

## Titan's chemical complexity

We review here our current knowledge of Titan's gas phase chemistry. We base our discussion on photochemical models as well as on laboratory experiments. We identify the lower mass positive [1,2] and negative [3] ions detected in the upper atmosphere and we show that their formation is a direct consequence of the presence of heavy neutrals. We demonstrate that the observed densities of CO, CO<sub>2</sub> and H<sub>2</sub>O can be explained by a combination of exogenous O, and OH/H<sub>2</sub>O input [4]. We argue that benzene [5] and ammonia [6] are created in the upper atmosphere through complex chemical processes involving both neutral and ion chemistry. These species diffuse downward where they are at the origin of heavier aromatics and amines, respectively. Finally, we discuss the impact on hydrocarbon densities of recent theoretical calculations of the rate constants of association reactions [7].

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