The elimination of volatile organic compounds (VOCs) from the atmosphere is initiated by reactions with OH, NO$_3$ and O$_3$. For oxygenated VOCs, such as alcohols, ketones, ethers, etc., reactions occur nearly exclusively with the hydroxyl radical. Furthermore, the potential energy surfaces associated with reactions between OH and oxygenated VOCs generally feature a pre-reactive complex, stabilized by hydrogen bonding, which results in rate constants that exhibit large negative temperature dependencies. This was explicitly demonstrated recently for the OH + methanol (MeOH) reaction, where the rate constant increased by nearly two orders of magnitude when the temperature decreased from 200 K to below 70 K, highlighting the potential impact of this reaction in the interstellar medium (ISM). In this study, we trap this postulated pre-reactive complex formed between OH and MeOH using He nanodroplet isolation (HENDI) techniques, and probe this species using a combination of mass spectrometry and infrared laser Stark spectroscopy.

---