THE MICROWAVE SPECTRUM AND MOLECULAR STRUCTURE OF TRIFLUOROETHYLENE-ACETYLENE

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The rotational spectra of six isotopomers of the 1,1,2–trifluoroethylene-acetylene complex have been collected in the 6–21 GHz region. In addition to the most abundant isotopomer, spectra are obtained for four isotopomers containing substitution in the HCCH subunit (HCCD, $H^{13}C^{13}CH$, and $H^{13}CCH$, which forms two different isotopomers for the complex) and for one isotopomer containing a substitution in the $CHFCF_2$ subunit ($CHF^{13}CF_2$). The spectra of the three isotopomers with a single substitution of ^{13}C are observed in natural abundance upon pulsed jet expansion of a mixture of HCCH, $CHFCF_2$, and Ar. Both a- and b-type transitions are seen, and the deuterium nuclear quadrupole hyperfine structure in HCCD-$CHFCF_2$ is resolved and analyzed. Both the Kraitchman substitution coordinates and the spectroscopic constants are consistent with a planar structure in which a hydrogen bond is formed between H in HCCH and the F on C-2 in $CHFCF_2$ with a secondary interaction between the H (geminal to the F involved in the hydrogen bond) in $CHFCF_2$ and the acetylenic bond.