CHEMICAL EVOLUTION OF ASTROPHYSICAL ICES

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ABSTRACT

Understanding the formation of interstellar dust grains and their ice mantles is crucial to developing our knowledge of Solar System origins, and the origin of life. Infrared observations presented here sample the primitive material that exists in dense dust clouds before stars form, or in the very early stages of star formation. This dissertation focuses on studies of the 15 μm CO_2 feature and the 5-8 μm bands present in observations of dense clouds. The 15 μm feature not only allows us to measure the abundance of CO_2 in a given region, but also provides some indication of temperature in the region observed, due to special characteristics of the profile when the ice is warmed. The 5-8 μm region contains unidentified absorption that, up until now, was thought to arise from energetic processing of ices. Our *Spitzer* and *IRTF* observations have allowed us to correlate various ice abundances with chemical processes occurring on dust grains and in gas phase reactions in clouds. The results (summarized in Chapter 6) provide new understanding of (1) the clouds studied, (2) the 15 μm feature toward YSOs and field stars, and (3) the possible carriers of the 5-8 μm bands.