ASTROCHEMICAL MODELING OF THE PROPARGYL RADICAL IN COLD MOLECULAR CLOUDS

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Recent detections of aromatic species in dark molecular clouds suggest formation pathways may be efficient at very low temperatures and pressures, yet current astrochemical models are unable to account for their derived abundances, which can often deviate from model predictions by several orders of magnitude. The propargyl radical, a highly abundant species in the dark molecular cloud TMC-1, is an important aromatic precursor in combustion flames and possibly interstellar environments. In this talk, we present the results of astrochemical modeling of TMC-1 using the NAUTILUS code and an updated chemical network, with a focus on the propargyl radical and chemically related species. Predicted abundances for the connected C_4H_3N isomers within an order of magnitude of observed values corroborate the high efficiency of CN addition to closed-shell hydrocarbons under dark molecular cloud conditions. In addition to other resonance-stabilized radicals, the propargyl radical remains an important potential precursor to aromatic formation.