HIGH RESOLUTION INFRARED SPECTROSCOPY OF THE FLUOROMETHYL RADICAL

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The CH_2F radical is an intermediate in the decomposition of various atmospheric species and is also important in free radical addition reactions. Previous work on the CH_2F radical has utilized microwave spectroscopy to determine rotational transitions within the ground vibrational state (the symmetric C-H stretch) [a]. Infrared spectroscopic methods have also been used to probe the v3 band (C-F stretch) origin and rotational constants [b].

We have used high resolution (0.0005 cm^{-1}) infrared spectroscopy to investigate rovibrational transitions and assign band origins for both the symmetric and asymmetric stretch regions of the CH_2F radical. Measurements were taken using direct absorption (sensitivity = 1 x 10^{-7} per root Hz) under slit-jet cooled conditions (20 K). Assignment of the spectrum (up to J=7) has yielded refined lower and upper state rotational and centrifugal distortion constants for this near-prolate top. The ratio of absorption intensities for the symmetric and asymmetric bands provides an interesting comparison to that of the CH_2Cl radical, where no asymmetric band was detected. Interpretation of hyperfine structure will also be discussed.

[a] Y. Endo, C. Yamada, S. Saito, and E. Hirota, J. Chem. Phys. 79(4), 1983.

[b] C. Yamada and E. Hirota, J. Molec. Spec. 116, 1986.