

# Halogenated Anesthetic Gases Facts



## What are Anesthetic Gases?

Halogenated anesthetic gases, primarily isoflurane, are widely used in laboratory animal research. Isoflurane is typically administered at concentrations of 0.5%–3% in oxygen using precision vaporizers. It is a clear, colorless, nonflammable, volatile liquid at room temperature and pressure. It has an ether-like or sweet odor. Isoflurane is structurally and pharmacologically similar to other halogenated anesthetics including: halothane, desflurane, enflurane, and sevoflurane.



## Health Hazards

Longterm exposure to Halogenated gases can have adverse effects on the the liver and kidneys, central nervous system, reproductive organs, and can cause congenital abnormalities.

Acute exposure can cause headaches, dizziness, drowsiness, nausea, and irritation of eyes, skin, and respiratory tract.



## Exposure Limits

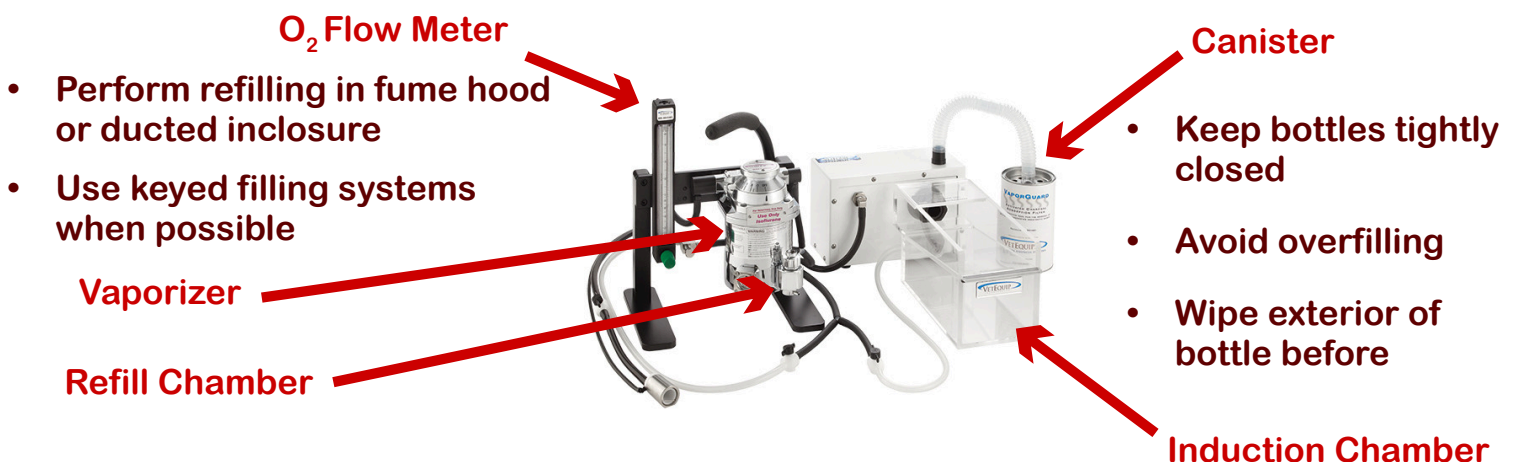
The National Institute for Occupational Safety and Health (NIOSH) recommends a ceiling concentration of 2 ppm for any halogenated anesthetic gas (when used alone) during a sampling period not exceeding 1 hour.



## Common Exposure Points

Workers are primarily exposed through inhalation of waste anesthetic gas (WAG). Common exposure points include:

- Open drop method
- Induction chamber opening
- Nose cone placement and removal
- Leaking tubing or fittings
- Non-rebreathing circuit failures
- Inadequate scavenging systems





# Waste Anesthetic Gas Controls

## BEST: Engineering Controls (Ducted Systems)

Certified chemical fume hood or hard-ducted class II type B2 biosafety cabinet. Perform procedures inside a certified chemical fume hood or hard-ducted BSC. Exhaust must be ducted directly outside the building.

Always verify the current certification sticker before use.

## GOOD: Active Scavenging (Ductless Systems)

Air cleaning extraction systems equipped with activated charcoal adsorption units may be used when ducted ventilation is unavailable. Must follow manufacturer specifications.

Do NOT connect to house vacuum lines unless evaluated and approved by EHS.

## SUFFICIENT: Passive Scavenging (Charcoal Canisters)

Charcoal Canisters rely on positive pressure from anesthesia machine and animal exhalation. The Canisters must remain upright and positioned below the vaporizer. You must ensure bottom airflow holes are not blocked. Always weigh before first use. Cannisters DO NOT absorb nitrous oxide.

Replace canisters when weight increases by 50 grams or per manufacturer's maximum loading capacity.



Class II Type B2 Biosafety Cabinet



Certified Chemical Fume Hood



## Recommended PPE

- Nitrile gloves (double glove when filling vaporizers)
- Lab coat or gown
- Eye protection during filling or spill response
- Avoid direct skin contact
- Change gloves immediately if contaminated

Periodic exposure monitoring may be conducted by EHS to verify control effectiveness.



## Waste Disposal & Spills

Dispose through EHS Hazardous Waste Program via EHSA.

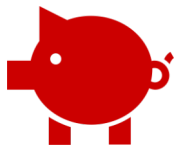
Email: [env-health-haz-waste@ncsu.edu](mailto:env-health-haz-waste@ncsu.edu)

Phone: 919-515-6859

**Small Spills (<25ml):** Small volume of anesthetic agents evaporates quickly at room temperature, and may dissipate before any attempts to clean up. For small spills lab personnel may perform cleanup if trained and knowledgeable on how to do so.

**Skin or Eye Contact:** If isoflurane is splashed on skin or eyes, flush with plenty of water for at least 15 minutes.

**Large Spills:** Evacuate immediately. Contact University Police at 919-515-3000 or 911.



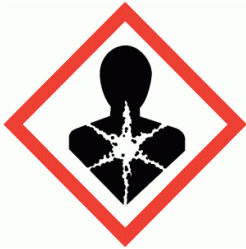
## Institutional Animal Care and Use Committee (IACUC)

Workers and supervisors with animal contact are subject to care, ethical, and practice standards governed by federal and local laws and regulations. Contact IACUC to ensure compliance with the university's rigorous program of animal care and use.



# Associated GHS Symbols

GHS labeling is a standardized system for classifying and labeling chemicals and hazardous substances. It provides a globally harmonized approach to identifying chemical hazards and communicating those hazards through labels and safety data sheets (SDS).



**HEALTH HAZARD** - Germ cell mutagenicity; carcinogenicity; organ damage; birth defects; aspiration hazard; breathing difficulties, allergies, or asthma if inhaled



**EXCLAMATION MARK** - Harmful if swallowed; toxic if inhaled; harmful if in contact with skin; may cause an allergic skin reaction; may cause respiratory irritation



## University Links and Resources

If you have any questions or concerns pertaining to waste anesthetic gases, email: [env-health-occ-health@ncsu.edu](mailto:env-health-occ-health@ncsu.edu)

See below links for additional resources.

- [NCSU Animal Contact Program](#)
- [Animal Care and Use \(IACUC\)](#)
- [NC State Environmental Health & Safety Homepage](#)
- [EHS Respiratory Protection Program](#)
- [OSHA Isoflurane Chemical Profile](#)