



Subject: Volatile Gas Anesthesia/Euthanasia

Source: Institutional Animal Care and Use Committee (IACUC)

Effective Date: 9/14/2026

Replaces: 12/11/2023

Applies to: Personnel involved in Research or Teaching involving animals.

Reference: Animal Welfare Act; PHS Policy on Humane Care & Use of Laboratory Animals.
Guide for the Care & Use of Laboratory Animals

Introduction

The Institutional Animal Care and Use Committee (IACUC) provides oversight of the institution's animal care and use program, ensuring compliance with federally mandated regulations, ethical standards, and institutional policies governing the humane use of animals in research and teaching at the University of Colorado Denver | Anschutz. The IACUC evaluates and reviews all activities related to the care and use of animals and determines if the proposed activities are in accordance with regulations.

Guidance Statement

This guidance provides information on appropriate procedures for the use of volatile gases (halothane, methoxyflurane, isoflurane, sevoflurane, desflurane, and enflurane) for anesthesia and euthanasia and to establish procedures that should be followed.

Occupational Safety & Health Hazards

Waste anesthetic gas exposure is a serious occupational hazard. Short-term exposure to high concentrations may cause the following health effects: headache, irritability, fatigue, nausea, drowsiness, difficulties with judgment and coordination; liver and kidney disease.¹

Additional information and guidance for occupational exposures and safety measures is available from the Department of Environmental Health and Safety, Industrial Hygiene / Occupational Health Office, 303-724-0345/0242. EHS professionals can be employed to assess and evaluate specific setup scenarios effectively.

Vaporizer & Equipment Mandates

The IACUC strongly recommends using precision vaporizers for accurate delivery of volatile anesthetics, along with adequate gas scavenging.

- **Delivery Method:** Anesthetic gases may be delivered via an induction box, a properly placed endotracheal tube, a laryngeal cuff, or an appropriately sized nose-cone device.
- **Annual Testing:** Qualified service personnel must inspect each anesthesia machine and vaporizer for air-tightness and calibration at intervals not to exceed 12 months.
 - Service dates must be noted on the "Verification/Certification" and "Vaporizer Concentration Verification" stickers on the machine.
 - Annual testing is not required for Somnosuite isoflurane vaporizers.
- **Full Service:** Vaporizers should undergo full servicing (detailed maintenance, cleaning, and replacement of parts) according to the manufacturer's and service provider's recommendations, which are generally every 3 years. This date should be annotated on the "Vaporizer Service and Calibration" sticker on the machine.

¹ CDC NIOSH Publication on Waste Anesthetic Gases, <http://www.cdc.gov/niosh/docs/2007-151/pdfs/2007-151.pdf>,



Drop Technique Requirements

The Drop technique (placing an anesthetic-soaked gauze or cotton ball in a sealed vessel with the animal) is a recognized method of delivering anesthetic gases under the following conditions:

- **Ventilation:** Perform the technique inside a certified, functional chemical fume hood, hard-ducted biosafety cabinet, or other approved ventilation system, and in a closed container that is of sufficient transparency to observe the animal closely enough to determine the depth of anesthesia.
- **Physical Barrier:** A rigid physical barrier is required between the animal and the liquid volatile anesthetic to prevent direct physical contact.
- **Sanitization:** Use a container made of durable, easy-to-clean materials that are able to withstand heavy disinfectant use between animals.

Euthanasia and Death Confirmation

When using volatile anesthetic overdose as a method of euthanasia, a secondary, follow-up method to confirm death, such as cervical dislocation (if less than 200g in body weight), decapitation, or bilateral thoracotomy or vital organ harvest, is required.

Anesthetic Gas Scavenging

- Anesthetic Gas Scavenging should be used when working with volatile gas anesthetics. Active scavenging is preferred.
- Active Scavenging: Utilizes engineering controls (chemical fume hood, hard ducted biosafety cabinet, or suction) to remove waste anesthetic gas from the procedural area. These methods are superior to other methods.
- Passive Scavenging: Relies on tubing and pressure of the carrier gas (typically O₂) to force waste anesthetic gas through activated charcoal canisters.
 - Charcoal canisters must be weighed routinely with use, and their weight recorded, to ensure they do not exceed their absorbent capacity.
 - Upright position of charcoal canisters ensures waste anesthetic gas does not bypass the charcoal media for effective scavenging.

Compliance and Accountability

In accordance with regulatory requirements, failure to comply with this guidance will result in a review by the IACUC. Depending on the severity of the violation, you may be required to complete additional training, and your privileges to conduct animal research at CU Denver | Anschutz may be suspended or completely revoked.

If your research privileges are suspended, your funding agency (e.g., NIH) and relevant regulatory agencies (e.g., USDA) may be informed about your violation of federal and/or local policies regarding the humane use of animals. This notification will have a direct impact on your ongoing funding for animal-related research.