ROTATIONAL SPECTRA OF ADDUCTS OF FORMALDEHYDE WITH FREONS

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The rotational spectra of three 1:1 complexes of formaldehyde (H_2CO) with freons, i.e. difluoromethane (CH_2F_2), fluorochloromethane (CH_2FCl) and trifluorochloromethane (CF_3Cl), have been observed and assigned using pulsed jet Fourier transform microwave technique. Several isotopologues (including some ^{13}C species) have been measured in natural abundance. The tunnelling splittings have been measured in the first two adducts with relative intensity 1:3, due to the internal rotation of the formaldehyde moity along its symmetry axis. The barriers to this motion have been estimated by using a flexible model. For the latter two complexes, each of transition displays the hyperfine structures due to the quadrupolar effects of ^{35}Cl (^{37}Cl) nucleus. The dissociation energy has been estimated within the pseudo-diatomic approximation for all three complexes.