EPSC Abstracts,
Vol. 2, EPSC2007-A-00193, 2007
European Planetary Science Congress 2007

Ion irradiation of icy mixtures: synthesis of molecules relevant to astrochemistry and astrobiology

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In the last years many experimental results have been obtained by our as well as other groups on the chemical and physical changes induced by ion irradiation and UV photolysis of frozen mixtures of simple molecules with a view to their astrophysical relevance.

The presence in space of complex organic molecules of astrochemical and even astrobiological relevance is revealed by mm and sub-mm observations. Many of those molecules are however thought to be formed by energetic processing of icy mantles on interstellar grains that occasionally (e.g. in the circumstellar region of a new-born star) warm-up and release molecules in the gas phase.

Here we present some recent results concerning:

- The formation of formamide, a molecule particularly relevant to astrobiology, produced by ion irradiation of frozen mixtures containing water, methane and nitrogen.
- The formation of sub-oxides after irradiation of CO-rich icy mixtures.