UF Environmental Health and Safety
UNIVERSITY of FLORIDA

Waste Anesthetic Gases (WAGS)

OVERVIEW

Waste Anesthetic Gases (WAGs) are volatile anesthetic gases (e.g., isoflurane, nitrous oxide, desflurane, and sevoflurane) used during a medical or surgical procedure to alleviate pain and/or distress. This document outlines the occupational hazards associated with exposure to WAGs, which may result in adverse health effects.

MINIMIZING EXPOSURE

Work in a well-ventilated area and ensure air is 100% exhausted and not recirculated to other areas. If you have questions or concerns about the space you are working in, please contact an **EH&S Industrial Hygienist** at **352-392-1591**

SCAVENGING METHODS

1. BEST: **Fume hood/ Class II B2 biosafety cabinet (BSC):** Work in a chemical fume hood or certified hard-ducted biosafety cabinet for best WAG capture.
2. BETTER: **Local exhaust ventilation:** snorkels or other ducted local exhaust capture devices
3. GOOD: **Active scavenging devices (ductless):** Use a manufacturer recommended air cleaning extraction system with an activated charcoal adsorption unit to actively scavenge WAG. ***Do NOT use the house vacuum line for active scavenging unless approved by EH&S.***
4. SUFFICIENT: **Charcoal canisters**: Relies on positive pressure from the anesthesia machine and the anesthetized animal's exhalation to push WAGs into gas adsorption units (i.e., canisters). Any leaks in passive scavenging systems, such as from an inadequate seal on the induction chamber cover or particularly with tubing and nose cones, can cause WAG to leak into the work area.

NOTE: Charcoal adsorption units CANNOT be used with nitrous oxide.

If you can **SMELL Isoflurane**, you are being exposed!

WARNING:

There are **no safe exposure limits** for staff who are pregnant or suspect they are pregnant.

AIR MONITORING

If you suspect that there is a risk for exposure, contact the EH&S Industrial Hygiene Office to discuss their sampling services at 352-392-1591.

SYMPTOMS OF EXPOSURE

- ACUTE:
  - Headache
  - Nausea
  - Irritability
  - Fatigue
  - Drowsiness
  - Difficulties in judgement and coordination
- Chronic:
  - Liver & Kidney disease
  - Reproductive effects

CONTRIBUTORS TO EXPOSURE

- Leaks from:
  - Tubing
  - Valves
  - Seals
  - Gaskets
- Poor work practices
- Lack of training
- Poor ventilation
- Ineffective gas-scavenging systems
- Bell Jar (Open-drop Method)

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CHECKLIST FOR WORKING WITH ANESTHETIC GASES

If there are limited options for scavenging, personal respiratory protection may be necessary to protect the researcher/employee.

*Please see the Respiratory Protection Policy and Contact the EH&S Industrial Hygienist Office for follow-up questions at **352-392-1591**.*

- ☐ Use a local exhaust ventilation system (chemical fume hood, downdraft table/sink, etc.) as the preferred means to remove WAGs. Among BSCs, only hard-ducted Class II B2 units effectively remove WAGs from the room.
- ☐ Verify equipment (e.g., fume hood and vaporizer) is currently certified and in good working condition.
- ☐ If active scavenging is not possible, passive scavenging using carbon canisters must be employed.
- ☐ Carbon canisters should be weighed when they are received AND prior to each procedure and discarded once they exceed the manufacturer recommended weight.
- ☐ Use chemically compatible gloves, lab coat, and eye protection.
- ☐ Keep laboratory doors closed when anesthetic gas is in use. Place signage at the entrance to notify lab staff that WAGs are "in use".
- ☐ Avoid high concentrations of isoflurane (>4%) for induction and/or for prolonged periods. Turn off vaporizer when animals are not receiving anesthetic.
- ☐ Close induction chamber lid(s) during anesthetic gas delivery. Purge induction chamber with oxygen/air for at least 60 seconds prior to opening the chamber and retrieving the animal. To open the door, stand back as far as feasible and open away from worker. Sliding-top chambers are best.
- ☐ Minimize leakage from animal's nose cone by selecting the best-fitting cone size with a tight-fitting diaphragm.
- ☐ Keep worker's breathing zone as far as possible from animal's facemask.
- ☐ IACUC/ACS information document: Waste-Anesthetic-Gas-Scavenging-Canister-Usage.pdf

- ☐ Ensure personnel receive training on equipment use. This should be documented through the creation of a lab-specific Standard Operating Procedure (SOP).
- ☐ Review and understand the manufacturer's operating instructions.
- ☐ Verify preventative maintenance is performed annually, or as indicated in Anesthetic Equipment Maintenance.
- ☐ Leak test all tubing connections monthly using high air flow. Allow the air to saturate the lines for at least 5 minutes before conducting the leak test. Use soapy water at the joint and allow compressed air to flow through the tubing. Check the integrity of gaskets in the induction chamber.
- ☐ Change plastic tubing at a minimum every 2 years.

Spills

- ☐ **Do not** attempt to clean up isoflurane spills. Evacuate personnel and allow anesthetic to evaporate. Call EH&S (**352-392-1591**) for support with large spills (1–2 stock bottles).

Waste

- ☐ Dispose of charcoal canisters in the regular trash.
- ☐ Empty bottles that are visibly free of liquid may be disposed of as non-hazardous glass waste.
- ☐ Unused and expired product needs to be disposed of through Hazardous Waste Management.

CHARCOAL CANISTERS

- The carbon canister must be in an upright/vertical position and the holes on the bottom of the carbon canister must not be blocked.
- New carbon canisters must be weighed **as soon as they arrive** and must be stored in sealed containers/ziplock bags away from any vapors or potential contamination.
- At installation, and after each use, the canister must be weighed to evaluate the remaining absorption capacity.
- The weight will be recorded and dated on the side of the canister.
- Canisters that exceed the manufacturer capacity recommendations must be removed and placed in a sealed plastic bag prior to disposal in regular trash.
- Capacity for F/Air is currently 50g. Capacity for Enviro-Pure is currently 100g.
- Verify if the carbon canister has a "use time" limit (number of hours). Discard canister if it has achieved its use time limit (even if the

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