Sodium-22

1. Radioactive Material Identification

Common Names: Sodium-22

Atomic Number: 11

Chemical Form: Soluble

Chemical Symbol: Na-22 or ^{22}Na

Mass Number: 22 (11 neutrons)

2. Radiation Characteristics

Physical half-life: 2.602 years

Specific Activity (TBq/g): 1,580.16

Principle Emissions	^{E}Max (keV)	^{E}eff (keV)	Dose Rate (µSv/h/GBq at 1m)	Shielding Required
Beta* (β)	545.5 (100%) 2842.1	215.5 834.8	-	Lead bricks (1" to 2" thick), HVL for ¼" lead/2.03" concrete, TVL for 1.34" lead, 6.73" concrete
Gamma (γ) / X-rays	511 (179.8%) 1274.5 (99.9%)	-	-	Lead bricks (1" to 2" thick), HVL for ¼" lead/2.03" concrete, TVL for 1.34" lead, 6.73" concrete
Alpha (α)	-	-	-	-
Neutron (n)	-	-	-	-

Progeny: Neon-22, Ne-22

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. (Ludlum)
2. Ion chamber survey meter (Fluke)
3. Liquid Scintillation Counting is to be used when conducting wipe tests for analyzing contamination.

Dosimetry

Whole Body __x___ Skin_____ Extremity __x____ Neutron _____

Internal: All precautions should be taken to prevent inhalation or ingestion of the material. Urine bioassay is not required but may be requested after a radioactive spill or suspected intake. Na-22 is eliminated from the body via urine with an 11-day half life.

Critical Organ(s): Total Body

Annual Dose Limits: Non-radiation workers: 0.1 rem per year
Radiation workers: 5 rem per year, 10 rem total over five years
Pregnant radiation workers: 0.4 rem over the balance of the pregnancy

4. Preventative Measures

Engineering Controls: Shielding is required when using Na-22.

Personal Protective Equipment: Always wear disposable gloves, safety glasses, and whatever personal protective equipment and clothing appropriate to the material handled.

Special Storage Requirements: Na-22 sources MUST be secured from unauthorized use, removal, and vandalism at all times (Secure in locked cabinet when not in use).

5. Control Levels

Oral Ingestion	Inhalation	
ALI (kBq)	ALI (kBq)	DAC (Bq/ml)
14,800	22,200	0.0111
Exemption Quantity (EQ):	370,000 Bq	

6. Non-radiological Hazards

Prolonged exposure to airborne particles may result in abdominal pain, nausea, and vomiting. Additional effects include lethargy, anemia, and dizziness. Could also lead to leukemia or other diseases/cancers.

OSHA Permissible Exposure Limit (PEL):
0.1 mg/m^3

7. Emergency Procedures

Personal Decontamination Procedures

- Remove loose contamination. Use care to prevent the spread of contamination and be extra careful around wounds
- Wash contaminated areas. Use mild soap or detergent initially; use a mild abrasive soap for more persistent contamination
- Do not abrade skin, only blot dry

Spill and Leak Control

- Alert everyone in the area
- Confine the problem or emergency (includes the use of absorbent material)
- Clear area
- Summon aid
- If a release of powdered or gaseous material, evacuate all personnel from room immediately and turn off any equipment that needs constant attention. Prevent others from entering the room.

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)