Atomic Number: 48 Mass Number: 109 (61neutrons)

Cadmium metal electrodeposited

Chemical Form: Cadmium metal Physical Form: 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 (Sv/h/GBq at 1m)	Shielding Required
Beta* ()	-	-	-	-
Gamma () / 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 ()	-	-	-	-
Neutron (n)	-	-	-	-

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

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.

^a Handbook of Health Physics and Radiological Health, Lippincott Williams & Wilkins, Third Edition, 1998

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 Extr	emity \square	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 worker Nuclear energy worker	: 1mSv per year : a) 50 mSv in one year b) 100 mSv total over five years		years		
	Pregnant nuclear energy worker	s: 4 mSv ov	er the balance of t	he 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 x 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 g/m3, Action Level 2.5 g/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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