

## **Sulfur-35 ( <sup>35</sup>S ) safety information and specific handling precautions**

### **General:**

Sulfur-35 is a low energy beta emitter and even large amounts of this isotope pose no external dose hazard to persons exposed. The beta radiation barely penetrates the outer protective dead layer of the skin of the body. The major concern for individuals working with this isotope is the possibility of an internal exposure. Such an exposure may occur if an individual contaminates bare skin, accidentally ingests the material, or breathes it in the form of a gas or vapor. The critical organ for most <sup>35</sup>S labelled compounds is the whole body. Urine analysis is an effective sampling technique to determine if a <sup>35</sup>S uptake has occurred.

Some <sup>35</sup>S labelled compounds may migrate through gloves and skin. <sup>35</sup>S compounds should be handled with gloved hands, and in some cases, with double gloves. Change gloves often. One should be careful not to contaminate the skin as some <sup>35</sup>S beta particles penetrate the dead layer of the epidermis. Some <sup>35</sup>S compounds may be incorporated in the skin causing very large skin doses and a pathway into the body. Certain forms of <sup>35</sup>S (methionine, cysteine and Translabel®) are volatile. Use a hooded enclosure, when possible, while handling volatile forms of <sup>35</sup>S. Activated charcoal is effective in helping to trap volatile species.

### **Physical Data:**

**Maximum beta energy:** 0.167 MeV, 100% emission

**Maximum range in air:** about 9.6 inches

**Radiological half-life:** 87.4 days

#### **Internal Occupational Limits:**

##### **Annual Limit on Intake-**

**Inhalation:** 20 mCi

**Ingestion:** 8 mCi.

### **Precautions:**

1. Follow General Safety Precautions for all isotopes.
2. Traps may be necessary if large gas or vapor releases are anticipated. This is to reduce the release to the environment. It may be necessary to incorporate activated charcoal into experiments involving volatile forms of <sup>35</sup>S.
3. Monitor surfaces routinely and keep record of the results. Geiger counters are sensitive to the beta radiation from <sup>35</sup>S if the probe is used within a 1/2 inch of the surface and the proper probe is used. The Radiation Safety Section recommends a pancake type probe and a meter with a linear scale. With such a probe very low amounts of <sup>35</sup>S may be detected on the surface. Average efficiency for <sup>35</sup>S with a pancake probe is approximately 8%. Do not cover the pancake probe with saran wrap® or parafilm®, etc. when using the probe to monitor for <sup>35</sup>S. This practice will decrease the efficiency of detection. Wipe tests should be taken and counted in a Liquid Scintillation Counter for the most sensitivity when detecting removable surface contamination.
4. Radiation badges are not issued for individuals using <sup>35</sup>S because it is very unlikely that any radiation exposure would be recorded because of the <sup>35</sup>S betas short range in air.
5. Proper tubes should be used for storage of single use aliquots of volatile <sup>35</sup>S material. Screw top tubes with rubber seals are recommended.

# <sup>35</sup>S LAB INFO SHEET

ALARA: Time—Distance—Shielding.

NO EATING, DRINKING, OR SMOKING in lab.

## <sup>35</sup>S Sulfur



Low Energy Beta Emitter  
Half-Life: 87.4 days  
Max energy: 167 KeV (at 100%)  
Max range in air: 9.6 in  
ALI: 20 mCi via inhalation  
8 mCi via ingestion  
Critical Organ: Whole Body  
Bioassay: Urine

**Detection:** GM or LSC  
GM meter w/Pancake probe  
(5-8%) efficient

**LSC:** (85-90%) efficient

**Shielding:** None Required

**PPE:** Double gloves,  
Lab coat, Safety glasses

**Dosimetry:** None Needed



LSC



## Notes and Special Precautions

- Use a Pancake GM for personal post experimental surveys, but note; efficiency is poor (5-8%). Survey technique should be slow and close to the surface without touching.
- Some chemical forms volatile...  
(Methionine/Cysteine, Translabel®, ProMix, Invitro cell labeling mix)
  - Activated charcoal is effective in helping trap volatile species.
  - Incorporate activated charcoal and single use aliquots.
  - Vent/open stock vials in a fume hood.
  - Surveys of incubators and waterbaths are important.
  - Use a hooded enclosure when possible.
- Wear double gloves and changes gloves often.
- Large quantities (>10 mCi) stored at -80 can cause local contamination of freezer. Larger stock vials should be placed in a secondary storage container and activated charcoal should be incorporated into container.



**Class III Waste ≥ 60 days ≤120 days**

**EMERGENCY SPILLS**

or

**SKIN CONTAMINATION**

**203-785-3555**

**Yale Environmental Health & Safety 203-785-3550**