CONTROL ID: 2257335

TITLE: A Complex Organic Slushy Bathing Low-Mass Protostars

ABSTRACT BODY:

Abstract Body: Complex organic molecules are ubiquitous companions of young forming stars. They were first observed in hot cores surrounding high-mass protostars [e.g., 1], but have since also been detected in the environs of several low-mass counterparts [e.g., 2]. Recent studies have shown that colder envelopes and positions with impinging outflows may also glow with emission from complex organic species [e.g., 3, 4]. For this meeting, I would like to present physicochemical modeling results on the synthesis of complex organics in an envelope-cavity system that is subject to non-thermal processing. This includes wavelength-dependent radiative transfer calculations with RADMC [5] and a comprehensive gas-grain chemical network [6]. The results show that the morphology of such a system delineates three distinct regions: the cavity wall layer with time-dependent and species-variant enhancements; a torus rich in complex organic ices, but not reflected in gas-phase abundances; and the remaining outer envelope abundant in simpler solid and gaseous molecules. Within the adopted paradigm, complex organic molecules are demonstrated to have unique lifetimes and be grouped into early and late species [7]. Key chemical processes for forming and destroying complex organic molecules will be discussed. In addition, the results of adding newly experimentally verified routes [8] into the existing chemical networks will be shown.

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