

Exposure Awareness

Symptoms of Exposure:

Headaches, irritability, nausea, fatigue, motor skill, perceptual, cognitive impairment

Act quickly if an exposure occurs:

- Seek medical attention immediately at an emergency room.
- Call Campus Police
- Cell: (858) 534-4357**
- Land line: 9-1-1**
- Request an ambulance if transportation is necessary.
- Call the Poison Control System, (800) 222-1222 , if you need additional information.
- You may request medical evaluation from the [EH&S Occupational Health Nurse](#), (858) 534-8225

Common Causes of Exposure:

- Benchtop delivery of inhalant anesthetic without adequate scavenging.
- Poorly fitted face masks.
- Use of uncuffed ET tubes or improper inflation of cuffs on ET tubes.
- Turning on flow meters or inhalants before attaching the breathing system to the subject.
- Disconnecting subjects from the anesthesia machine before waste anesthetic gases have been adequately scavenged.
- Leaks in the anesthetic delivery system.

Equipment and System Maintenance

- Check anesthesia machines, breathing systems, and scavenging systems for leaks before each use.
- Have equipment and systems regularly serviced and maintained to ensure reliable performance.



Environment, Health and Safety

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This guide is only intended as a summary of the requirements to work with anesthetic gases. Please consult the EH&S web site for more complete information.

Safe Use of Anesthetic Gas in Research



Environment, Health and Safety

Preparation

Training and Hazard Evaluation:

- The PI or a knowledgeable designee must provide appropriate safety training.
- Evaluate the possible hazards of materials before beginning work.
- Consult Safety Resources before beginning work (e.g., MSDSs)
- Consult with one or both of the UCSD staff below about questions or concerns related to work with anesthetic gases
 1. Jennifer Fujimoto
 2. Doug Harvey

Emergency Preparedness:

- Never work alone.
- Clean up small, incidental spills promptly .
- Review your MSDS.
- Know the location and how to operate safety equipment, including:
 - Emergency Guide
 - Emergency Eyewash and Shower
 - First aid kit
 - Fire Extinguisher & fire alarm pull sta-

Identifying Anesthetic Gases:

Anesthetic gases commonly used at UCSD include:

Halogenated

- Isoflurane is the predominant halogenated ether in use at UCSD

Purchasing and Storage:

Label all containers as follows:

- Name of the material
- Concentration
- Warnings
- Date, when appropriate
- Preparer's initials, when appropriate

Buy the least amount of product the work requires. Do not buy in large quantities to "save money."

Hazard Control

Engineering controls involving active scavenging strategies (using negative pressure to manage unwanted material) are vital for working safely with anesthetic gases. As part of this strategy, Environment, Health & Safety (EH&S) uses a 2 ppm ceiling limit to determine whether or not your control strategy is adequate.

Active Scavenging Models: Minimize or eliminate the possibility of workplace exposure by using 1 of the 3 active scavenging models listed below (in descending order of priority). Model 1 is always preferred over all other methods of scavenging.

Model 1 (preferred) – Handle inhalants and subsequent waste products using a hard-ducted device that allows rapid elimination of waste gases from the workplace:

- Certified chemical fume hood
- Certified hard-ducted biosafety cabinet
- Ducted downdraft table
- Other local exhaust device (e.g., snorkel, etc)

Model 2 – Handle inhalants and subsequent waste products in a ductless device that allows rapid elimination of waste gases from the workplace by adsorption in activated charcoal:

- Chemical fume hood
- Downdraft table
- Other local exhaust device

Note: Activated charcoal is not effective for adsorption of nitrous oxide. Activated charcoal filters become saturated with anesthetic gas so they must be changed out regularly. Frequency depends on the amount of time and quantities of material being used. Attach a log sheet to the filter and record relevant information to better manage the change out interval.

Hazard Control

Model 3 – Handle inhalants and subsequent waste products using house vacuum that allows rapid elimination of waste gases from the workplace:

- Line and mini snorkel
- Downdraft tables
- Other effective means

These types of set ups can work well, but not always. Use them only if other more reliable techniques are not available. Model 1 is preferred whenever possible.

Passive Scavenging:

- Discharging directly into the working environment
- Adsorption devices, such as canisters containing activated charcoal, can be used as waste-gas disposal systems in lieu of other types of scavenging systems, especially when portability is an issue. However, some variation in effectiveness occurs with different brands of canisters and with changes in the rate of gas flow through the canister. Activated charcoal is not effective for adsorption of nitrous oxide.

Additional Required Controls:

- Work in a well-ventilated room
- Wear this personal protection equipment:
 - Lab coat
 - Safety glasses
 - Disposable surgical gloves
 - Closed-toed shoes
- Use the least hazardous product and delivery system available for the task.
- Keep container sizes and quantities as small as possible in the work area.
- Store and transport stock bottles in a secondary container.
- Avoid techniques that make scavenging difficult or impossible (ex: open drop etc)

For additional controls see the EH&S Blink web site.