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THE EFFECT OF CO<sub>2</sub> ON GAS TRAPPING IN COMETARY ICES

**Abstract**

Water vapor and CO<sub>2</sub> have been detected as the major constituents of the volatiles in the coma of comet 67P/Churyumov-Gerasimenko (Hässig et al., 2015), by ROSINA (Rosetta Orbiter Spectrometer for Ion and Neutral Analysis) onboard the Rosetta spacecraft. In this paper we describe the experimental results of the influence of trapping CO<sub>2</sub> on the trapping efficiency of other gases such as CH<sub>4</sub>, N<sub>2</sub>, Ar, Kr, Xe, in cometary ices. In these experiments gas mixtures with CO<sub>2</sub> and water vapor are deposited on a cold surface at temperatures between 25-80 K in a thoroughly evacuated chamber. At these temperatures the water ice formed is amorphous and highly porous, and gases are trapped in the lattice. Upon heating, changes occur in the ice, from the amorphous to the crystalline structure (Bar-Nun et al. 1987, Laufer et al. 1987, Notesco and Bar-Nun 2000). The gases trapped in the ice are released during the structural changes and upon the sublimation of the ice. The trapping efficiency is determined by monitoring the fluxes of the released gases and water vapor during these stages. The experimental results on gas trapping in the ice will be presented and compared with the in-situ Rosetta measurements.

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References:

Bar-Nun A., et al., 1987. Phys. Rev. B 35, 2427-2435. Hässig M., et al., 2015. Science 347, 349-452. Laufer D., et al., 1987. Phys. Rev. B 36, 9219-9227. Notesco G. and Bar-Nun A., 2000. Icarus 148, 456-463.