SPECTRAL LINE SURVEYS OF YOUNG STELLAR OBJECTS USING THE CALTECH SUBMILLIMETER OBSERVATORY

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Advancements in radioastronomical instrumentation have allowed for the identification of approximately 170 interstellar molecules, many of which are complex organic molecules (COMs). Many of the detected COMs, including species such as glycolaldehyde and formamide, are thought to be prebiotic precursors in the chemistry of these star-forming regions. Complex organic chemistry is especially rich in hot cores/corinos, where thermal evaporation during the warm-up phase of star-formation releases molecules from icy grain mantles into the gas phase. Grain surface and gas phase astrochemical models provide predicted abundances of COMs, and these predictions can be tested through observations of a variety of sources. We have used the Caltech Submillimeter Observatory (CSO) to conduct deep λ=1.3mm unbiased line surveys of 8 sources including hot cores, hot corinos, dense molecular clouds, and shocked regions. These line surveys cover frequencies in the range of 215 - 270 GHz with an RMS noise level of $\sim$30 mK, which is sufficiently deep to probe many of the largest COMs that have been identified to date. We have performed detailed spectral analyses for these line surveys targeting a range of COMs that test the chemical mechanisms included in astrochemical models. Here we present the spectra and results of a quantitative analysis of these sources, and discuss the implications of these results for astrochemical models.