

Chemical evolution and spectroscopy of some complex molecules which could be treated as the precursor of some bio-molecules in the interstellar medium

Liton Majumdar¹, Ankan Das¹, Sandip K. Chakrabarti^{1,2}, and Sonali Chakrabarti^{1,3}

¹Indian Centre For Space Physics
43 Chalantika, Garia Station Road, Kolkata 700084, India
email: liton.icsp@gmail.com, ankan.das@gmail.com

²S.N. Bose National Center for Basic Sciences,
JD-Block, Salt Lake, Kolkata, 700098, India
email: chakraba@bose.res.in

³Maharaja Manindra Chandra College,
20 Ramakanto Bose Street, Kolkata, 700003, India
email: sonali@csp.res.in

Abstract. This work reports the chemical evolution of adenine, alanine & glycine along with their precursor molecules during the collapsing phase of protostars. Since the abundances of these three molecules are not in the detectable range, we are proposing to observe some of its pre-cursor molecules to predict the abundances of these bio-molecules. We perform a higher order quantum chemical simulation to provide detailed spectroscopic knowledge of the precursor of these bio-molecules in the infrared and electronic range. These pre-biotic molecules could be produced in the gas phase as well as in the ice phase. Spectral properties significantly vary depending upon the environment around these molecules. To approximate recent observational/experimental features, we conduct our simulation for various astrophysical conditions. We found that our results are in line with the some recent experiments and observations.

Keywords. ISM: molecules — astrochemistry — stars: formation

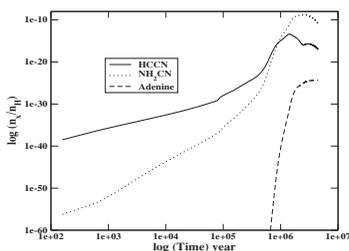


Figure 1. Chemical evolution of adenine with its two precursor molecules.

Reference

Majumdar, L., Das, A., Chakrabarti, S. K., & Chakrabarti, S. 2013, *New Astron.*, 20, 15,
<http://www.sciencedirect.com/science/article/pii/S1384107612000838?v=s5>