Comparison of Nitrogen Incorporation in Tholins Produced by FUV Irradiation and Spark Discharge

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The discovery of very heavy ions (Coates *et al.,* 2007) in Titan's thermosphere has dramatically altered our understanding of the processes involved in the formation of the complex organic aerosols that comprise Titan's characteristic haze. Before Cassini's arrival, it was believed that aerosol production began in the stratosphere where the chemical processes were predominantly initiated by FUV radiation. This understanding guided the design of Titan atmosphere simulation experiments. However, the energy environment of the thermosphere is significantly different than the stratosphere; in particular there is a greater flux of EUV photons and energetic particles available to initiate chemical reactions, including the destruction of N_2, in the upper atmosphere. Using a High-Resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF-AMS), we have obtained *in situ* composition measurements of aerosol particles (so-called "tholins") produced in CH_4/N_2 gas mixtures subjected to either FUV radiation (deuterium lamp, 115-400 nm) (Trainer *et al.*, 2012) or a spark discharge. A comparison of the composition of tholins produced using the two different energy sources will be presented, in particular with regard to the variation in nitrogen content of the two types of tholin. Titan's aerosols are known to contain significant amounts of nitrogen (Israël *et al.,* 2005) and therefore understanding the role of nitrogen in the aerosol chemistry is important to further our knowledge of the formation and evolution of aerosols in Titan's atmosphere.

References:

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