

# **The rotationally resolved infrared spectrum of fluorobenzene ( $C_6H_5F$ ) between 600 and 1200 $cm^{-1}$ : FTIR spectroscopy with synchrotron radiation**

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The spectroscopy of aromatic compounds and in particular benzene and its substituted derivatives has fascinated people for more than 70 years. Substitution in  $C_6H_6$  can lead to a change from the  $D_{6h}$  symmetry. The simplest substitution besides deuterium or  $^{13}C$  [1] is with fluorine which yields fluorobenzene ( $C_6H_5F$ ) with  $C_{2v}$  symmetry. The lowering of the symmetry generates fundamental questions: Does the molecule really have  $C_{2v}$  symmetry? Also, can we understand the intramolecular dynamics and the energy flow in a molecule like fluorobenzene ( $C_6H_5F$ ) which has thirty normal modes? How does the change from  $D_{6h}$  to  $C_{2v}$  symmetry influence IVR [2]? A preliminary analysis of the  $\nu_{10b}$  band of  $C_6H_5F$  has already been presented in 2007 [3]. In the meantime we have extended our measurements using the FTIR setup at the Swiss Light Source (SLS) including synchrotron radiation [4-6] up to 2000  $cm^{-1}$ . We were able to extend our rovibrational analysis up to 1200  $cm^{-1}$ . We shall present a rovibrational analysis of the  $b_1$  fundamental bands  $\nu_4 = 685.206399\text{ cm}^{-1}$ ,  $\nu_{10b} = 754.903641\text{ cm}^{-1}$ ,  $\nu_{17b} = 894.970254\text{ cm}^{-1}$ , the  $b_2$  fundamental band  $\nu_{15} = 1066.300580\text{ cm}^{-1}$  including a resonance state and the  $a_1$  fundamental bands  $\nu_{12} = 807.548659\text{ cm}^{-1}$ ,  $2\nu_{18b} = 810.331870\text{ cm}^{-1}$  and  $2\nu_{16a} = 825.869699\text{ cm}^{-1}$  including a resonance state. The similarities of the FTIR spectra between fluorobenzene ( $C_6H_5F$ ) and phenol [7] shall be also discussed.

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