DO INTEGRATED INFRARED BAND STRENGTHS CHANGE WITH TEMPERATURE IN THE GAS- PHASE?

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There have been several recent reports of gas-phase molecules having integrated infrared band strengths that show temperature dependence. At PNNL we have measured a large number (over 400) of gas-phase molecules for an infrared database. Most of the spectra were taken at 3 different temperatures (278, 298, and 323 K). During the data reduction, the integrated band strength was determined at each temperature, with no obvious differences detected. As an example, we present the band strengths of a number of chlorofluorocarbons (CFCs) at the three temperatures. Of particular interest were molecules such as acetone with low frequency torsional levels, which might be expected to exhibit temperature dependence. The integrated band strengths of acetone were measured from 323 to 233 K and show no temperature dependence within our measurement uncertainty of +/- 2 percent.