

Halothane, Isoflurane, Enflurane, Desflurane, and Sevoflurane: Atmospheric Chemistry and Environmental Impact of General Anesthetic Gases

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The atmospheric chemistry of halothane (CF_3CHClBr), isoflurane ($\text{CF}_3\text{CHClOCHF}_2$), enflurane ($\text{CHFClCF}_2\text{OCHF}_2$), desflurane ($\text{CF}_3\text{CHFOCHF}_2$) and sevoflurane ($((\text{CF}_3)_2\text{CHOCH}_2\text{F})$) has been investigated using laser photolysis/laser induced fluorescence and FTIR/smog chamber techniques. The kinetics of reactions with OH radicals and Cl atoms have been measured and the products resulting from the OH radicals and chlorine atom initiated oxidation have been identified. For the first time, measured absorption cross sections of the anesthetics were weighted by an instantaneous cloudy-sky radiative forcing calculated for a model atmosphere, allowing for a more accurate evaluation of the global warming potentials for this selection of important medical compounds. The results will be discussed with respect to the impact of inhaled anesthetics on the radiative forcing of climate change.