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TITLE: Cyanopolyynes in Cep E: analysing their synthesis through their isotopic fingerprints

ABSTRACT BODY:

Abstract Body: Cyanopolyynes are species commonly encountered both in galactic as extragalactic environments. To analyse their abundances and isotopic fractionation offers us relevant clues about polymerization processes in space. We present results on the systematic search of HC_3N and HC_5N towards the intermediate-mass protostar Cep E. The spectral line identification was performed through an unbiased molecular survey, covering a broadband between 80 and 350 GHz, acquired with the IRAM 30 m telescope.

We have identified several unblended lines of HC_3N and HC_5N , including their ^{13}C and D isotopologues. The bulk of the molecular emissions arises from the cold part of the protostellar envelope, as indicated by a simple rotational diagram analysis. Large deuterium fractionation is measured: $[\text{HC}_3\text{N}]:[\text{DC}_3\text{N}] \approx 9:1$ and $[\text{HC}_5\text{N}]:[\text{DC}_5\text{N}] \approx 4:1$. We find an anomalous isotopic ratio between the ^{13}C isotopologues of cyanoacetylene: $[\text{H}^{13}\text{CCCN}]:[\text{HC}^{13}\text{CCN}]:[\text{HCC}^{13}\text{CN}] \approx 1:3:1$. We discuss possible mechanism responsible for such a ratio. We propose that it is actually related to the formation pathway of HC_3N via $\text{C}_2\text{H}_2 + \text{CN} \rightarrow \text{HC}_3\text{N} + \text{H}$.

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