LARGE INTERSTELLAR MOLECULES: ARE THEY FORMED BY GAS PHASE CHEMISTRY, GRAIN SURFACE CHEMISTRY, OR BOTH?

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Large interstellar molecules with a low degree of saturation can be formed by gas-phase chemistry[a]. However, large molecules with a high degree of saturation cannot be formed easily by gas-phase reactions; consequently, solid state chemical reactions on icy grain surfaces followed by sublimation and enriched gas-phase reactions are often invoked to form large molecules[bcd]. A growing body of astronomical data supports the concept of grain chemistry, but quantitative evidence depends on matching abundance predictions from indirect laboratory analogue models with high spatial resolution astronomical data. High resolution molecular line maps made with the Berkeley-Illinois-Maryland Association (BIMA) Array can be used to compare the column densities and relative abundances of formic acid (HCOOH), acetic acid (CH_3COOH), methyl formate ($HCOOCH_3$), acetone ($(CH_3)_2CO$), vinyl cyanide (CH_2CHCN), ethyl cyanide (CH_3CH_2CN), and possibly glycine (NH_2CH_2COOH) in the hot molecular core Sgr B2 (LMH). Those large interstellar molecules associated with grain surface chemistry are a window to presolar nebular chemistry, and can give insight about the potential of the associated accretion chemistry for seeding newly formed planets.

This work was partially funded by NSF AST96-13999 and the University of Illinois.

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