New pathways to interstellar complex organic molecules: carbon chemisorption and chemistry on CO ices.

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Interstellar complex organic molecules (COMs) are molecules with six or more atoms, of which one of them is carbon. The elucidation of synthetic pathways for these molecules in extremely cold interstellar environments is one of the most active fields of research in astrochemistry. Although COMs can reportedly be formed in the gas-phase, they are mostly thought to form on the surface of interstellar dust grains covered with ice. Traditionally, the latter route considered two temperature regimes for the formation of COMs. The first one occurs at T <20 K and is dominated by reactions with hydrogen, starting from CO molecules.[1,2] The second one occurs at T>20 K and starts to be relevant when heavier species, and mostly "heavy" radicals like CH_3, HCO, or NH_2 start to diffuse on water ice.[3]

In this talk, I will present our recent efforts to advance our knowledge on the synthesis of COMs in the regime below 20 K. Our investigation in the last years have focused on alternative routes to the traditional ones for such synthesis. In particular, during this talk I will focus on chemistry triggered by the chemisorption of carbon (^{3}C) atoms on different ice substrates and diffusive chemistry[4,5,6,7,8] on apolar CO ices.[9] Both alternative routes are key in the increase of the abundance of COMs in interstellar environments, challenging our current view of organic, and thus prebiotic chemistry.

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