SF-P055

UV induced protonation of ammonia

Eui-seong Moon, Du Hyeong Lee, Heon Kang

Department of Chemistry, Seoul National University, Gwanak-gu, Seoul 151-747, Republic of Korea

Ammonium ion (NH_4^+) was suggested as the origin of interstellar 6.85 μm band. Early study, in which organic molecule and water ice film mixtures were photolyzed so that organic acids could be produced, explained the generation of NH_4^+ from the reaction of photogenerated organic acid and ammonia (NH_3). However, the observed abundance of organic acids or their counter-anions are not so high in interstellar ice and not enough to protonate NH_3 into NH_4^+ in the observed level. Because of the shortage in photogenerated organic acids, the candidate of acid which protonates NH_3 should be modified.

Here, we prepare NH_3/H_2O binary mixtures and photolyze them with vacuum ultraviolet (VUV, peak at 10.6 and 10.0 eV). We find the ammonium ion (NH_4^+) from photolyzed mixture by using low energy sputtering (LES) and reflection absorption IR spectroscopy (RAIRS). As a hydronium (H_3O^+) can be produced by UV irradiation and protonate bases, NH_4^+ may be formed from the reaction of photogenerated H_3O^+ and NH_3. We show the generation of NH_4^+ without any kind of organic molecules or acids, and it may explain the relatively high abundance of NH_4^+ compared to the counter-anions or organic acids in interstellar ice.