



Policy on the Use and Control of the anesthetic agent Isoflurane

Background

Isoflurane is a halogenated (F, Cl) ether compound which is a colorless, non flammable and highly volatile (330 mmHg at 25C/70F) liquid.

Isoflurane (CAS # 26675-46-7) is also called forane and aerrane by certain suppliers.

Toxicity

Overexposure to Isoflurane can cause headaches, inattentiveness and irritation. The adverse behavioral effects occur at a lower concentration than any physiological damage to tissues or organs.

Permissible exposure concentrations

OSHA – no permissible exposure levels (PELs) established

The National Institute for Occupational Safety and Health recommends that exposure to halogenated anesthetic agents be limited to 2 ppm (1977) however isoflurane was developed later and was not included in this standard setting process so its applicability is questionable. In 2006 NIOSH requested public response to establishing an isoflurane recommended exposure limit REL.

The American Conference of Governmental Industrial Hygienists has set an 8 hr exposure concentration for enflurane at 75 ppm. Enflurane has the same chemical composition and the same molecular weight as isoflurane. Enflurane is slightly more toxic to the liver than isoflurane hence the TLV for enflurane is reasonable applicable to isoflurane.

The Dutch Occupational Standards Committee established a safe concentration of 20 ppm.

Conclusion: Based on best available information, Tufts EHS recommends a limit of 75 ppm time weighted average and ceiling value not to be exceeded at any time. We also recommend an action level of 20 ppm which means that actions must be taken to monitor and control exposures when 20 ppm twa is exceeded.

The 2 ppm limit is not based on current information and is not relevant.

Methods

Static induction or bell jar administration of Isoflurane

Pouring liquid isoflurane produces a high concentration cloud of vapor; hence this procedure should take place in a chemical fume hood or a ventilated biosafety cabinet. A local exhaust system must draw sufficient air to produce airflow of 100 ft per minute where the open liquid is poured to prevent vapors from escaping into the room.

Anesthetic vaporizers

Recommended Isoflurane flow rates for mice using an open system (non rebreathing) is 200 cc/min and rats 500 cc/min.

Check all tubing, joints and connections to head cones for damage and possible leaks. Use a chemical fume hood, ventilated biosafety cabinet or local exhaust system to control vapors emitted from open system.

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