



Analogues of Titan's aerosols produced with a radio-frequency plasma experiment: physical and chemical properties determined from various complementary diagnostics

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The Titan's atmosphere contains large amounts of aerosols produced by an organic chemistry generated from the two major atmospheric components, i.e. N₂ and CH₄. These aerosols are of primary importance because they play a major role in the atmospheric and surface properties of Titan, and also because they could be somewhat representative of organic species which could have been produced on the primitive Earth, and involved for pre-biotic chemistry. The data describing the Titan's aerosols are still limited today, in spite of the great progress made by the instruments of the Cassini orbiter and the Huygens probe. The laboratory experiments devoted to the production and the study of Titan's aerosols analogues (named tholins) remain a good mean to learn more about the aerosols characteristics and their production mechanism(s). To this end, the PAMPRE experiment is used for a few years to produce tholins with a radio frequency plasma discharge in N₂ containing a few percents of CH₄ (from 0 to 10%). Tholins hence produced were characterized with various and numerous chemical and physical diagnostics, mainly relying on spectrometric measurements. The aim of this paper is to discuss the current knowledge of the chemical and physical properties of the tholins that we produced, and the influence of the parameters controlling their production in the plasma (e.g. relative abundance of CH₄, pressure etc.) on these

properties. We also propose possible connections, from the chemical composition of the plasma discharge gas phase, between the gaseous chemistry and solid phase.