

Environmental Health and Safety

Technical Data Sheet for Radioactive Material

Carbon-14

1. Radioactive Material Identification

Common Names: Carbon-14

Atomic Number: 6

Chemical Form: Carbon dioxide, carbon monoxide

Chemical Symbol: C-14 or ¹⁴C

Mass Number: 12 (8 neutrons)

Physical Form: Organic compounds

2. Radiation Characteristics

Physical half-life: 5,730 years

Specific Activity (GBq/g): 165

Principle Emissions	^E Max (keV)	^E eff (keV)	Dose Rate (μSv/h/GBq at 1m)	Shielding Required
Beta* (β)	156.4 (100%)	49.5	-	≤3mm Plexiglas (recommended, not required)
Gamma (γ) / X-rays	-	-	-	-
Alpha (α)	-	-	-	-
Neutron (n)	-	-	-	-

Progeny: Nitrogen-14 (N-14)



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3. Detection and Measurement

Methods of detection (in order of preference):

- 1. A radiation survey meter equipped with an energy-compensated Geiger Mueller pancake/frisker detector, however the survey meter probe must be at close range.
- 2. Liquid scintillation counter should be used to detect removable C-14 contamination.

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Whole Body x Ski	Extremit	v Neutron
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Internal: In the event of loss of containment by the sealed source, all precautions should be taken to prevent inhalation or ingestion of the material. Urine bioassay is the most readily available method to assess intake, recommended following a spill.

Critical Organ(s): Fat tissue

Annual Dose Limits: Non-radiation workers: 1 mSv per year

Radiation workers: 50 mSv per year, 100 mSv total over five years Pregnant radiation workers: 4 mSv over the balance of the pregnancy

4. Preventative Measures

Engineering Controls: Shielding is recommended but not required.

Personal Protective Equipment: For normal handling of unsealed sources only. Always wear disposable gloves, safety glasses, and whatever personal protective equipment and clothing appropriate to the material handled. Wear double gloves and change the outer pair at least every 20 minutes.

Special Storage Requirements: N/A

5. Control Levels

Oral Ingestion	Inhalation		
ALI (kBq)	ALI (kBq)	DAC (Bq/ml)	
74,000	7,400,000 (CO2), 74,000,000 (CO)	0.037	
Exemption Quantity (EQ):	100 mCi		



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6. Non-radiological Hazards

Prolonged exposure to airborne particles may result in cell damage, with the potential for subsequent cancers.

OSHA Permissible Exposure Limit (PEL): 0.1 mg/m³

7. Emergency Procedures

Personal Decontamination Procedures

- 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 (minimum 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)