ORIGIN OF ELEMENTS AND CHEMISTRY IN SPACE

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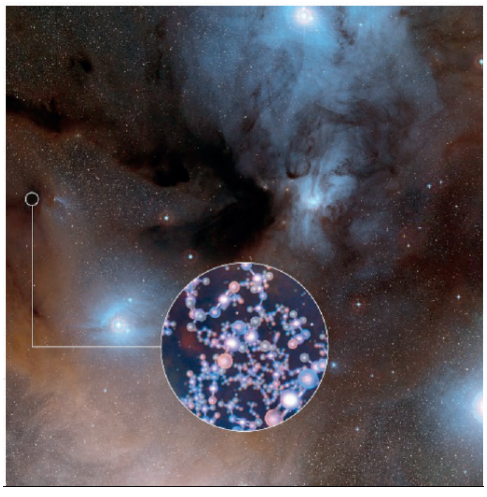
'We are all stardust'. Most of the elements in the periodic table were formed in space. The simplest species - H, D, He, and Li - were made shortly after the Big Bang in the early Universe, whereas the rest of the elements that make 'us' were produced by nuclear fusion in the interior of stars, gradually enriching the Universe with heavier elements. A brief overview of the production of the main elements that are important for interstellar chemistry will be given.[1]

Chemistry starts in the cold and tenuous clouds between the stars. In spite of extremely low temperatures and densities, these clouds contain a surprisingly rich and interesting chemistry, as evidenced by the detection of more than 200 different molecules, from simple to complex[1]. Chemistry takes place both in the gas and on the surfaces of interstellar dust grains.[1,2] New facilities such as ALMA allow us to zoom in on the formation sites of new stars and planets with unprecedented sharpness and sensitivity. Spectral scans of young protoplanetary disks contain tens of thousands of rotational lines[3], revealing water and a surprisingly rich variety of organic materials, including simple sugars[3], molecules with peptide bonds[4] and high abundances of deuterated species[3]. What are the dominant chemical processes at work? How common are they? What material is available to build new exo-cometary and planetary systems?



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