THE CHEMISTRY AND IMPORTANCE OF INTERSTELLAR METHANOL

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Methanol has been detected in a variety of environments in interstellar clouds. In cold sources, methanol is produced in the gas via a sequence of ion-molecule reactions and is produced on the surfaces of interstellar dust grains by hydrogenation of condensed phase carbon monoxide. The gas-phase methanol has been detected unambiguously via its rotational-torsional transitions while the surface methanol has probably been detected via its broad vibrational transitions. In regions of high mass star formation, known as "Hot Cores," temperatures rise sufficiently to allow the methanol synthesized on grain surfaces to evaporate into the gas. The resulting large concentration of gaseous methanol acts as an excellent indicator of the physical conditions. In addition, methanol acts as a precursor for the gas-phase syntheses of a variety of more complex molecules found in Hot Cores such as dimethyl ether.