

## **UM PROGRAM FOR USE OF ANESTHETIC GASES WITH RESEARCH ANIMALS**

According to the *Guide for the Care and Use of Laboratory Animals*, “Exposure [of personnel] to anesthetic waste gases should be limited. This is usually accomplished by using various scavenging techniques. If ether is used, personnel safety should be ensured by proper use of signs and by using equipment and practices to minimize risks associated with its explosiveness.” The University of Michigan Department of Occupational Safety and Environmental Health (OSEH) has issued the guideline, “Anesthetic Gas Use (Research),” dated August 16, 2005, which recommends safe practices for the use of anesthetic gases and describes required engineering controls. Adherence to these recommendations will help protect personnel and animals from overexposure to anesthetizing and euthanizing gases and vapors.

The University Committee on Use and Care of Animals (UCUCA) requires all personnel involved in the care and use of animals in research, testing, or instruction to comply with the recommendations of this OSEH Guideline. Exceptions requested for scientific reasons must be proposed in the applicable UCUCA Application to Use Vertebrate Animals in Research, Testing, or Instruction (Form 8225), and must be reviewed and approved by the UCUCA. Failure to comply with the OSEH Guide could result in withdrawal of UCUCA approval to use animals.

#### Related Documents:

- OSEH Guideline, “Anesthetic Gas Use (Research),” 8/16/2005

UCUCA Approved 12/16/96, Updated 1/26/06



**OCCUPATIONAL SAFETY AND ENVIRONMENTAL HEALTH GUIDELINE**

**Subject: Anesthetic Gas Use (Research)**

**Date: 8/16/2005**

**Revision: 03**

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This Guideline is issued by the Department of Occupational Safety & Environmental Health to provide guidance and consistency in management of anesthetic gasses in animal research operations.

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**SUMMARY:** Anesthetic gases, used during research involving animals, must be properly controlled to avoid overexposure of the researcher to the chemical. Anesthetics of concern include ether, nitrous oxide, and halogenated agents including: chloroform, enflurane, halothane, isoflurane, methoxyflurane, and trichlorethylene. Use of anesthetic gases requires engineering controls (typically ventilation) to remove chemicals from the workplace and prevent overexposure. This Guideline describes safe practices for the use of anesthetic gases and engineering controls necessary to protect personnel from overexposure to the chemicals.

**SCOPE:** This Guideline applies to all University of Michigan personnel that use anesthetizing and euthanizing chemicals in animal research operations.

## REFERENCE

### DOCUMENTS:

The following documents provide guidance, rules, and regulations that govern the use of anesthetic gasses. When questions arise, OSEH is the University authority having jurisdiction over safety practices.

- Laboratory Safety Standard (29 CFR 1910.1450)
- Accreditation Guidelines from 1996 AAALAC Report (Association for Assessment and Accreditation of Laboratory Animal Care, International)

### DEFINITIONS:

*Chemical Hygiene Plan (CHP)* is a written plan, developed and implemented by lab management, which sets forth procedures, equipment, personal protective equipment, and work practices that protect employees from the health hazards associated with the use of hazardous chemicals. In essence, it is a laboratory safety manual.

*Engineering Controls* are methods of controlling employee exposures by modifying the source or reducing the quantity of contaminants released into the work environment. Typical engineering controls are ventilation systems that capture the contaminant before it reaches the employee.

*Material Safety Data Sheets (MSDS)* are chemical information sheets produced by the manufacturer containing the following information: identification and synonyms, hazardous components, physical data, fire and explosion data, toxicity data, health effects and first aid, reactivity, storage and disposal procedures, spill and leak procedures, and protective equipment. It also contains a contact number in case of emergency.

*Peroxides* are a class of chemicals that may explode when subjected to heat, light, friction and impact.

*Personal Protective Equipment (PPE)* is a device worn by the worker to protect against hazards in the environment. Respirators, gloves, and hearing protection are examples.

### **RESPONSIBILITY:** Deans, Directors, and Department Heads

- Ensure that adequate facilities, ventilation, and equipment are provided for the safe use of anesthetic gases.
- Coordinate the implementation of recommended remedial action measures when necessary to correct health or safety deficiencies.
- Ensure an environment where principal investigators and other personnel are encouraged to follow this Guideline.
- Actively support this Guideline within individual units under their authority by ensuring individuals working within areas under their control have the appropriate resources to implant the procedures.

Principal Investigators/Laboratory Supervisors

- Implement procedures in accordance with this Guideline. Prepare a laboratory specific Chemical Hygiene Plan to ensure hazards and risks are identified and proper procedures are in place to control the risks. Make sure all individuals working in the laboratory are trained and familiar with the plans.
- Ensure that staff is aware of this Guideline, instructed on the details of implementation, and provided with equipment and controls. Maintain documentation of the program and training as required by the Chemical Hygiene Plan.
- Assign resources to support the implementation of this Guideline.
- Report all work related injuries and illnesses (including animal bites) to the Work Connections office within 24 hours by completing and faxing the [Illness and Injury Report Form](#) to (734) 936-1913.

OSEH

- Provide training to the Principal Investigator and Laboratory Manager upon request, and maintain records of training.
- Provide technical assistance and conduct safety audits.
- Conduct air monitoring for anesthetic gases to evaluate employee exposure. Monitoring to evaluate work conditions will be conducted initially, upon request, and after an exposure incident.

University Committee on the Use and Care of Animals (UCUCA)

- Upon request provides OSEH with a list of laboratories using anesthetizing and euthanizing gases.

Employees

- Comply with this guideline and any further safety recommendations initiated by the Principal Investigator, ULAM, UCUCA, or OSEH.
- Conduct assigned tasks in a safe manner, wear appropriate personal protective equipment, and only use equipment for which they have been formally trained.
- Report to the principal investigator any job related injuries or illnesses, health and safety concerns, and unsafe or unhealthy working conditions.
- Review chemical hazard information detailed on MSDSs before beginning work with anesthetic gases.

**PROCEDURES:**

The following procedures have been prepared to provide a consistent approach to the health and safety programs for animal handlers at the University of Michigan.

A. Chemical Hygiene Plan

1. The PI/Supervisor will designate personnel responsible for preparing the [Chemical Hygiene Plan](#) for the laboratory. The Chemical Hygiene Plan is required of all laboratories that handle hazardous chemicals for research purposes. Guidelines and templates are available on the OSEH website. It is advised that one individual should be assigned as a Chemical Hygiene Officer for the laboratory to make sure the documents are maintained up to date. It is the PI/Supervisor that is ultimately responsible to devise effective occupational safety protocols in consultation with ULAM and OSEH.
2. During preparation of the manual by laboratory staff and review of the MSDS hazards may be identified in the operation. The PI will work with the OSEH representative in assessing the risks and identifying equipment, PPE, or procedures to mitigate the risks. These will all be documented within the manual specific to the laboratory, and will be available to anyone working within the area.
3. Within the laboratory setting, it is the responsibility of each PI/Supervisor to identify situations in which the potential for exposure to hazardous biological, chemical, or physical agents exists. Upon evaluation, OSEH will assume responsibility for monitoring and reporting on personnel exposure to selected hazards as needed.
4. Personnel who use anesthetic gases should be aware of the exposure symptoms associated with handling and use. If a lab worker is experiencing symptoms, the person should seek immediate medical attention. The supervisor must then complete a Work Connections Injury or Illness Report, and contact OSEH to arrange for environmental monitoring.

#### B. Ventilation

All personnel using anesthetic gases must use adequate local exhaust ventilation to minimize personal exposure. Recommended ventilation during anesthetizing and euthanizing procedures includes scavenging devices, chemical fume hoods, and snorkel hoods. Canopy hoods do not work well for this application, due to the distance from the source and the large volume of air required in capture of migrating gasses.

#### C. Restrictions on Use of Ether

1. Ether has properties that make it more dangerous to use than other anesthetics: extreme flammability, high vapor pressure, low flash point, peroxide formation, and its classification as a mutagen by NIOSH. Use of ether requires adequate exhaust ventilation, approved flammable liquid storage cabinets, and diligent lab safety procedures. Precautions include close tracking and dating of ether supplies to avoid peroxide formation. OSEH strongly recommends

the substitution of ether with less volatile and less flammable anesthetics. Possible anesthetic substitutes include: halothane, enflurane, isoflurane, and methoxyflurane.

2. Ether must be stored in National Fire Protection Association (NFPA) approved flammable liquid storage cabinets or in rooms meeting OSHA flammable liquid storage requirements. Oxidizers, acids, and other incompatible chemicals are prohibited from being stored in these areas. Sources of ignition, such as surgical cauterizers, must not be permitted in or near work and storage areas.
3. Store ether in airtight containers in a dark, cool and dry area. **DO NOT** allow sources of heat, friction, grinding, or impact near storage areas. Due to peroxide formation, contact OSEH HazMat (3-4568) for disposal of ether over one year old or nearing the manufacturer's expiration date.
4. Ether-exposed carcasses must be stored in freezers and refrigerators made for the storage of flammable material. These units will have a factory identification plate indicating it is safe for flammable liquids storage.

#### **RELATED DOCUMENTS:**

The following documents provide additional guidance on the safe use of anesthetic gasses.

- OSHA guidance document - [ANESTHETIC GASES: Guidelines for Workplace Exposures.](#)
- Federal OSHA Fact Sheet No. 91-38 (Waste Anesthetic Gases)
- OSHA 1910.106 Flammable Liquid Storage
- NFPA 45 Fire Protection for Laboratories Using Chemicals
- NFPA 30 Flammable and Combustible Liquids Code

#### **TECHNICAL SUPPORT:**

OSEH (3-6973) provides technical support for the proper use and storage of anesthetic gases, evaluating engineering systems used to control exposures to anesthetic gases, and conducting personal exposure monitoring for laboratory workers.

The Unit for Laboratory Animal Medicine (ULAM) provides information on suitable anesthetic gasses to use in research (4-0277).