CHEMISTRY AND EVOLUTION OF TITAN'S ATMOSPHERE

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A review will be given of the scientific findings from the Voyager Flyby of Titan with emphasis on chemistry and implications on evolution. Magnetospheric electrons interact with Titan's exosphere to produce a power dissipation rate of $\sim 2 \times 10^9$ W with UV optical signatures from the $N_2\ c_4'\ ^1\Sigma_u^+$ 0–0 and 0–1 bands at 958 and 981 Å, respectively, the NI multiplet at 1134 Å, and the NII multiplet at 1085 Å. As a result of this magnetospheric interaction nonthermal N and H atom escape rates of $\sim 3 \times 10^{26}$ s^{-1} are generated from Titan's exosphere to the magnetosphere. The latter populate the hydrogen torus between 8 and 25 R_s and within $\pm$ 8 R_s of the equatorial plane. If the N atom escape rate were maintained over the age of the solar system approximately 0.2 of Titan's present atmosphere would be lost.

Dissociation and dissociation ionization of N_2 by magnetospheric electrons, solar radiation, and cosmic rays, and subsequent reactions with hydrocarbons yield an HCN production of $\sim 10^9$ $cm^{-2}\ s^{-1}$. CH_4 photolysis is the principal source of C_2H_2, whereas C_2H_6 is formed from C_2H_2 photolysis by catalytic dissociation of CH_4.

Additional References

Planet. Space Sci. 30, August 1982, pp. 839–48.
Strobel and Shemansky, *J. Geophys. Res.* 87 (A–3), March 1, 1982, pp. 1361–69.

THE SATELLITES OF JUPITER AND SATURN: SURFACE CONDITIONS AND PROPERTIES

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A majority of the satellites of Jupiter and Saturn have surfaces composed of ice and rocky material. Two exceptions exist. The surface of Io is continually renewed by volcanic processes in which sulfur compounds play a dominant role. The surface of Titan is renewed by precipitation of particulate and liquid hydrocarbons. Current knowledge of these and other satellite surfaces is summarized, with emphasis on new results from the Voyager mission.