

Physical Chemistry Seminar

Tuesday,
November 2, 2010

11:00 a.m.

Room 1315
Chemistry Building

The Origin and Chemical Evolution of Titan's Aerosol Layers



Professor Ralf I. Kaiser

*Department of Chemistry
University of Hawaii at Manoa*

Astrochemistry or Astrochemical Dynamics presents a newly emerging, interdisciplinary and innovative field comprising scientists in chemistry, physics, biology, astronomy, and planetary chemistry. The prime directive of Astrochemical Dynamics is to understand the origin and chemical evolution of the interstellar medium and of our Solar System. Here, the arrival of the Cassini-Huygens probe at Saturn's moon Titan - the only Solar System body besides Earth and Venus with a solid surface and thick atmosphere - in 2004 opened up a new chapter in the history of Solar System exploration. Titan's most prominent optically visible features are the aerosol-based haze layers, which give Titan its orange-brownish color. However, the underlying chemical processes, which initiate the haze formation, have been the least understood to date. This talk reviews recent laboratory studies on the role of polyacetylenes (polyynes) and (hetero)aromatic molecules like the phenyl radical, benzene, and pyridine in the formation of Titan's organic haze layers utilizing crossed molecular beam experiments. Those investigations provide key concepts on the formation mechanisms of unsaturated hydrocarbon molecules - in particular polyynes and aromatic compounds - together with their hydrogen deficient precursors from the 'bottom up' in the atmosphere of Saturn's moon Titan. A brief outline to future research directions tackling also the heterogeneous chemistry on Titan will also be presented.

Refreshments will be available prior to the seminar at 10:45 a.m. outside room 1315

Graduate Students and Post Docs may meet with the speaker at 1:00 p.m. in Room 8335