

Chemistry in protoplanetary disks

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Protoplanetary disks around young stars are the birthplaces of planetary systems. They share many of the properties of the "solar nebula" from which the Sun and our planetary system formed, but show a large diversity in mass, size, and physical structure. Both the physical and chemical state of protoplanetary disks provide the initial conditions for planetary system architectures and planet composition.

Protoplanetary disks are characterized by a wide range of temperatures, densities, and radiation environments leading to regions of different chemistry and atomic and molecular content. In addition, the disks contain small dust particles - the seed particles for planetesimal formation - which provide surfaces for chemical reactions and freeze-out in the cold disk midplane regions. They also shield the inner parts of disks from ionizing cosmic rays and UV photons. The review talk will summarize the physical and chemical structure of these disks and will place the solar nebula in the wider context of disks around young stars.

Infrared and (sub)millimeter observations are providing a first inventory of the molecular and dust content of disks. I will summarize the main observational findings and will especially discuss the origin of water on Earth and other exoplanets.

[1] Henning, Th., Semenov, D.: Chemistry in Protoplanetary Disks. *Chemical Reviews*. **113**, 9016-9042. 2013.