

Interstellar Chemistry Gets More Complex With New Charged-Molecule Discovery (Forwarded)

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Astronomers using data from the National Science Foundation's Robert C. Byrd Green Bank Telescope (GBT) have found the largest negatively-charged molecule yet seen in space. The discovery of the third negatively-charged molecule, called an anion, in less than a year and the size of the latest anion will force a drastic revision of theoretical models of interstellar chemistry, the astronomers say.

"This discovery continues to add to the diversity and complexity that is already seen in the chemistry of interstellar space," said Anthony J. Remijan of the National Radio Astronomy Observatory (NRAO). "It also adds to the number of paths available for making the complex organic molecules and other large molecular species that may be precursors to life in the giant clouds from which stars and planets are formed," he added.

Two teams of scientists found negatively-charged octatetraynyl, a chain of eight carbon atoms and one hydrogen atom, in the envelope of gas around an old, evolved star and in a cold, dark cloud of molecular gas. In both cases, the molecule had an extra electron, giving it a negative charge. About 130 neutral and about a dozen positively-charged molecules have been discovered in space, but the first negatively-charged molecule was not discovered until late last year. The largest previously-discovered

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negative ion found in space has six carbon atoms and one hydrogen atom.

"Until recently, many theoretical models of how chemical reactions evolve in interstellar space have largely neglected the presence of anions. This can no longer be the case, and this means that there are many more ways to build large organic molecules in cosmic environments than have been explored," said Jan M. Hollis of NASA's Goddard Space Flight Center (GSFC).

Ultraviolet light from stars can knock an electron off a molecule, creating a positively-charged ion. Astronomers had thought that molecules would not be able to retain an extra electron, and thus a negative charge, in interstellar space for a significant time. "That obviously is not the case,"