INFRARED ABSORPTION CROSS-SECTIONS AND BAND STRENGTHS OF HFC-32 VAPOUR (DIFLUOROMETHANE)

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Recent legislation controlling the use of Chlorofluorocarbons (CFCs) has led to the introduction of replacement compounds, hydrochlorofluorocarbons (HCFCs), in a wide range of domestic and industrial applications. However, from 2030 the usage of HCFCs will also be controlled and the more environmentally acceptable Hydrofluorocarbons (HFCs) will probably replace them.

The C-H bonds present in HCFCs and HFCs allows destruction in the atmosphere by reaction with OH radicals, significantly reducing the lifetime of these compounds compared with CFCs. However, many HCFC and HFC compounds absorb strongly in the mid-infrared, particularly in the 8-12 μm "atmospheric transmission window" region. It is therefore important to include data on these absorptions in the radiative transfer calculations used to model warming of the Earth's atmosphere.

Medium resolution (0.03 cm^{-1}) Fourier Transform Infrared Spectroscopy was used to determine absorbance cross-sections and integrated band strengths of the ro-vibrational absorption bands of HFC-32 lying in the region 600 to 1900 cm^{-1}. Measurements were performed at eight temperatures (203, 212, 222, 243, 253, 264, 287 and 297 K) for pure vapour samples, and at three temperatures (203, 253 and 297 K) for mixtures containing 5, 20 and 100 kPa of dry air.

The derived absorbance cross-sections have been submitted for inclusion in the AFGL HITRAN database, and are available via the anonymous FTP site at The University of Strathclyde (kashmir.phys.strath.ac.uk).

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