

## Ingredients of life could form over Saturn moon: study

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Courtesy of the University of Arizona  
and World Science staff

**The types of molecules necessary to build living things may have formed in the hazy atmosphere of Titan, Saturn's largest moon, scientists say.**

The conclusions come after a study simulating chemical processes in Titan's atmosphere, and checking for the formation of molecules similar to those that compose life forms on Earth.

The researchers said they found that molecules known as nucleotide bases and amino acids can arise. These are components, respectively, of two key building blocks of life, DNA and protein molecules. DNA provides the genetic code, while proteins make up much of the actual structure of organisms and carry out day-to-day chemical functions.

The study shows that the complex molecules composing these larger structures can arise entirely "in the outer parts of an atmosphere," said University of Arizona graduate student Sarah Horst, a member of the research team. "We don't need liquid water, we don't need a surface."

The simulations led to the formation all of the five nucleotide bases used by life on Earth and the two smallest amino acids, glycine and alanine, said the researchers, from the University of Arizona and other institutions.

Intense radiation hits the top of Titan's thick atmosphere and can break apart normally stable molecules, members of the research group explained. They studied what happens after these molecules fall apart. The researchers beamed radiation into a chamber containing chemicals believed to replicate those in Titan's atmosphere, nitrogen, methane and carbon monoxide. Formation of the life-building molecules, called complex organic compounds, followed.

The results not only suggest that Titan's atmosphere could contain molecules that might serve as the springboard to life, but may offer a new perspective on the emergence of life on Earth, Horst and colleagues said. For one thing, they noted, instead of the first ingredients of life forming in a "primordial soup" in the oceans, as often assumed, they could have formed in a "primordial haze" high in Earth's atmosphere.

The scientists are to present the findings Oct. 7 at a meeting of the American Astronomical Society's Division for Planetary Sciences in Pasadena, Calif.