DIAGNOSTIC TESTS OF A COLLISIONAL COOLING CELL USED IN AN FTIR SPECTROMETER

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A new, liquid helium cooled collisional cooling cell has been constructed for use in spectral simplification experiments. The cell was cooled in a Janis vaporization cryostat and spectra were measured using a Bruker high resolution Fourier transform infrared spectrometer. Diagnostic tests of this cell using C_2H_2, N_2O, and $CClF_3$ injected into a helium buffer gas show that the cell can be a useful tool for future simplification experiments. The initial failures and later successes of these tests revealed important information on the required operational parameters. Near-infrared measurements of C_2H_2 seemed to show only moderate cooling of the gas. However, in the overtone region, the S/N ratio was not adequate for useful diagnostics, and the spectrum was only observed for excessive injector flow rates. In the mid-infrared region, measurements of N_2O yielded very acceptable rotational temperatures (T_{rot}=76 K for T_{cell}=50 K). Measurements of $CClF_3$ lines were taken to demonstrate the capabilities of collisional cooling with this system for spectral simplification.