ENVIRONMENTAL HEALTH AND SAFETY
University of Nebraska-Lincoln

Safe Operating Procedure

(Revised 3/20)

SAFETY PROTOCOL: Rb-86

Use of radioactive materials requires a safety protocol be submitted to the UNL Radiation Safety Committee (RSC) for approval. This is a safety protocol. To obtain RSC approval:

- Submit an Authorization for Radioactive Material Use request for review by the UNL RSC. Contact the UNL Radiation Safety Officer (RSO) for specific instructions.
- Agree to use this safety protocol or submit an alternative and equivalent procedure that you develop to meet your unique needs.

All radiation workers must be at least 18 years of age and have completed required radiation safety training. **Never handle radioactive material prior to the completion of radiation safety training.**

All research protocols involving the radioactive material must be approved by the RSC.

Physical Data

- Half-life of Rb-86 = 18.6 days.
- Beta particles and gamma-rays are the primary radiation hazard.
- Major beta particles maximum energy and intensity = 0.698 MeV (8.8%) and 1.77 MeV (91.2%).
- Major gamma-ray energy and intensity = 1.077 MeV (8.8%).
- Gamma dose rate per mCi = 500 mrem/hr at 1 cm; 0.5 mrem/hr at 30 cm.
- Beta dose rate per mCi = 310,000 mrem/hr at 1 cm.
- Maximum beta range in lucite = 0.8 cm.
- Half-value layers for shielding the gamma-rays = 1.4 cm (lead).

Radiation Protection Procedures

1. Special equipment or procedures
    a. Use transfer pipettes, spill trays, and absorbent coverings to confine contamination.
    b. Volatile chemical forms should be handled in a certified fume hood.
    c. Use lab coats, safety glasses, and disposable gloves.
    d. Replace gloves as needed.
    e. Regularly monitor and promptly decontaminate gloves and work surfaces to maintain contamination and exposures As Low As Reasonably Achievable (ALARA).
    f. Select gloves appropriate for chemicals handled.

g. Do not work over open containers, as practical.

2. Shielding requirements
   a. Store Rb-86 behind lead shielding.
   b. Lucite shielding should be used when working with concentrated/primary solutions of Rb-86.

3. Surface contamination survey schedule
   a. A survey meter should be used to monitor work surfaces after use.
   b. A removable contamination (swipe) survey utilizing a smear and appropriate counter must be performed each month in which radioactive material is used (including sewer disposal). The RSC may require a higher contamination survey frequency depending on the amount of material in process.
   c. The action limit for cleanup of removable contamination is 1000 dpm/100 cm^2. Any indication above this limit on a swipe survey or above two times background with a survey instrument is considered to be contamination. Any accessible area found to be contaminated above this limit shall be decontaminated.

4. Bioassay requirements
   a. None routinely required.

5. Dosimetry
   a. Rb-86 can pose an external dose hazard, particularly from the high energy beta particle emission. The most significant external dose hazard is exposure to extremities (fingers) through the handling of primary solutions.
   b. Rb-86 distributes in the total body similarly to potassium. It has a biological half-life of 45 days and effective half-life of 13.2 days.
   c. The annual limit of intake through ingestion is 0.5 mCi.

Waste Disposal

EHS procedures for disposal of hazardous and/or radioactive wastes are to be followed. Rb86 waste should be segregated from all other wastes. Lead or similar shielding may be needed for waste containers depending upon the amount of waste stored.

Survey Meters

A survey meter is required to work with Rb-86. A thin window Geiger-Mueller tube or a NaI detector is necessary to detect Rb-86.

Personnel Monitoring

Dosimeters are required when any individual will receive or is likely to receive in any period of one year an occupational dose in excess of 10% of the applicable limits. At UNL, all users of Rb-86 are issued whole-body and ring dosimeters.