ROTATIONAL SPECTROSCOPY OF NEWLY DETECTED ATMOSPHERIC OZONE DEPLETERS: CF_3CH_2Cl, CF_3CCl_3, AND CF_2ClCCl_3

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In a recent study of unpolluted air samples from Tasmania and of deep firn snow in Greenland four previously overlooked ozone-depleting substances have been identified.[a] These compounds started to emerge in the atmosphere in the 1960s, and two: CF_3CCl_3 (CFC-113a) and CF_3CH_2Cl (HCHF-133a) continue to accumulate in the atmosphere.

Three of the four compounds have non-zero dipole moments and are amenable to study by rotational spectroscopy, establishing the basis for analytic applications. Relatively limited studies have been reported for CF_3CH_2Cl[b] and CF_3CCl_3,[c,d] while CF_2ClCCl_3 has not yet been studied by this technique. We presently report extensive results obtained for all three compounds, resulting from concerted application of supersonic expansion FTMW spectroscopy in chirped pulse and cavity modes, and room-temperature MMW spectroscopy. Among the plentiful results, we have been able to resolve and fit the complex nuclear quadrupole hyperfine splitting.

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[c] R.Holm, et al., *Z. Naturforsch.* **23a**, 1040 (1968).
[d] J.H.Carpenter et al., *J. Mol. Spectrosc.* **154**, 207 (1992); P.J.Seo et al., *J. Mol. Spectrosc.* **169**, 58 (1995).