NAT CRYSTALS EXPOSED TO HCl: A SYSTEMATIC RAIR INVESTIGATION

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As is well known, nitric acid hydrates, and in particular the trihydrate (NAT), are among the main components of polar stratospheric clouds (PSC). The systems formed by hydrogen halides on NAT crystals have been studied from different points of view. We present here a systematic spectroscopic investigation of the effects of exposure of NAT to hydrogen chloride, with the final aim of achieving a better understanding of the physical properties of these ternary systems. The technique used in this study is reflection-absorption infrared spectroscopy. HCl was added on NAT crystals at temperatures of 87, 120, 140, 155 and 165 K, and background pressures of either 10^{-4} or $5x10^{-4}$ mbar. Spectra were recorded consecutively until no changes were observed. Subtraction of the reference NAT spectra allows the study of the exposure effects.

We have found very different behaviour depending on the temperature. For the lower HCl pressure, small changes were observed for temperatures below 150K, but significant alterations are produced at the two highest temperatures recorded, being much faster for the 165K study. In the higher HCl pressure investigation, important spectral changes are found even at the lowest temperature in specific spectral regions. On the other hand, spectral modifications are comparatively much smaller for the 165K.