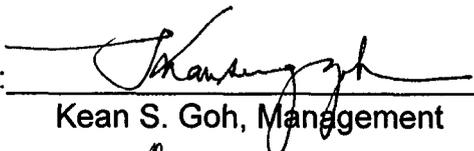


**STANDARD OPERATING PROCEDURE
PREPARATION OF AIR SAMPLING TUBES AND RESIN JARS**

KEY WORDS

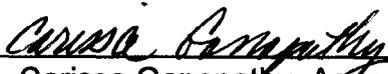
Air sampling, charcoal tube, XAD Resin, COC, glass cleaning.

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Environmental Hazards Assessment Program (EHAP) organization and personnel such as management, senior scientist, quality assurance officer, project leader, etc. are defined and discussed in SOP ADMN002.

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1.0 INTRODUCTION

Many air samplers draw air through a glass or stainless steel cylinder containing a sampling medium capable of trapping the chemical of interest. The various sampling media available consist of numerous sizes and types of sorbent resins, charcoal, and filters, used alone or in combination. Sampling cylinders for HI-VOL (high-volume) and LO-VOL (low-volume) air samplers can be prepared from component materials available from various vendors (Figures A and B). All materials that will come into contact with samples are prepared by washing, double rinsing with deionized water, rinsing with a solvent (pesticide grade isopropyl or ethyl alcohol, acetone) and heat drying. A variety of pre-packed sorbent tubes, designed for use with the personal air samplers are available for purchase (Figure C). Prior to initiating an air study, ensure that the tubes or resin jars are of the proper type and size for the sampling medium as well as the analytical lab's requirements.

1.1 Purpose

This Standard Operating Procedure (SOP) discusses preparing, labeling and packaging tubes or large cylinders (resin jars) to be used for air sampling, as well as special Chain of Custody (COC) handling. This SOP will describe methods for packing tubes or resin jars with trapping media (such as XAD resin). Study specific decisions may be made by the project leader and chemist regarding sample tube/jar preparation. These decisions should be described in the study protocol.

1.2 Definitions

- 1.2.1 **XAD resin** is a styrene-divinylbenzene polymeric adsorbent resin available from Rohm and Haas Company. The resin must be cleaned prior to use with a solvent compatible with the chemical analytical method and dried. The procedure takes about one week and is conducted by the California Department of Food and Agriculture Laboratory Services for EHAP. When measuring the XAD resin and packing tubes, work under a vacuum hood to avoid inhalation of solvent vapors.

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1.2.2 A **Chain of Custody (COC)** is a legal document designed to track a sample container from container preparation through sample analysis as defined in SOP ADMN006.00.

2.0 MATERIALS

2.1 HI-VOL samples:

- (A) Appropriate resin, usually XAD resin
- (B) Glass cylinders (called HI-VOL resin jar)
- (C) Super fine, material-like, stainless-steel screen cut to fit jars (100 to 120 mesh, small enough that no resin will pass through)
- (D) Open-cell, foam sponge cut to fit jars
- (E) Expanded metal stainless-steel screen cut to fit jars (0.050 in. thick, 0.50 in. corrugated) (Figure D)
- (F) Aluminum foil
- (G) Half-pint Mason jar
- (H) Gaskets (approximately 3 5/8 in. I.D., 4 3/8 in. O.D., 3/16 in. thick)

2.2 LO-VOL samples

- (A) Appropriate resin, usually XAD resin
- (B) Glass tubes (called LO-VOL resin tubes, with indentation in glass)
- (C) Super fine, material-like, stainless-steel screen cut to fit tubes (100 to 120 mesh, small enough that no resin will pass through)
- (D) Glass wool
- (E) Rubber stoppers that fit glass tubes
- (F) Teflon tape
- (G) Aluminum foil
- (H) Forceps

2.3 Pre-packed sorbent tubes (packed by the manufacturer):

- (A) Tygon[®] tube (R-3603) cut into 1-inch length pieces
- (B) Tube caps (2 per tube)

2.4 Labels pre-printed with Study Number, Sample Number (A and B if linked tubes in series), and Sample Type.

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- 2.5 Clear adhesive tape wide enough to cover a label.
- 2.6 COCs appropriate to the study.
- 2.7 Small (minimum 6 X 12 inches) resealable plastic bags.
- 2.8 Shipping box or archive box
- 2.9 Permanent ink pen.
- 2.10 Latex gloves.

3.0 PROCEDURES

3.1 HI-VOL Jar Preparation (Figure A)

- 3.1.1 Clean glass HI-VOL resin jars according to SOP EQOT002.00, then rinse with a solvent (pesticide grade isopropyl or ethyl alcohol, or acetone).
- 3.1.2 Gather materials listed in 2.1 above. All materials that will come into contact with samples, with the exception of the sponge which is new and the resin jars described in 3.1.1, are prepared by washing, double rinsing with deionized water, rinsing with a solvent and heat drying.
- 3.1.3 While wearing latex gloves, begin assembling the HI-VOL resin jar by placing a piece of expanded stainless-steel screen in the bottom of the jar. This screen holds all of the following materials in place.
- 3.1.4 Next place the foam sponge on top of the expanded screen.
- 3.1.5 Then set a piece of fine stainless-steel screen on top of the sponge.
- 3.1.6 Finally place another piece of expanded screen on top of the fine screen.
- 3.1.7 Wrap the outside of the jar with aluminum foil to prevent photolysis of the analyte to be trapped on the resin, secure with tape.
- 3.1.8 Under a vacuum hood measure 125 ml of cleaned XAD resin with a graduated cylinder into a new half-pint mason jar then replace the lid. This prevents spills during storage and transport and also prevents

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contamination by atmospheric deposition. The resin will be poured from the mason jar into the HI-VOL jar after the HI-VOL jar is placed on the sampler at the field site. Be careful not to spill the resin, it is very slippery.

3.2 LO-VOL Resin Tube Preparation (Figure B)

- 3.2.1 Clean glass LO-VOL tubes according to SOP EQOT002.00, then rinse with a solvent (pesticide grade isopropyl or ethyl alcohol, or acetone).
- 3.2.2 Gather materials listed in 2.2 above. All materials that will come into contact with samples except for the tubes described in 3.2.1 and the glass wool, are prepared by washing, double rinsing with deionized water, rinsing with a solvent and heat drying.
- 3.2.3 While wearing latex gloves, begin assembling the LO-VOL resin tube by placing a piece of super fine stainless-steel screen with forceps into the bottom of the tube against the indentations in the glass. The indentations prevent the materials from pulling through during sampling.
- 3.2.4 Next place a 1 cm plug of glass wool with forceps above the screen within the glass tube.
- 3.2.5 While working under a vacuum hood, measure appropriate milliliters of resin with a graduated cylinder (based on consultation with the chemist). Pour the resin from the cylinder into the glass tube, on top of the glass wool.
- 3.2.6 With forceps, place a 1 cm plug of glass wool on top of the resin.
- 3.2.7 Wrap rubber stoppers with Teflon[®] tape then insert the stoppers into both ends of the glass tube.
- 3.2.8 Wrap the glass tube, but not the stoppers, with aluminum foil and secure with tape.

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3.2.9 The LO-VOL resin tube is used with the Anderson® air sampler or any sampler that operates at 1 to 30 liters per minute.

3.3 Pre-packed (manufactured) tubes

3.3.1 Cut Tygon® tube listed in Section 2.3 above into 1 inch lengths.

3.3.2 Follow instructions in the section below for packaging and labeling of pre-packed tubes.

3.4 Labeling and packaging resin jars, resin tubes and pre-packed tubes

3.4.1 Obtain sufficient sample tubes/jars, caps, labels, COCs and other supplies to complete the number of sample tubes required by the study. Labels need to be printed with the study number, unique sample number (see 3.4.2 for tubes in series), and sample type (air) for every tube that will be used. A spread-sheet program works well for making labels.

3.4.2 Sampling tubes are often used in series, to check for break-through of analyte. For example, in the case of the pre-packed SKC® charcoal tubes, each tube is labeled with the same sample number. However, one tube (usually the 400 mg charcoal tube) is marked A and the other (200 mg tube), B. In some cases a third tube or tubes with different trapping medium may be used. Tube A is considered the primary sample and B the break-through sample used to check if the primary tube trapped all of the analyte in the air stream. The number of tubes and type of tube selected should be stated in the study protocol. Also, if photolysis is considered a problem for the analyte, wrap each tube with aluminum foil and secure with tape.

3.4.3 Cut out a pre-printed label and affix it lengthwise to the tube or horizontally on the resin jar, on top of the foil wrap if used, using clear tape. Smooth the tape to assure a good seal around the label.

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3.4 COC handling and packaging of tubes and jars

- 3.4.1 Fill out the COC for each jar, sample tube or set of tubes as detailed in SOP ADMIN006.00. Generally, only one COC is needed for a stacked set of tubes. As a minimum, each COC must have the study number, sample number, chemicals to be analyzed, and the preparer's signature.
- 3.4.2 For both tube types, LO-VOL and pre-packed, fold the COC in half and place in a 6" x 12" plastic bag. Place the tube or tube set in the plastic bag with the COC. For the pre-packed tubes, also place 2 caps per tube and 1 piece of Tygon[®] tube (2 Tygon[®] for 3 tubes) in the plastic bag and seal.
- 3.4.3 For resin jars, the COCs should be filled-out as in 3.4.1. The resin jars should be placed in a protective box with dividers. Then the COCs matching the HI-VOL jars should be simply stacked on top of the jars inside the box in sample number order. Also place two gaskets per HI-VOL jar into the box for use with the HI-VOL sampler in the field.

3.5 Storage

All prepared sample tubes or resin jars with COCs for a given study should be stored together in archive-boxes or storage-boxes on the shelves in the EHAP warehouse. The warehouse manager will direct the storage location. Label the box with the study number to make identification easier.

4.0 Study Specific Decisions

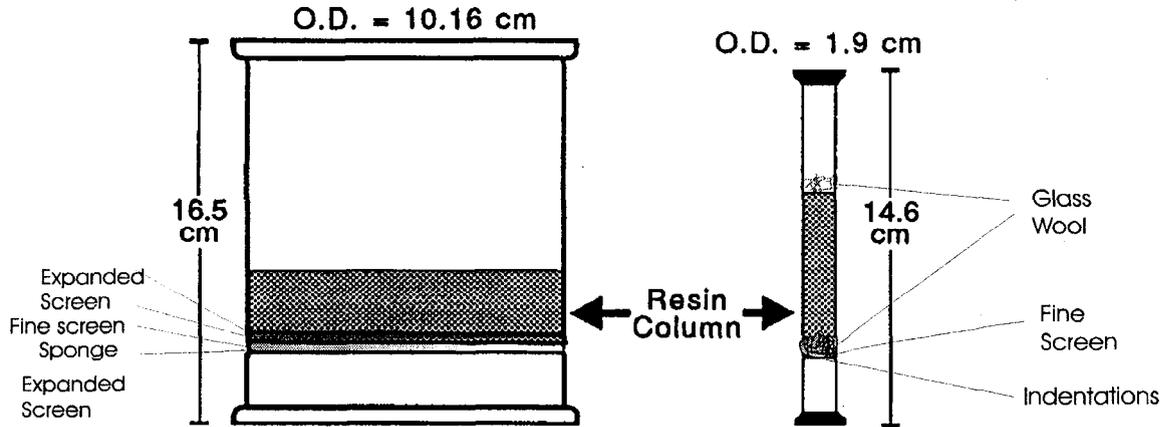
If deviations from the standard operating procedures outlined above are required, they should be detailed in the study protocol. Before preparing any air sampling protocol for a study, the project leader or field coordinator must determine:

- 4.0.1 The type of air sampling device that will be used (high or low volume, or personal air sampler).

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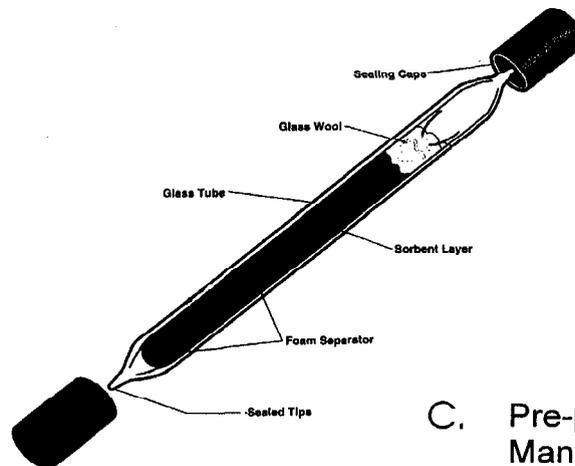
- 4.0.2 The type of container or tube appropriate for the air sampler.
- 4.0.3 The type of resin or trapping medium.
- 4.0.4 If break-through may be a problem, use tubes in series or adjust sampler flow volume.
- 4.0.5 The number of containers required including spares and quality control.
- 4.0.6 Transport and storage arrangements.

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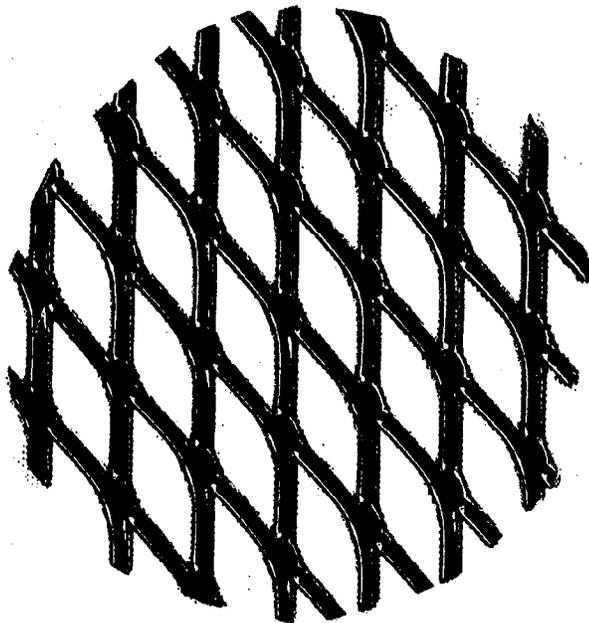
A. **HI-VOL
Resin Jar
(125 ml Resin)**

B. **LO-VOL
Resin Tube
(15 ml Resin)**



C. **Pre-packed or
Manufactured Tube**

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D. Expanded stainless-steel screen