



The Department of Chemistry Presents:

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"Exploring Chemistry During Star and Planet Formation"

Astrophysical observations reveal a rich inventory of organic molecules in star-forming regions of the interstellar medium (ISM), highlighting the importance of chemistry in cold interstellar ices. Solid, icy, and gaseous material in the ISM is eventually incorporated into protoplanetary disks and, ultimately, into planets and planetesimals such as comets.

What reactions can occur at the low temperatures (10–50 K) characteristic of the ISM, and what is the fate of molecules throughout star and disk formation and evolution?

We address these questions using laboratory experiments, with a particular focus on ice-phase chemistry driven by electronically excited oxygen atoms and their role in the functionalization of hydrocarbons and small aldehydes. We also consider the fate of complex organic molecules during the transition from the ISM into protoplanetary disks and throughout disk evolution, where enhanced radiation fields can trigger molecular dissociation while simultaneously driving further chemical processing and molecular complexity.

These works contribute to our understanding of molecular formation and survival starting from the cold ISM and throughout the protoplanetary disk stage, helping to trace the chemical thread that shapes the molecular inventory available to forming planets such as Earth.

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1260 Chemistry Building