EDITORIAL

Anesthesia Machine with Oxygen Absorber Compatible for Xenon Anesthesia

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Xenon can be used as an anesthetic gas and has very good characteristics, but it is very expensive and its resources are hard to reach. Some investigators proposed the liquefaction and then the purification of the wasted gas from xenon anesthesia machine to reuse xenon in anesthesia machines. They proposed that exhaled breathing gas will be compressed by a pre-cleaning and introduced into a pressure vessel which is included in a cooling device. The pressure vessel is cooled so far that xenon liquefies. These devices have the disadvantage of a high costing apparatus for compressing the gas and the cooling of the whole container.[1]

The second kind requires the use of specific adsorbents to selectively adsorb some of the components of the anesthetic gas mixture. Zeolites (molecular sieves) are used for this purpose and for a wide range of catalytic applications. Zeolites are used in the filtration of air supplies for breathing apparatus, for example, those used by scuba divers and firefighters. In such applications, air is supplied by an air compressor and is passed through a cartridge filter which, depending on the application, is filled with molecular sieve and/or activated carbon, finally being used to charge breathing air tanks. Such filtration can remove particulates and compressor exhaust products from the breathing air supply. 4Å molecular sieves are widely used to dry laboratory solvents. The expiratory limb in xenon anesthesia machine mainly contains xenon, oxygen, and nitrogen. Zeolite 5A can selectively retain high quantities of xenon in a small volume at low pressures. Zeolite 5A adsorbs 5 times more xenon than nitrogen and 14 times more xenon than oxygen (at 1 atm).[2-4]

The main characteristic of the invention, we proposed, is reusing xenon from wasted gas from the expiration limb and purifying it from CO_2 and oxygen. First, the gas collected in the expiration limb must enter into a CO_2 absorber chamber filled with soda lime, and then, the gas enters to an oxygen absorber chamber. This part is the novelty of this invention for the anesthesia machines. This invention contains an oxygen absorber that consists of $[\{(bpbp)Co_2^{III}(O_2)\}_2(bdc)](PF_6)_4$ (bpbp$^-$ = 2,6-bis(N,N-bis(2-pyridylmethyl)aminomethyl)-4-tert-butylphenolato, bdc^{2-} = 1,4-benzenedicarboxylato)}. This material was presented by Sundberg, *et al*. in their article: "Oxygen chemisorption/desorption in a reversible single-crystal-to-single-crystal transformation."[5]

This material can be used for a source of O_2 supply. This invention provides a simple and economical process for separating a component of an anesthetic gas from the expiratory breathing gas of a patient's anesthesia and associated apparatus. Another objective of the invention is to provide an economical recycling process for oxygen gas, from ICU ventilators.

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