Measurements from the Cassini Plasma Spectrometer (CAPS) have revealed the presence of very heavy ions (up to 10,000 amu/q) in the ionosphere of Titan, the largest moon of Saturn. CAPS has also observed O+ flowing into Titan's atmosphere, which is deposited in the same region where the heavy ions are observed. This leads to the exciting possibility that oxygen can be incorporated into these ions resulting in the formation of molecules of biological interest. In this talk, I will discuss the fate of O+ in Titan's atmosphere and a series of laboratory atmosphere simulation experiments aimed at understanding the effect of oxygen bearing molecules on the formation and composition of hazes in planetary atmospheres.