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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.

# Radium-226

### Part 1 - Radioactive Material Identification

Common Names: Radium-226 Chemical Symbol: Ra-226 or <sup>226</sup>Ra

Atomic Number: 88 Mass Number: 226 (138 neutrons)

Chemical Form:

Radium bromide or Physical Form:

A pellet or solution housed within a

radium chloride radium chloride ceramic outer-housing.

# Part 2 - Radiation Characteristics

Physical half-life: 1,603 years Specific Activity (GBq/g): 36.6

Principle Emissions	<sup>E</sup> Max (keV)	<sup>E</sup> eff (keV)	Dose Rate ( Sv/h/GBq at 1m)	Shielding Required
Beta* ( )	-	-	-	-
Gamma ( ) / X-Rays <sup>b</sup>	186 (32.8%) <sup>214</sup> Bi 609 (46%) 1112 (15%) 1838 (16%) <sup>214</sup> Pb 295 (19%) 352 (37%)	•	318 <sup>a</sup>	HVL Lead: 1.7 cm
Alpha ( )	4,785 (94.6%)	-	-	-
Neutron (n)	-	-	-	-

Where Beta radiation is present, Bremsstrahlung radiation will be produced. Shielding may be required. Note: Only emissions with abundance greater than 10% are shown.

Progeny: Radon-222 (Ra-222)

# Part 3 - Detection and Measurement

<sup>&</sup>lt;sup>a</sup> Handbook of Health Physics and Radiological Health, Lippincott Williams & Wilkins , Third Edition, 1998

<sup>&</sup>lt;sup>b</sup> Only the 186 keV photon is native to radium-226, the remainder are due to the short lived daughter products bismuth-214 and lead-214. In a sealed source these daughter products would be in secular equilibrium with the parent radium atoms.

# Methods of detection (in order of preference)

- 1. A radiation survey meter equipped with an energy-compensated Geiger Mueller detector.
- 2. A radiation contamination monitor equipped with a Geiger-Mueller pancake detector.
- 3. Gamma scintillation detector very sensitive but is also energy dependent. Must be calibrated for Ra-226 before it can be used for dose assessment surveys.

# **Dosimetry**

Whole Body	Skin				
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):	Bone tissue				
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)	
74	22.2	1.11 x 10 <sup>-5</sup>	

Exemption Quantity (EQ):	10,000 Bq
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# Part 6 - Non-Radiological Hazards

None identified at this time.

OSHA Permissible Exposure Limit (PEL)

No limit set at this time

# 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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