



Waste gas scavenging in the work place: active vs. passive

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The problem

Isoflurane is a halogenated anesthetic agent commonly used in the lab environment for animal research. Inhalant anesthesia is quick, cost effective and can be maintained for long periods of time. However, until recently the scavenging of the waste gas has not been done very effectively. It is becoming a large issue as Environmental Health and Safety (EH&S) departments are taking notice of exposure levels to users. National Institute for Occupational Safety and Health (NIOSH) states that the recommended exposure limit (REL) should not exceed 2ppm over an 8-hour time weighted average for the technician¹. As we know, if the technician can smell Isoflurane, they are well exceeding those limits. Headaches, dizziness and nausea are all common symptoms of repeat exposure to Isoflurane, which can be avoided with new state of the art equipment.

Active vs. passive

In the past, the standard of collecting waste gases has been through passive methods, which include (depending on the flowrate of the delivery gas) pushing the waste gas into an activated charcoal canister or trying to create a seal around the subject's nose, which would prevent the waste gas from entering the workplace. The problem with this method is that the gases are very volatile and will follow the path of least resistance. Once the gases have entered the workplace air, they are very hard to capture because of their properties. Instead of depending on flowrates to push the gases to their waste gas collection filters, it is much more efficient to actively pull these gases to a device and then exhaust them either to a filter, or a non-recirculating fume hood. The issue with this is the risk of pulling too much of the gas and affecting the subject's depth of anesthesia, causing the subject to awaken. Therefore, the vacuum or pull needs to be attenuated and specific vacuum designed devices (nose cones, induction chambers, etc.) need to be utilized. These accessories, along with attenuating the vacuum, are the keys to making an active scavenge system work.

The solution

The Exposure Prevention System (EPS-3) designed by Somni Scientific is a self-contained three station flowmeter controlled active waste gas scavenging system that was designed to solve the above-mentioned problems (Figs. 1 and 2). The EPS-3 is powered by an internal linear vacuum pump that can pull 45 liters per minute. Three independent flow meters for attenuation of the vacuum allow for a combination of devices to be used simultaneously. Each



FIGURE 1 | SOMNI EPS-3 Exposure Prevention System



FIGURE 2 | SOMNI EPS-3 Exposure Prevention System Package

of the three scavenging ports include a stopcock to allow independent scavenging flow and can be turned off when not in use without the need to change the flowmeter setting. A rear discharge port pushes the collected waste gas into either a large charcoal filter (such as the SOMNI WAG Canister), or if the lab is equipped with a non-recirculating fume hood, this can also be utilized to dispose of the waste gases. An internal vacuum pump that generates so much negative flow allows the user to have the collection filter (or other source) up to 30 feet away from the EPS-3 unit itself. This allows for the user to place the EPS-3 in a convenient location and

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not take up vital surgery counterspace. Noise and vibration are minimal in the EPS-3 (~50 dB), however the user always has the option to place the EPS-3 on a shelf, below the work area, or in a fume hood with tubing routed to the surgery station. The EPS-3 is compact (12" x 8" x 7") and lightweight (14 lbs.), and is equipped with a safety auto-off timer switch that shuts the unit down after a selectable period of time. The SOMNI EPS-3 is also available as a non-pump version that can be used in conjunction with an in-house active vacuum system. The non-pump option is a perfect fit for facilities that have and can use their own in-house vacuum system, but need a way to attenuate it.

Somni Scientific has developed a selection of accessories that work in conjunction with an active vacuum system such as the EPS-3. Such accessories include nose cones that are magnetically positionable. These cones come in a variety of sizes, ranging from a single mouse or rat up to a ten-station version. Somni also offers multiple induction chambers that work with the EPS-3 and have been independently tested to meet NIOSH REL standards.

Company profile

SOMNI Scientific provides equipment and services to the animal welfare and research community with a focus on clinical accuracy, clinician/technician safety, economic performance and intuitive functionality.

SOMNI Scientific's roots are in both human and veterinary anesthesia. SOMNI personnel have been at the cutting edge of vaporizer and anesthesia system design for over 35 years. We have worked alongside the world's largest pharmaceutical companies and are involved in the advancement in animal research equipment. SOMNI Scientific's trained and knowledgeable staff bring unparalleled diversity and education throughout the veterinary and animal research field.

SOMNI Scientific Solution specialists have an expertise in maintenance and design of complete veterinary anesthesia systems. Anesthesia system service includes the inspection and preventative maintenance of your complete anesthesia system. This service is conveniently provided on-site at your facility. SOMNI has the capability to service and calibrate vaporizer types across the line. Our unique service exchange program allows for little to no operating room downtime, elimination of valuable anesthetic wastage, and maintenance of vaporizer compliance to ensure vaporizer clinical accuracy, patient safety and employee health and safety.

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1. OSHA Directorate of Technical Support and Emergency Management. Anesthetic gases: guidelines for workplace exposures. 1999. <https://www.osha.gov/dts/osta/anestheticgases/index.html#C2>

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