



X-Ray spectroscopy of frozen salt solutions: Formation of liquid NaBr in ice and hydrates in NaBr solutions

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Natural ice in clouds and on the Earth surface contains many impurities, such as salts or acids. The chemical reactivity of these substances is defined by the thermodynamic state of the impurity. Impurities can be in a solid or a liquid state, which strongly affects its chemical reactivity. Moreover, under some conditions some salts may also form hydrates, which may be stable even at ambient temperatures in salt solutions.

Using synchrotron based X-Ray absorption and fluorescence spectroscopy, we study the physical state of salt ions in ice, which was frozen from dilute salt solutions. With this method, we can determine whether the salt ions in the ice are in a solid or a liquid state. Using X-Ray microscopy we demonstrate the formation of hydrates in micron-sized liquid aerosols using an in-situ cell.