



## Waste Anesthetic Gases (WAG)

Animal research protocols commonly use halogenated anesthetic gases/vapors such as isoflurane. Researcher exposure risks occur primarily through inhaling waste anesthetic gases (WAG); these gases are unintentionally released into the laboratory environment if the equipment is not set up or functioning correctly or the WAG is not properly exhausted.

- Some potential effects of short-term exposure to waste anesthetic gases are nausea, dizziness, headaches, fatigue, and irritability.
- Long-term effects can include sterility, miscarriages, birth defects, cancer, liver/ kidney disease, and asphyxia.
- For hazards associated with the specific anesthetic gas used consult the Safety Data Sheet (SDS), which can be found at <https://www.ehs.uci.edu/sds/index.php>
- For assistance in setting up your gas anesthesia equipment, please contact the ULAR campus veterinarian at 949-824-5271, 949-824-4666, or 949-824-0569.
- If you have reproductive health concerns, please visit the EHS Occupational Health page for more information at <https://ehs.uci.edu/research-safety/occupational-health/occupational-health-services.php>

### Exposure Monitoring

- Isoflurane exposure monitoring can be requested to assess the potential waste anesthetic gases in the general laboratory work area. Exposure monitoring is requested by contacting Environmental Health and Safety (EHS) at (949) 824-6200.
- The occupational exposure limit for halogenated anesthetic agents is 2 parts per million (ppm) based on an eight-hour time-weighted average.

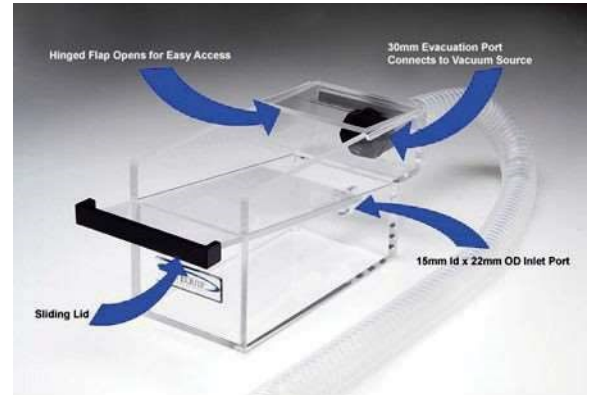
### Sources of Waste Anesthetic Gases (WAG)

1. Leaks within the anesthesia machine, breathing system, hoses, and connections.
2. Opening of induction boxes.
3. Leaks between subject and facemask/nosecone; over reliance on passive scavenging system.
4. Leaks from around the tracheal tubing.
5. Spills of liquid anesthetics.
6. Charcoal canister misuse or over saturation.

## Anesthetic Waste Gas Capture Systems

### Active Capture/Scavenging

- **Fume hood, hard-ducted biosafety cabinet, or down draft/necropsy table:** (Most biosafety cabinets on campus are not hard-ducted.)
- **Building ventilation exhaust or vacuum system:** The waste exhaust hose can be hooked into the building ventilation exhaust system or attached to a vacuum outlet. Personnel must match input flow with exhaust flow if hooked up directly or use a non-direct hookup, such as with a snorkel or thimble connection.



Active Scavenging Chamber

- **Non-ducted active scavenging device:** Vacuum devices designed to pull/push the WAGs through a charcoal filter system. CANNOT be used with nitrous oxide.



Non-ducted active scavenging- device

### Passive Scavenging

- **It cannot be used with nitrous oxide.**
- **Charcoal Canisters:** This method relies on positive pressure from the anesthesia machine and the anesthetized animal's exhalation to push WAGs to gas absorption units.
- When tubing or a nose cone is used, a secondary scavenging system is recommended to prevent WAGs from escaping around the tubing or nose cone. Nose cones are not one-size-fits-all. Using a tight-fitting nose cone will minimize WAGs.



## Minimizing Exposure/Safe Work Practices

- Bell Jars are commonly used in the laboratory setting when a small lab animal needs to be anesthetized for a short time. All bell jars should be filled and opened inside a fume hood, hard-ducted biosafety cabinet, or downdraft table to prevent inhalation of WAGs.
- All vaporizer units on campus must be maintained and certified at a minimum every three years. Please visit the Office of Research IACUC Use and Maintenance of Gas Anesthesia Equipment Policy for more information at <https://research.uci.edu/animal-care-and-use/policies-and-guidance/use-and-maintenance-of-gas-anesthesia-equipment/>
- Inspection: Before each use, all components of the anesthetic system, including tubing, flow meters, valves, gaskets, scavenging system, etc., should be inspected by the user to ensure that all components are correctly set up and functioning properly without any leaks in the system.
- Vaporizers are anesthetic specific. Anti-spill bottle adaptors are available for filling.
- The oxygen flow rate should be as low as possible to minimize the total amount of anesthetic gas usage. Most vaporizers need a minimal flow rate of 500-800 ml/min to ensure a proper percentage of gas output.
- Charcoal canisters must be weighed regularly to ensure they are within the manufacturer's saturation limits. Once the canister has reached the saturation limit, it should be immediately discarded into the regular trash and replaced to ensure proper WAG absorption. Continuing to use the canister after saturation limits are met will lead to WAGs leaking out of the canister and into the workspace. Do not block airports. Depending on the model, these can be located on the canister's top or bottom.
- Induction chambers are ideally used within a fume hood. Alternatively, if the chamber is the hooded type, a vacuum line needs to be attached to the hood, or if the chamber is a simple box type (no collection hood area), a hose can be attached to allow WAG to flow into a charcoal canister passively. At all times, the induction chamber's opening (both time and frequency) should be minimized.

## Injuries and Spill Procedures

- If isoflurane is splashed in the eyes, use an emergency eye wash to flush your eyes for 15 minutes and complete an injury/incident report. If medical attention is needed, refer to the UCI Injury & Medical Treatment Poster for location information at [med-emergency-poster.pdf \(uci.edu\)](#)
- Do not attempt to clean up if you feel unsure of your ability to do so or if you: Perceive the risk to be greater than normal laboratory operations.
- Small volumes of isoflurane evaporate readily at average room temperatures and may dissipate before any attempts to clean up or collect the liquid are initiated. If a small spill occurs, rapidly absorb any liquid with absorbent pads or paper towels and place it in a chemical fume hood for safe evaporation.
- If a large spill occurs, notify others in the area and evacuate the area immediately.
- Contact EHS at 949-824-6200 during working hours and 911 for emergency medical attention.

## Waste Disposal

- Unused (expired) solutions of all anesthetic liquids need to be disposed of as hazardous material through EHS. To schedule a pick-up: [Text a Pickup // Environmental Health & Safety // UCI](#)
- Isoflurane-saturated charcoal canisters and empty bottles can be disposed of in the regular house trash.

## Contact Information

- EHS (949) 824-6200 or visit <https://www.ehs.uci.edu/>
- ULAR Veterinarians (949-824-5271, 949-8244666, 949-824-0569).
- For exposure monitoring and testing results, contact EHS at x4-6200

## Anesthesia Equipment Vendor Information

- South Coast Anesthesia [southcoastanesthesia@cox.net](mailto:southcoastanesthesia@cox.net)
- Vet Equip <http://www.vetequip.com/>
- E-Z Anesthesia <https://www.ezanesthesia.com/>
- Vet-Tech Active Scavenging Unit <https://www.vet-tech.co.uk/product-category/anaesthesia-supplies/anaesthesia-accessories/scavenging/>

