have been determined mass spectrometrically (141-293 keV, 20-80 Torr N₂) in N₂-OD₄ mixtures. It was found that $\Delta H_\text{f}^{\circ} = 4.9$ kcal/mole and $\Delta H_\text{f}^{\circ} = 2.2$ kcal/mole. Three-body ion-molecule association reactions are probably involved in the synthesis of organic compounds in Titan's atmosphere. (Supported by CNPq and CAPES, Brazil; $\&$ associated with the CNRS).

2.12  Photochemical and Thermal Modeling of the Upper Atmosphere of Titan. Y. L. Yung, M. Allen and J.A. Freyberg - Caltech Institute of Technology. The photochemistry of simple molecules containing carbon, hydrogen, nitrogen and oxygen atoms in the atmosphere of Titan has been investigated using updated chemical schemes and our own estimates of a number of key rate coefficients. Proper thermal structure, exospheric boundary conditions, vertical transport and condensation processes at the tropopause have been incorporated into the model. It is argued that the composition, climateology and evolution of Titan's atmosphere are controlled by five major processes: a) escape of hydrogen, b) secondary photolysis of CH₄, c) synthesis of higher hydrocarbons, d) coupling between nitrogen and hydrocarbons and e) coupling between oxygen and hydrocarbons. Starting with CH₄, N₂ and CO, and invoking interactions with ultraviolet sunlight, energetic electrons and cosmic rays, the model satisfactorily accounts for the concentrations of minor species observed by the Voyager IRI and UVS instruments. Photochemistry is responsible for converting the simpler atmospheric species into more complex organic compounds, which are subsequently condensed at the tropopause and deposited on the surface. Titan might have lost the equivalent of 10, 1 and 0.1 present atmospheres of CH₄, N₂, and CO respectively over geologic time. The exosphere of Titan may be as warm as 400 K at the subsolar point due to heating by energetic electrons.

2.13  Theoretical Intensities of Optically Thick N₂ Emissions in Titan's Dayglow. W. E. Conway, Naval Research Lab., Washington, D.C. 20375. In a recent analysis of the EUV dayglow spectrum of Titan, Strobel and Shemansky (1982 J. Geophys. Res. 87, 1361) identified several N₂ bands including members of the Birge-Hopfield (8R) and Lyman-Birge-Hopfield (18I) systems. The altitude of the observed peak in the bright limb intensity indicates that these emissions are optically thick due to self-absorption or pure absorption by methane. A multiple fluid scattering model has been used to study entrainment of the optically thick bands. A line-by-line calculation shows that the LH bands are an effective probe of the emission layer because they coincide with the absorption threshold of methane around 1400 Å. Comparison of the BH/LH intensity ratio for a bright limb and full disk spectrum constrains the depth of the emission layer, despite the unknown energy distribution of exciting particles. The brightnesses of both systems are sensitive to the vibrational temperature of the ambient N₂ since a particular ($v', v$) band can be optically thick even though only a few percent of the N₂ population is in the $v'$ level.