

## **New High-pressure Forms of Simple Salts-sulfates, Formates, and Acetates**

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Over the last few years, we have been studying the effects of high pressure on the structures of a variety of molecular compounds that include: simple organic compounds [1], pharmaceuticals [2], amino acids [3], and simple inorganic compounds such as the oxoacids and their hydrates [4]. All of these systems have been studied principally with single-crystal x-ray diffraction techniques in combination with diamond-anvil cells (DAC). Methods for studying single crystals in DACs include growth of single crystals *ex situ* followed by loading into the DAC or growth of single-crystals *in situ* from the melt. Both of these methods suffer from disadvantages and so we have recently developed methods for the high-pressure *in situ* growth of single crystals from solution [Ref]. Using these methods, we have studied the high-pressure recrystallisation of the sodium salts of the simple carboxylic acids, formic acid and acetic acid, and of the sodium salt of sulfuric acid. All of these compounds form previously unobserved hydrate phases at high pressure. For the new sodium sulfate hydrate phase, the growth of the single-crystal occurred *via* a high-pressure/high-temperature chemical reaction and its structure is certainly the most complex of all five known phases of Na<sub>2</sub>SO<sub>4</sub>, or its two previously observed hydrates, Na<sub>2</sub>SO<sub>4</sub>·7H<sub>2</sub>O and Na<sub>2</sub>SO<sub>4</sub>·10H<sub>2</sub>O. These sulfates are all geologically relevant and so the identification of this new high-pressure phase is likely to be highly significant.

[1] Allan D.R. et al., *Chem. Commun.*, 1999, 751. [2] Fabbiani P.A. et al., *Chem. Commun.*, 2003, 3004. [3] Moggach S.A., et al., *Acta Cryst.*, 2005, **B61**, 58. [4] Allan D.R. et al., *Dalton Communications*, 2002, **8**, 1867.

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