LABORATORY STUDY OF THE ROTATIONAL SPECTRUM OF 2-BUTANONE

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Our recent observations of the Orion-KL region in the λ = 1.3 mm window reveal that $\sim$55% of the observed transitions cannot be assigned to previously identified molecules. In addition, the strongest unidentified transitions have peak intensities on the order of 7 K. This provides strong evidence that new molecules of astrochemical interest need to be studied in the laboratory in order to compare to interstellar spectra. A starting point for this work is to target complex organic molecules that are structurally-similar to molecules that have already been detected in interstellar environments. We have therefore collected the microwave, millimeter, and submillimeter spectra of 2-butanone [also known as methyl ethyl ketone (MEK), $CH_3COCH_2CH_3$]. MEK is a likely candidate for detection in the ISM because it contains similar functional groups to known and highly abundant interstellar molecules such as ethanol, acetaldehyde, and acetone. The microwave spectrum of MEK was acquired with the chirped-pulse waveguide Fourier Transform Microwave (CP-FTMW) spectrometer at New College of Florida; and the millimeter and submillimeter spectrum was acquired with the direct absorption flow cell spectrometer at Emory University. We have collected the spectrum of MEK from 8 GHz to 1 THz and assigned the ground vibrational state spectrum of MEK from 8 GHz to 500 GHz using the ERHAM program. We will report here on the laboratory characterization and assignment of the MEK spectrum. We will also report on the analysis of observational lines surveys in the context of the identification of new, complex organic molecules such as MEK.