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Study of the dissociative recombination of $HCNH^+$ and its isomers NICOLAS DOUGUET, University of California Davis, VIATCHESLAV KOKOOULINE, University of Central Florida, ANN OREL, University of California Davis — The hydrogen isocyanide HNC is less stable than the hydrogen cyanide HCN so that there should be no abundance of HNC compared with HCN in a thermochemically equilibrated system at temperature around 100K. Surprisingly, astrophysical observations of the interstellar medium have reported rather different results for the ratio [HNC]/[HCN]. Therefore, much interest has been recently directed towards the main mechanism of production of these neutral elements, namely the reaction of dissociative recombination (DR) e^-+$HCNH^+ \rightarrow$ HNC/HCN+H. There exist controversies in the literature on whether the DR reaction proceeds via a direct or an indirect mechanism. Our previous results indicate that the direct DR cross section is small. Therefore, we investigate the indirect mechanism for $HCNH^+$ by electron capture in excited Rydberg states. First, we use a simplified model considering the electronic capture via Renner-Teller non-adiabatic couplings as the decisive step of the DR reaction. This procedure, which already provided good results for other polyatomic ions as H_3^+, HCO^+ or H_3O^+, allows an estimation of the absolute cross section. Other possible DR reactions yielding HNC or HCN involve the metastable isomers H_2CN^+ and H_2NC^+. We also performed scattering calculations on these systems to estimate the direct DR cross sections.

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