

REDUCING EXPOSURE TO ANESTHETIC GASES

Epidemiological and toxicological studies have suggested that chronic exposure to low levels of anesthetic gases may be dangerous to human health. Reported hazards include increased rates of cancer, spontaneous abortion, congenital abnormalities of offspring, and kidney and liver disorders. The National Institute for Occupational Safety and Health has recommended an exposure limit of two parts per million for halogenated anesthetics as a one-hour time-weighted average. However, there have been no reported studies on the occupational exposure of laboratory personnel to anesthetic gases.

In order to decrease exposure levels, the following technique for anesthetizing animals has been outlined by the National Institute of Environmental Health Sciences. While this technique was developed for handling methoxyflurane (MOF), it is appropriate for handling all halogenated anesthetic gases.

1. All procedures performed in the laboratory areas should be done in a hood, which exhausts outside.
2. Personnel should wear nitrile gloves at all times to minimize skin absorption.
3. Animals should be induced in a glass desiccator; the use of non-glass containers, such as Nalgene and Plexiglas, is not advisable because repeated exposure to halogenated anesthetic agents can render these materials opaque.
4. The desiccator should be prepared in the hood by filling the well with absorbent materials, such as cotton or gauze sponges or paper towels, which are then wetted with the anesthetic agent until almost saturated. A porcelain plate with many holes should then be placed over the towels to prevent direct animal contact with the liquid. Animals should be placed only on the porcelain plate (or other suitable false bottom). An airtight seal should be formed when the lid is on, by applying a thin coat of stopcock grease on both the top edge of the desiccator tank and the underside of the lid. The desiccator should be opened only to place animals inside or remove them.
5. Once an animal has been induced, it should be removed immediately and maintained under anesthesia using a nose cone. Small jars, beakers, and plastic syringe covers can be filled with cotton or gauze pads, then saturated with the anesthetic agent for use as nose cones. The diameter of the container must be small enough to fit snugly around the animal's muzzle;

however, the cotton should not touch the animal's nose. The depth of anesthesia can be controlled by intermittently removing the nose cone.

6. Experimental procedures involving these animals should be performed in well-ventilated areas, preferably within a hood.
7. All waste materials and carcasses should be sealed in a double layer of plastic bags and stored in an explosion-safe refrigerator for disposal by incineration.
8. The desiccator should be cleaned after each use and stored with the lid on in a designated area. When MOF is used properly within a fume hood, exposures have been shown to be negligible.

Commercial anesthesia machines should be equipped with properly operating waste gas scavenging systems or the equipment should be operated within a chemical fume hood.

There are a variety of anesthetic agents effective in inducing anesthesia in laboratory animals; the most common other than ethyl ether are the halogenated agents (e.g., methoxyflurane, halothane, enflurane, isoflurane, and occasionally, chloroform). In choosing the appropriate anesthetic agent, certain safety aspects in addition to the physiological effects desired should be considered. The halogenated anesthetic agents are volatile but are not flammable and may pose a significant toxic hazard to laboratory personnel who might be inadvertently exposed to the material. Ether is less toxic than the halogenated agents but is highly flammable (flash point -49°F). In addition, routine use of ether poses a storage problem beyond the need for a flammable storage cabinet. Ethers may form highly explosive peroxides. Therefore, a controlled inventory system is suggested for preventing peroxidation of ethers in the laboratory (see Safetygram 122). Etherized animal carcasses also require precautions for storage and disposal; several incidents have been reported where the temporary storage of etherized animal carcasses in non-explosion safe refrigerators has resulted in explosions.

If you have any questions, please feel free to call EHS at x1451.

(Extracted, with modifications, from Lab Safety Views, July 1983.)