Isocare 100% w/v Inhalation Vapour, Liquid

Introduction

Company name: Animalcare Limited
Address: **Common Road**
Dunnington
York YO19 5RU
Telephone: **01904 487687**
Fax: **01904 487611**
Email: **animalcare@animalcare.co.uk**

Presentation

Volatile liquid for the generation of gaseous anaesthetic for use in dogs, cats and horses.

100% isoflurane.

Uses

Isoflurane is a volatile inhalation anaesthetic for induction and maintenance of general anaesthesia in puppies and adult dogs, cats and kittens, and horses of all ages.

Dosage and administration

The delivered concentration of isoflurane must be regulated accurately. Vaporisers specially calibrated for the agent should be used.

Isoflurane may be vaporised from a flow-over vaporiser specifically calibrated for isoflurane. Vaporisers delivering a saturated vapour which is then diluted (flow-through vaporisers) may also be used. Levels of anaesthesia may be altered rapidly and easily. Isoflurane may be administered in oxygen or oxygen/nitrous oxide mixtures.

Instructions for use for the keyed bottle collar (for use with key-fill vaporiser)

- •To attach a keyed bottle adapter, remove the cap and the seal from the attachment bottle.
- •Check that the anaesthetic bottle neck is not chipped or damaged.
- •Note that the colour of the keyed bottle collar will match the colour of the adapter.
- •Match the keyed bottle adapter to the keyed bottle collar and screw together until tight.
- •Now connect the bottle to the vaporiser filler receptacle.

The potency of inhalation anaesthetics is expressed by their required Minimum Alveolar Concentration (MAC) which prevents gross purposeful movements in response to a pain stimulus in 50% of the animals. For adult dogs, this MAC for isoflurane is 1.28; for cats it is 1.63; and for horses it is 1.31.

Preanaesthetic management

Healthy dogs, cats and horses should not receive food 8 to 12 hours before anaesthesia. Water should be allowed by free choice. Animals should be examined clinically before anaesthesia. Other factors such as age, pre-existing disease, medication and surgical sites should also be considered before using isoflurane.

Premedication

Dogs and cats

Depending upon the patient status, a short-acting barbiturate or an anticholinergic, a tranquilliser or a muscle relaxant may be used to avert excitement during induction (see interactions).

Horses

Acepromazine or xylazine can be used as preanaesthetic agents, while in certain patients an anticholinergic may also be indicated.

Induction of anaesthesia

Dogs and cats

Following a barbiturate anaesthetic dose, mask induction using inspired concentrations of 2.0-2.5% isoflurane alone with oxygen is usually employed. Pure mask induction with isoflurane alone with oxygen may require concentrations of up to 5.0% in dogs or 4.0% in cats. These concentrations can be expected

to produce surgical anaesthesia within 5 to 10 minutes. Pharyngeal and laryngeal reflexes are rapidly diminished, as a result of which tracheal intubation is made easy. Intubation in cats should be performed quickly before anaesthesia lightens and the glottis closes.

Horses

Anaesthesia may be induced using intravenous administration of glyceryl guaiacolate followed by either a short acting barbiturate or ketamine hydrochloride. In unweaned foals, anaesthesia can be induced by face mask delivery of isoflurane at the maximum vaporiser concentration (5%) with an oxygen flow of 8 l/min.

Maintenance of anaesthesia

The concentration of isoflurane necessary to maintain anaesthesia is less than the required concentration for induction.

Dogs

Surgical anaesthesia may be maintained during surgery using a concentration of 1.5-1.8% isoflurane alone with oxygen.

Cats

Surgical anaesthesia may be maintained during surgery using a concentration of 1.5-3.0% isoflurane alone with oxygen.

Horses

After induction and intubation, isoflurane may be delivered in either 100% oxygen or oxygen/nitrous oxide mixture (1:1). At the start isoflurane concentrations in the inspired air should usually be set at the maximum level allowed by the vaporiser (4-5%). Oxygen flow rates of 13-22 ml/min/kg are used to fill the anaesthetic machine rapidly with isoflurane. The vaporiser setting should then, based on the horse's reactions, be gradually decreased to 3.5% and further down to reach the optimum concentration, to 2%, or between 1.5% and 2.5%.

Induction and maintenance of anaesthia

Species	MAC (%)	Induction (%)	Maintenance (%)
Cats	1.63	Up to 4.0	1.5-3.0
Dogs	1.28	Up to 5.0	1.5-1.8
Horses	1.31		1.5-2.5
Unweaned foals	1.31	3.0-5.0	1.5-2.5

Body temperature, blood pressure and respiration should be monitored during anaesthesia. These effects are dose dependent, and the anaesthetic flow should be adjusted to compensate for changes.

Recovery

Consideration should be given to the analgesic requirements of the patients *before* recovery from anaesthesia takes place.

When used in excitable horses, consideration should be given to the administration of a sedative to cover the period of recovery from isoflurane anaesthesia.

The concentration of isoflurane must be reduced to 0% at the end of surgery to allow prompt recovery. This recovery from isoflurane anaesthesia is typically uneventful. When the administration of isoflurane has been stopped, the air passages of the patient should be ventilated several times with 100% oxygen until complete awakening.

Due to the low solubility of isoflurane in blood, rapid changes in anaesthetic depth and a rapid recovery may be seen. Isoflurane administration should therefore not be discontinued until the completion of the surgical procedure and the preparations for recovery.

Contra-indications, warnings, etc

Contra-indications

Isoflurane should not be administered to animals with a known history of sensitivity to halogenated anaesthetics including symptoms of malignant hyperthermia.

Warnings

When using isoflurane to anaesthetise an animal with a head injury, consideration should be given as to whether artificial ventilation is appropriate to maintain normal CO_2 levels, so that cerebral blood flow does not increase.

As with all halogenated anaesthetics, repeat anaesthesia within a short period of time should be approached cautiously.

Use of greater than 1.3-1.6 MAC should be avoided in cats.

Isoflurane produces respiratory depression in horses. It is recommended that horses, anaesthetised for longer than 2 hours, should be mechanically ventilated to prevent atelectasis, hypoxaemia and respiratory alkalosis.

Respiratory failure occurs at concentrations exceeding 2 MAC. Respiratory complications, especially in cats are often linked to inadequate consideration of reducing the MAC of isoflurane required.

Interactions

Interactions with other drugs should always be kept in mind before any anaesthesia.

The simultaneous administration of isoflurane and the following products requires strict supervision of the patient's clinical and biological condition.

- *Muscle relaxing agents:* Intensification of the action of depolarising relaxants and, especially, nondepolarising relaxants such as atracurium, pancuronium or vecuronium. Thus it is recommended that ±1/3 to 1/2 of the usual dose of these substances is administered. The disappearance of the myoneural effect takes longer with isoflurane than with other conventional anaesthetics. Neostigmine reverses the effect of the nondepolarising muscle relaxants, but does not reverse the direct neuromuscular depression of isoflurane.
- The concurrent use of sedative or analgesic drugs may reduce the level of isoflurane required to induce and maintain anaesthesia. For example, opiates, alpha-2-agonists, phenothiazines and benzodiazepines have been reported to reduce the MAC values. Particular caution should be exercised if administering dissociative combinations to a dog or cat already anaesthetised with isoflurane. Respiratory complications are often linked to inadequate consideration of reducing the MAC of isoflurane.

Isoflurane has a weaker sensitising action on the myocardium, to the effects of circulating dysrhythmogenic catecholamines, than halothane.

Isoflurane has been reported to interact with dry carbon dioxide absorbents to form carbon monoxide. In order to minimise the risk of this in rebreathing circuits, and the possibility of elevated carboxyhaemoglobin levels, absorbents should not be allowed to dry out.

Side-effects

Hypotension, respiratory depression with hypercapnia and arrhythmias have been reported. These can often be controlled by decreasing the level of anaesthesia.

In sensitive dogs, isoflurane anaesthesia can induce a hypermetabolic state in the skeletal muscles, which leads to a high oxygen consumption and a clinical syndrome known as malignant hyperthermia.

Operator warning

Do not breathe the vapour. Users should consult their National Authority for advice on occupational exposure standards for Isoflurane.

Operating rooms and recovery areas should be provided with adequate ventilation or scavenging to prevent the accumulation of anaesthetic vapour. *Make sure that the ventilation system in the operating room assures a number of air changes that is at least equal to 12 times the percentage of isoflurane in the anaesthetics multiplied by the applied flow rate (in litres per minute) and divided by the volume of the operating room (in m***3).**

All scavenging/extraction systems must be adequately maintained.

Avoid using masking procedures for prolonged induction and maintenance of general anaesthesia. Use cuffed endotracheal intubation when possible for the administration of Isocare during maintenance of general anaesthesia.

Care should be taken when dispensing isoflurane, with any spillage removed immediately using an inert and absorbent material e.g. sawdust.

Pregnant and breast-feeding women should avoid exposure to the product and should avoid operating rooms and animal recovery areas. Wash any splashes from skin and eyes immediately and avoid contact with the mouth. **In the event of severe accidental exposure:**remove the operator from the source of the exposure and seek urgent medical assistance and show this label.

Halogenated anaesthetic agents may induce liver damage. In the case of isoflurane this is an idiosyncratic response very rarely seen after repeated exposure.

Advice to doctors: maintain a patent airway and give symptomatic and supportive treatment. Note that adrenaline and catecholamines may cause cardiac dysrhythmias.

For animal treatment only.

Overdose

Overdosage with isoflurane produces marked hypotension and respiratory depression. In the event of an overdosage, or an adverse effect, stop drug administration, establish a clear airway and initiate assisted or controlled ventilation with pure oxygen. Administration of fluids may be beneficial.

From an environmental point of view, it is considered good practice to use charcoal filters with scavenging equipment. Do not dispose container or unused product into the environment. Care should be taken when dispensing isoflurane into the vaporiser. Spillage should be contained or removed immediately, using sawdust, sand or other inert absorbent, to a well ventilated place.

Disposal

Dispose of any unused product and empty containers in accordance with guidance from your local waste regulation authority.

Pharmaceutical precautions

Isoflurane can be used in combination with the commonly used vector gases.

Handle and store the bottles so as to avoid breakage.

Isoflurane is non-flammable and non-explosive and it is non-reactive to metal used in anaesthetic equipment.

Keep out of reach of children.

Protect from direct sunlight. Store in tightly closed original container.

Isoflurane has been reported to interact with dry carbon dioxide absorbent to form carbon monoxide.

In order to minimise the risk of formation of carbon monoxide in rebreathing circuits and the possibility of elevated carboxyhaemoglobin levels, absorbents should not be allowed to dry out.

Legal category

POM-V

Packaging Quantities

Isoflurane is supplied in 250 ml amber coloured, airtight glass bottles.

Further information

Isoflurane is metabolised minimally in animals, mainly to inorganic fluoride, and almost all of the administered isoflurane is excreted unchanged by the lungs. Isoflurane produces general anaesthesia after inhalation and is a good muscle relaxant for surgical procedures. It has negligible analgesic properties and consideration should be given to the analgesic requirements of the patient before recovery from anaesthesia takes place.

In the dog and cat, isoflurane has been safely used for anaesthesia during Caesarean section. Reproduction studies have been performed in mice and rats and have provided no evidence of embryotoxicity, teratogenicity, or any other negative effect on reproduction performance attributable to isoflurane at clinically relevant conditions. However, full comprehensive data concerning the use of isoflurane in pregnant or lactating dogs, cats and horses have not been obtained.

Marketing Authorisation Holder (if different from distributor)

Baxter Healthcare Ltd, UK

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