Auxiliary Material for

# Experimental evidence for the formation of liquid saline water on Mars

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Geophysical Research Letters, 2014

Manuscript #: 2014GL060302

## Introduction

This auxiliary material for manuscript 2014GL060302 consists of a supplemental table to provide data for main and auxiliary figures and two supplemental figures to compare experiments with sodium perchlorate to those with calcium perchlorate from the main body.

1. **ts01.pdf** Table showing data necessary to reproduce decomposition figures from the main body and figures in the auxiliary material. The table is labeled and includes a description in form of a caption.

1.1 Column “Figure”, figure which this dataset refers to.
1.2 Column “Peaks”, number of Gaussian peaks in the referenced figure.
1.3 Column “Peak center”, $cm^{-1}$, center wavenumber of the Gaussian.
1.4 Column “Peak height”, arbitrary units, amplitude of the peak.
1.5 Column “Peak FWHM”, $cm^{-1}$, Full Width Half Maximum of the peak.
1.6 Column “$\overline{R}^2$”, adjusted coefficient of determination of the Gaussian decomposition.

2. **fs01.png** (Figure S1) Spectra of sodium perchlorate in contact with ice. Experiments similar to those for $Ca(ClO_4)_2$ were performed for $NaClO_4$ in contact with ice while the temperature of the sample was raised above its eutectic temperature $T_E \approx$ -37 ºC at the typical rate occurring diurnally in the shallow Martian subsurface. When the crystalline salt (here mostly anhydrous $NaClO_4$ but with small peaks in the O-H region indicating partial hydration) hydrates or forms a liquid solution, the 954 $cm^{-1}$ peak in the Raman spectrum shifts toward 937 $cm^{-1}$. The appearance of the typical O-H vibrational band for liquid water

indicates the occurrence of a liquid solution within about 1 hour of the start of the experiment, when the salt is in contact with ice at environmental conditions of Mars' polar region.

3. **fs02.png** (Figure S2) Decomposed OH vibrational spectrum of $NaClO_4$ in contact with ice at -18 ºC. The O-H vibrational spectrum at -18 ºC shown in Figure S1 contain four Gaussians components at 3230, 3437, 3559, and 3610 $cm^{-1}$ with FWHM > 50 $cm^{-1}$ indicating the presence of liquid water. $\bar{R}^2 \approx 1.000$.