A Complete Quantification of Photon-induced Desorption Processes: Morphology effect on CO_2 ice

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According to literature[1], different deposition temperatures of CO_2 ice lead to distinct structures of CO_2, which possesses an amorphous structure below 35 K and a crystalline structure at temperatures higher than 35 K[2]. In Öberg et al. 2009, the photodesorption yield of CO_2 ice depends on its morphology. For the purpose of investigating the relationship between the photodesorption yield of CO_2 ice and its morphology, the CO_2 ice was deposited at 16, 30, 40, 50, and 60 K respectively, and all of these ices were irradiated with vacuum ultraviolet (VUV) photons at 16 K. In this work, we will introduce a novel method to quantify the photodesorption yield of CO_2 ices by a calibrated quadrupole mass spectrometer (QMS). The experimental results show that the photodesorption yields of CO_2 ices deposited at different temperatures mentioned above are almost the same, meaning that the photodesorption yield of CO_2 ice is irrelevant to its morphology, which is inconsistent with previous works[1, 3, 4].

References

[1] Öberg, K., E. van Dishoeck, and H. Linnartz, Astronomy and Astrophysics, 2009. **496**: p. 281-293.
[2] Falk, M., The Journal of chemical physics, 1987. **86**(2): p. 560-564.
[3] Yuan, C. and J.T. Yates Jr, The Astrophysical Journal, 2014. **780**.
[4] Bahr, D.A. and R.A. Baragiola, The Astrophysical Journal, 2012. **761**(1): p. 36.