

IS GLYOXAL A POTENTIAL PRECURSOR OF GLYCOLALDEHYDE AND ETHYLENE GLYCOL THROUGH SUCCESSIVE H-ADDITION REACTIONS IN THE INTERSTELLAR MEDIUM?

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Glycolaldehyde (CHOCH_2OH) and ethylene glycol ($\text{HOCH}_2\text{CH}_2\text{OH}$) are among many complex organic molecules (COM) detected in the interstellar medium (ISM). Astrophysical models proposed very often that the formation of these compounds would be directly linked to the hydrogenation of glyoxal (CHOCHO), a potential precursor which is not yet detected in the ISM. We have performed, in the present work, surface and bulk hydrogenations of solid CHOCHO under ISM conditions in order to confirm or invalidate the astrophysical modeling of glyoxal transformation. Our results show that the hydrogenation of glyoxal does not lead to the formation of detectable amounts of heavier organic molecules such as glycolaldehyde and ethylene glycol but rather to lighter CO-bearing species such as CO, H_2CO and $\text{CO} - \text{H}_2\text{CO}$, a reaction intermediate resulting from an H-addition-elimination process on CHOCHO and where CO is linked to H_2CO . The solid phase formation of such a reaction intermediate has been confirmed through the neon matrix isolation of $\text{CO} - \text{H}_2\text{CO}$ species.