

Time dependent chemistry in Planck clouds?

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Abstract. We present a set of time dependent chemical evolution models (based on the UMIST† astrochemistry 2012 code, McElroy *et al.* (2013) for a range of initial physical cloud parameters: $10\text{ K} < T < 20\text{ K}$; $10^3\text{ cm}^{-3} < n(\text{H}_2) < 5 \cdot 10^4\text{ cm}^{-3}$; $1 < AV < 10$ and with estimated values of scaled interstellar ultraviolet radiation field. We compare our chemical model results with the relative abundances of: CO, CH, OH, HCO^+ , HCN, HNC, NH_3 , N_2H^+ and H_2CO molecules. We find significant time dependent variations of the chemical ratios of: $X(\text{NH}_3/\text{H}_2)$; $X(\text{HCO}^+/\text{H}_2)$ and $X(\text{HCO}^+/\text{NH}_3)$. The input physical conditions were taken from Fehér O. *et al.* (2015) at 16 positions along the TMC-1 dark cloud. The NH_3 and HCO^+ relative densities based on the observations of Fehér O. *et al.* (2015) help to find the “chemical age” of the given position in the evolution curves.

Keywords. Keyword1, keyword2, keyword3, etc.

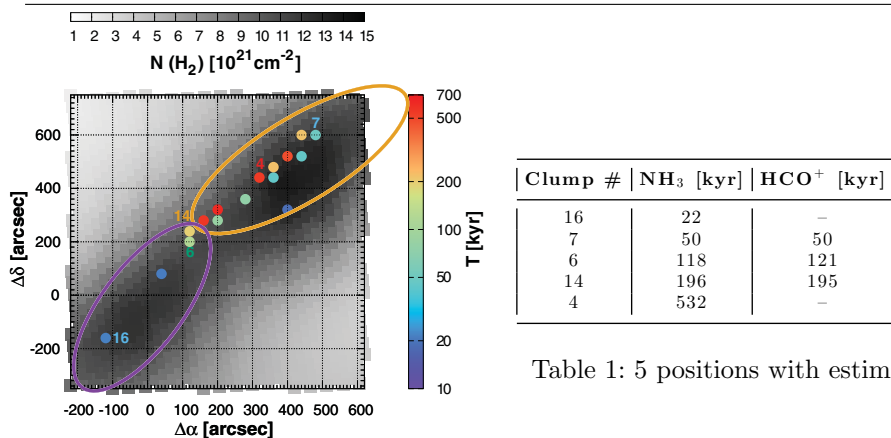


Table 1: 5 positions with estimated ages.

Figure 1: Observed $N(\text{H}_2)$ column density with positions where “ages” was estimated.

References

- Fehér O., Ward-Thompson, D., Tóth L. V., Kirk, J., Pelkonen, V. M., Zahorecz, S. & Pintér S. 2015, *A&A*, submitted
- McElroy, D., Walsh, C., Markwick, A. J., Cordiner, M. A., Smith, K., & Millar, T. J. 2013, *A&A*, 550, A36

† UMIST Database for Astrochemistry can be downloaded from the following link:
<http://www.udfa.net>