CSO BROADBAND MOLECULAR LINE SURVEYS I: BENCHMARKING GOBASIC ANALYSIS SOFTWARE

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Broadband molecular line surveys of hot cores can reveal important information about the chemistry of these interstellar regions. Observations of a large number of sources allow trends to be determined, enabling comparison with chemical models of star-forming regions. To this end, 25 broadband line surveys in the λ =1.3 mm band have been performed using the Caltech Submillimeter Observatory. Each of these surveys is $\sim$ 60 GHz in bandwidth, has a noise level $\leq$30 mK, and contains thousands of spectral features. The challenge now becomes how to mine these surveys for useful physical and chemical information in a reasonable timeline. The challenge is not only the vast amount of data, but also the spectral complexity and high sensitivity, both of which lead to significant line blending. Simultaneous multi-molecule, multi-component fitting programs with iterative analysis schemes are necessary to fully model the observed spectra of these complex chemical sources. A new program, GOBASIC, has been written in the MATLAB numerical computing environment for this purpose. This program has been benchmarked against a similar analysis program, MAGIX, using the preliminary results from these line surveys. Significant improvements in the quality of the spectral fitting and the time involved in analysis have been demonstrated using GOBASIC. The observations, analysis program design, and results of benchmarking tests will be presented here. Details of the results from the line survey analyses will be presented in the next talk.