Chemical evolution of a protoplanetary disk

Dmitry A. Semenov (1) ((1) Max Planck Institute for Astronomy, Heidelberg, Germany)

(Submitted on 22 Jul 2011)

In this paper we review recent progress in our understanding of the chemical evolution of protoplanetary disks. Current observational constraints and theoretical modeling on the chemical composition of gas and dust in these systems are presented. Strong variations of temperature, density, high-energy radiation intensities in these disks, both radially and vertically, result in a peculiar disk chemical structure, where a variety of processes are active. In hot, dilute and heavily irradiated atmosphere only the most photostable simple radicals and atoms and atomic ions exist, formed by gas-phase processes. Beneath the atmosphere a partly UV-shielded, warm molecular layer is located, where high-energy radiation drives rich ion-molecule and radical-radical chemistry, both in the gas phase and on dust surfaces. In a cold, dense, dark disk midplane many molecules are frozen out, forming thick icy mantles where surface chemistry is active and where complex polyatomic (organic) species are synthesized. Dynamical processes affect disk chemical composition by enriching it in abundances of complex species produced via slow surface processes, which will become detectable with ALMA.

Comments:	13 pages, 1 figure, 3 tables, IAU 280 "Molecular Universe" invited paper
Subjects:	**Galaxy Astrophysics (astro-ph.GA)**; High Energy Astrophysical Phenomena (astro-ph.HE)
Cite as:	**arXiv:1107.4513 [astro-ph.GA]**
	(or **arXiv:1107.4513v1 [astro-ph.GA]** for this version)

Submission history

From: Dmitry Semenov Dr. [view email]
[v1] Fri, 22 Jul 2011 13:13:44 GMT (1348kb)

Which authors of this paper are endorsers?