Formaldehyde: Poison could have set the stage for the origins of life

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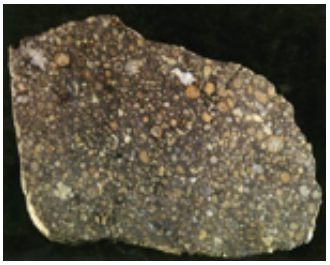

This is a cross-section of a chondritic meteorite.

(PhysOrg.com) -- Formaldehyde, a poison and a common molecule throughout the universe, is likely the source of the solar system's organic carbon solids—abundant in both comets and asteroids. Scientists have long speculated about the how organic, or carbon-containing, material became a part of the solar system's fabric. New research from Carnegie's George Cody, along with Conel Alexander and Larry Nittler, shows that these complex organic solids were likely made from formaldehyde in the primitive solar system. Their work is published online April 4 by the *Proceedings of the National Academy of Sciences*.

"We may owe our existence on this planet to interstellar formaldehyde," Cody said. "And what's ironic about it is that formaldehyde is poisonous to life on Earth."

During the early period of the inner solar system's formation, much of

the organic carbon that wasn't trapped in primitive bodies was lost to space, along with much of the water. Prior to this study numerous competing ideas emerged to explain the existence of primitive organic solids. Cody, of the Geophysical Laboratory, along with Alexander and Nittler, of the Department of Terrestrial Magnetism, and the team decided to study primitive solar system objects using advanced methods. What they discovered clearly pointed to a polymer formed from formaldehyde.

They tested their conclusion with experiments to reproduce the type of organic matter found in carbonaceous chondrites, a type of organic-rich meteorite, starting with formaldehyde. They found that their formaldehyde-synthesized organic material was not only similar to that found in carbonaceous chondrites, but also similar to organic material found in a comet named 81P/Wild 2, pieces of which were collected in space by NASA's Stardust mission, as well as in interplanetary dust particles, or particles from space that likely originated from comets and asteroids.

Their results make sense, because formaldehyde is relatively abundant throughout the galaxy and the polymerization process would have been possible under conditions of the primitive solar system.

"Establishing the likely origin of the principal source of organic carbon in primitive solar system bodies is extremely satisfying," Cody said.

Provided by Carnegie Institution