

SOP for working with Isoflurane

Students and employees who handle Isoflurane must be proficient in the material Safety Data Sheet (MSDS), this S.O.P and receive training on the hazards of Isoflurane concerning:

- ❖ Proper handling, use, storage and disposal of Isoflurane.
- ❖ The anesthesia procedures, including the use of the anesthetic machine, the waste anesthetic gas scavenging system.
- ❖ Proper use of chemical fume hoods or other applicable local exhaust ventilation.
- ❖ Spill clean-up and emergency response procedures.

Isoflurane

1-chloro-2,2,2-trifluoroethyl difluoromethyl ether, commonly known as Isoflurane, is a halogenated inhalation general anesthetic (usually used as an animal anesthetic) .

Isoflurane is a non-flammable, clear, colorless liquid with a mild ether-like odor. It is a very volatile liquid at ordinary temperature and pressure (evaporation rate increase with increasing temperature).

The National Institute for Occupational Safety and Health (NIOSH) has recommended that the average concentration of halogenated agents should not exceed 2ppm (15mg/m³) during any 1 hour period.

When a fire breaks out toxic substances/products may be released as a result of decomposition of isoflurane (e.g. carbon oxides, hydrogen chloride gas or hydrogen fluoride).

Exposure to Isoflurane:

Exposure to Isoflurane may occur during filling the anesthetic machine or from escape of waste anesthetic gases while administering the anesthetic.

Inhalation of isoflurane at a concentration of 0.5-3.0% can induce general anesthesia in 7 to 10 minutes, with analgesia, muscle relaxation, and loss of consciousness.

Isoflurane is mildly pungent and may cause coughing, laryngospasm and breath holding in an unconscious individual. pharyngeal and laryngeal reflexes may be obtunded.

Isoflurane is a severe respiratory depressant and may produce hypercapnia.

Blood pressure is depressed with an initial decrease in systemic vascular resistance, heart rate and cardiac output, arrhythmias can occur.

Renal blood flow, glomerular filtration and urine flow are decreased without residual renal depression or renal injury following isoflurane anesthesia.

Isoflurane does not appear to produce liver injury when given for prolonged periods.

Contact with Skin or Eyes, May cause irritation.

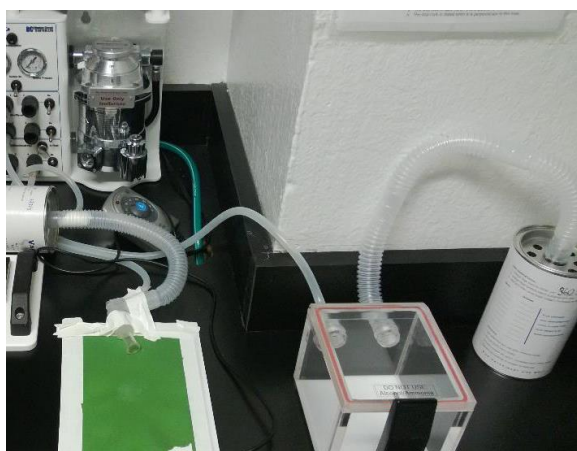
In case of acute exposure: Inhalation of higher (then 3%) concentrations may lead to death by medullary paralysis. Those recovering from exposure may exhibit shivering, nausea, vomiting, ileus, or excitation, and there may be a transient white blood count increase. A slight decrease in intellectual function may persist for 2-3 days, with small mood changes or symptoms possible for 6 days. Induction of general anesthesia may cause malignant hyperthermia from hyper metabolism of skeletal muscles in susceptible individuals.

In case of chronic exposure: hypotension, tachycardia, respiratory depression, and elevated blood glucose level.

****Halogenated anesthetics in general have been linked to reproductive problems in women and developmental defects in their offspring. ****

Exposure control

- ❖ Chemical resistant gloves, such as nitrile gloves, lab coats and eye protection such as chemical goggles or a face shield must be worn when handling stock bottles of isoflurane. When working with the isoflurane anesthesia for an animal protocol an N95/N99 respirator or respiratory half-mask / activated carbon, should be worn.
- ❖ Isoflurane must be stored in a cool well-ventilated location away from direct sunlight. A ventilated chemical storage cabinet is preferred. Laboratory door must be locked when authorized personnel are not present in the lab.
- ❖ Before each use, a visual check of hoses for cracks, obstructions or kinks should be performed. Leaks should be identified and corrected, before the system is used.
- ❖ Change plastic tubing at a minimum every 1-2 years.
- ❖ Isoflurane must be used with a waste anesthetic gas scavenging system.



Before using the vaporiser, weight the charcoal canister and record its weight, to determine if the canister needs to be replaced (follow the manufacturer instructions).

- ❖ Isoflurane stock bottle should be opened only in fume hood or under scavenging exhaust using PPE as described above.



e.g. Laminar Flow Hood (Negative Pressure hood) with activated carbon filtered exhaust chamber.

- ❖ To fill the vaporiser use a filler key; this is the only safe way to fill the vaporiser.



- ❖ Place the rodent in the chamber and ensure it is sealed.



Turn the oxygen on, set the flow meter to deliver 1L of oxygen per minute. Turn on the isoflurane Vaporizer to 5%(monitor the rodent at all times), once the rodent is recumbent, turn the vaporizer to **ZERO**.

Allow some pure oxygen to flow through to the chamber so that you **do not exposure yourself to isoflurane** when you open the chamber.

- ❖ Use snorkel Hood connected to building exhaust system, used for controlling and exhausting waste vapors during animal procedures.



Storage

Store Isoflurane bottles in a cool well-ventilated area as indicated in the MSDS.

Do not store large quantities of Isoflurane.

Ensure bottles are tightly closed and returned to storage location immediately after use.

Spill Clean-up procedure

Small spill (A few milliliters):

Isoflurane is a highly volatile liquid. Therefore, any attempt to clean or collect liquid of small spills may not be successful as the liquid may dissipate quickly.

- ❖ Evacuate personnel from immediate area. Allow spilled liquid to evaporate.
- ❖ Ensure adequate ventilation.
- ❖ Wear appropriate personal protective equipment (PPE) (including activated carbon respirator).
- ❖ Review cleaning/spill procedures found in MSDS.
- ❖ If any residual liquid is to be picked-up, use absorbent pads. Dispose of absorbent along with other chemical waste following the University chemical waste procedures.
- ❖ Clean spill area with soap and water.

Large Spills (1-2 stock bottles):

- ❖ Evacuate immediate area.
- ❖ **DO NOT attempt to clean up large spills of isoflurane:** immediately evacuate the spill area and close all doors.
- ❖ Alert all personnel in the immediate area to evacuate.
- ❖ Call the University security -5555 or the safety Unit -7555.
- ❖ Secure entry points with banner tape or other means to prevent entry into area.
- ❖ Wait outside the laboratory for emergency responders.
- ❖ Wait for instructions from Environmental Health & Safety before re-entering the laboratory.

Emergency Procedures

a) Skin Contact

1. Immediately rinse the affected area thoroughly with large amounts of water 15 minutes.
2. Remove all contaminated clothing while continuing to flush with water.
3. Call Security at ext. **5555** and ask for medical assistance.

b) Eye Contact

1. Immediately flush the eyes with plenty of water for at least 15 minutes.
2. Call Security at ext. **5555** for emergency medical assistance.

c) Inhalation

1. Immediately move to fresh air.
2. Call Security at ext. **5555** and ask for medical assistance.

d) Ingestion

1. Call Security at ext. **5555** and ask for medical assistance.
2. Never induce vomiting unless directed to do so by medical personnel.

All Isoflurane incidents and exposures must be reported to your Supervisor and to Environmental Health & Safety (EHS). An Incident Report must be filled for any incident involving Isoflurane spill or exposure.

Decontamination procedures:

Before removal of PPE, workplace should be wiped clean with mild soap and water or Virusolve. Wash hands thoroughly after glove removal.

Waste disposal Procedures.

Any unused stock isoflurane which reaches the expiration date or waste stock/solution, will be labeled with the Chemical hazardous waste label, boxed, and disposed of through the chemical waste program.

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