

CONTROL ID: 2255656

TITLE: Formation of water on warm dust grains

ABSTRACT BODY:

Abstract Body: The early stage of water formation on dust grains in the ISM depends on sticking and retention of atoms and molecules on surfaces of grains. We investigated the interaction of oxygen with amorphous silicates. We find that atomic oxygen is retained on an amorphous silicate surface with a much higher binding energy ($1850\text{K} \pm 90\text{K}$) than previously estimated (800K). We then used such value in the simulation of the chemical evolution of an interstellar environment – a molecular cloud edge in star-forming regions in Orion exposed to FUV illumination, and found that OH and H_2O formation on grains is considerably enhanced while O_2 formation is suppressed because of the higher O binding energy. These effects are especially important in dense gas exposed to high FUV fields because of the wider temperature range in which oxygen can reside. Because of the higher binding energy, photodesorption controls the gas phase chemistry. Consequences of this discovery for observations will be discussed.

This work is supported by the NSF Astronomy and Astrophysics Division (Grant No.1311958 to GV) and by NASA support for US research with the Herschel Space Observatory (RSA No. 1427170 to MJK).

CONTACT (NAME ONLY): Gianfranco Vidali

CONTACT (E-MAIL ONLY): gvidali@syr.edu

AUTHORS/INSTITUTIONS: G. Vidali, J. He, J. Shi, T. Hopkins, Physics, Syracuse University, Syracuse, New York, UNITED STATES|M. Kaufman, Physics, San Jose' State University, San Jose', California, UNITED STATES|J. He, Chemistry, University of Hawai'i, Manoa, Hawaii, UNITED STATES|

PRESENTATION TYPE: Oral