AOGS 2005

Sugars, Alcohols, and Solar System Ices

REGGIE L. HUDSON[1] and MARLA H. MOORE[2]
[1]*Eckerd College*
[2]*NASA Goddard Space Flight Center*

Radio and IR observations have revealed a rich organic chemistry in comets and in a variety of interstellar regions. Among the organic molecules observed are acids, alcohols, aldehydes, ketones, and nitriles. The simplest sugar, glycolaldehyde, has been reported (Hollis et al., *ApJ*, 2000, 540, L107), as has an amino acid, glycine (Kuan et al., *ApJ*, 2003, 593, 848; but see Hollis et al., *ApJ*, 2003, 588, 353). Gas-phase reactions to produce many of these molecules are not well understood, and solid-phase chemistry is thought to make an important contribution. To better understand organic chemistry in cold cosmic environments, we have performed photo- and radiation chemical experiments on icy materials at 10 - 100 K. Gas-phase molecules are frozen in a vacuum chamber, and then exposed to either MeV protons or vacuum-UV photons to mimic cosmic-ray bombardment or cosmic-UV exposure, respectively. Changes in ice composition are followed in situ with IR spectroscopy. In this AOGS presentation we will recent results for glycolaldehyde and some prebiological organics. Solid-state IR spectra and reaction pathways will be presented, and predictions will be made for the chemical composition of selected Solar System objects. This research is funded through NASA's Planetary Atmospheres and SARA programs, and through the NASA Astrobiology Program under RTOP 344-53-51-01 to M. J. Mumma (NASA GSFC).