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2,2-BIS(TRIFLUOROMETHYL)-1,3-DIOXOLANE AS INHALATION ANESTHETIC

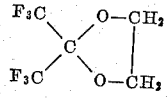
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1 Claim. (Cl. 167—52)

This invention relates to a process for using 2,2-bis(trifluoromethyl)-1,3-dioxolane as a general inhalation anesthetic.

In the field of general anesthesia, many of the commonly used and most effective anesthetics are unstable or inflammable or both. The discovery therefore of compounds which have anesthetic properties coupled with high stability and low inflammability is greatly to be desired.

I have now found that 2,2-bis(trifluoromethyl)-1,3-dioxolane of the formula



has high potency as a general inhalation anesthetic when administered to inhalation-anesthetic-susceptible organisms.

The compound 2,2-bis(trifluoromethyl)-1,3-dioxolane is a known compound which is readily prepared by reacting perfluoroacetone and ethylene chlorohydrin under basic conditions as described in U.S. Patent 2,925,424. The compound has a boiling point of about 99°–100° C. at atmospheric pressure, is high in stability and has such high resistance against thermal and oxidative degradation as to be noninflammable.

The physiological effects of 2,2-bis(trifluoromethyl)-1,3-dioxolane upon mice were demonstrated in the following manner, using a standard test for evaluation of inhalation anesthetics similar to that described by Robbins, J. Pharmacology and Experimental Therapeutics, 86, 197–204 (1946).

In the test as carried out, five mice were placed in each of a number of 6.3 liter animal jars wherein the mice were subjected to various dose levels of inhalation anesthetic vapor. Ten mice (five in each of two jars) were used for each dose level. A minimum of three graded doses, injected at 0.1 ml. per 10 seconds was used to establish that dose which caused 50% of the mice to lose the righting reflex in five minutes. The concentration of anesthetic vapor in the jar was calculated using the ideal gas law (see Carson et al., Anesthesiology, 23, 187 (1962)). The AD_{50} (volume percent of compound required to anesthetize 50% of the mice used), was determined by plotting the data on log-probit graph paper (see Miller et al., Proc. Soc. Exp. Biol. and Med., 57, 261 (1944)). Essentially the same experimental procedure was used to determine the LD_{50} (dosage required to kill 50% of the mice).

The AD_{50} obtained upon testing the 2,2-bis(trifluoromethyl)-1,3-dioxolane was 0.50, and the LD_{50} obtained was 2.38. The AI (anesthetic index=$LD_{50} \div AD_{50}$) was, therefore, 4.7. The AI is a measure of the margin of toxic safety of the compound; the higher the number, the less toxic the compound relative to the dosage needed to induce anesthesia. The three most highly developed commercial fluorinated anesthetics ("Fluomar" (trifluoroisopropyl vinyl ether); "Fluothane" (1,1,1-trifluoro-2-bromo-2-chloroethane); "Penthrane" (2,2-dichloro-1,1-difluoroethyl ether)) have AD_{50} values of 3.5, 0.78 and 0.51 respectively, and AI values in the range of 3.3 to 4.5. It is apparent, therefore, that the bis(trifluoromethyl)-1,3-dioxolane is a potent anesthetic and possesses very low toxicity.

While the above describes the preferred embodiments of my invention, it will be understood that departures can be made therefrom within the scope of the specification and claim.

I claim:

The process which comprises administering 2,2-bis(trifluoromethyl)-1,3-dioxolane as a general inhalation anesthetic to inhalation-anesthetic-susceptible organisms.

References Cited by the Examiner

Chemical Abstracts 54, 21101b–21103a (1960).

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