Latest News

April 27, 2009
Volume 87, Number 17
p. 6

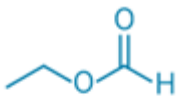
Astronomy

New Molecules In Space

Discovery of two complex compounds hints at more chemical diversity lurking in space

Steve Ritter

AN INTERNATIONAL research team has peered into a gaseous cloud at the heart of the Milky Way galaxy and detected ethyl formate and *n*-propyl cyanide, two of the most complex organic molecules ever observed outside our solar system. On the basis of spectroscopic evidence and computer models of how the molecules were formed, the scientists believe that molecules with even greater chemical complexity are waiting to be discovered in space.



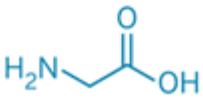
Ethyl formate

One of those molecules is glycine, the simplest amino acid, which has eluded detection thus far. Glycine is similar in size and complexity to the two new compounds, and its presence would help confirm suspicions that prebiotic chemistry exists beyond our solar system.

n-Propyl cyanide

Team member Robin T. Garrod, an astrochemist at Cornell University, announced the discovery on behalf of the team on April 21 during the European Week of Astronomy & Space Science at the University of Hertfordshire, in England. The study is also being reported in the journal *Astronomy & Astrophysics* (DOI: 10.1051/0004-6361/200811550).

Commenting on the discovery, astrochemist Steven B. Charnley of NASA's Goddard Space Flight Center, in Greenbelt, Md., tells C&EN that detecting these compounds should help shed new light on how complex molecules are formed in space and "gives impetus to future searches for higher amino acids, as well as for nucleobases and their heterocyclic precursors."



Glycine

The researchers used millimeter-wavelength spectroscopy to study a dense cloud of gas and icy dust particles in the star-forming region Sagittarius B2. This particular spot in the universe has been a treasure trove of many different types of small organic molecules (C&EN, June 16, 2008, page 58). Even so, detecting ethyl formate and *n*-propyl cyanide was difficult for the scientists because the 36 spectral lines they assigned to the two compounds were hidden in a forest of 3,700 overlapping spectral lines from the many molecules detected.

The study supports the idea that larger and more complex molecules like ethyl formate and *n*-propyl cyanide form stepwise on the surface of dust grains by tacking a functional group onto a building block formed from an existing molecule, rather than by adding atoms sequentially, Garrod says. This process appears to be limitless, "so there's good reason to expect even more complex organic molecules to be out there, if we can detect them," he adds.

Chemical & Engineering News
ISSN 0009-2347