

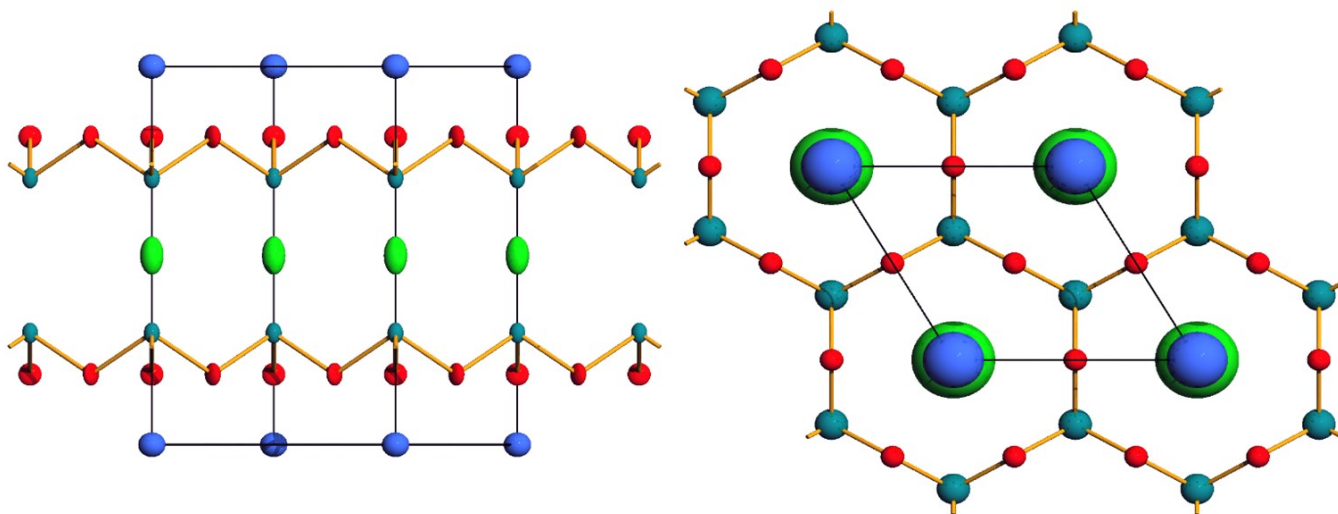
## Water induced variety of arsenic(III) oxide intercalates with alkali chlorides

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Arsenic(III) oxide has been known to form stoichiometric compounds with potassium and ammonium halides since the 19<sup>th</sup> century but they have not been structurally characterized until the middle of the 20<sup>th</sup> century [1-4]. It was found that the compounds are intercalation compounds in which like-charged ions form alternating layers which are separated by electroneutral As<sub>2</sub>O<sub>3</sub> layers (see Figure 1). This type of compounds have been found in nature as minerals, for instance, lucabindiite [5]. In case of intercalates with ammonium and potassium cations the layers are hexagonal and non-corrugated, whereas for smaller sodium cations the arsenic(III) oxide layers are corrugated and exhibit lower symmetry. Herein, we present the synthesis methods and structural characterization of the first As<sub>2</sub>O<sub>3</sub> intercalates with potassium, rubidium and cesium chlorides containing water molecules in their crystal structure: MCl·As<sub>2</sub>O<sub>3</sub>·½H<sub>2</sub>O (for M = K, Rb, Cs) and KCl·As<sub>2</sub>O<sub>3</sub>·3H<sub>2</sub>O. The compounds are not only studied by single-crystal X-ray diffraction but also by solid state NMR spectroscopy and ATR-FTIR. The crystal structure determination of KCl·As<sub>2</sub>O<sub>3</sub>·½H<sub>2</sub>O permitted for the correction proposal of NH<sub>4</sub>Cl·As<sub>2</sub>O<sub>3</sub>·½H<sub>2</sub>O crystal structure.



**Figure 1.** Crystal structure of KCl·2As<sub>2</sub>O<sub>3</sub>. View along [120] (left) and [001] (right). Anisotropic displacement parameters at 50% probability level are shown in the left and ball-and-stick model is used in the right. As, K, Cl and O atoms are colored dark green, blue, light green and red, respectively.

- [1] Rüdorff, F. (1886). *Ber. Dtsch. Chem. Ges.* **19**, 2668–2679.
- [2] Edstrand, M. & Blomqvist, G. (1955). *Arkiv för kemi.* **8**, 245–256.
- [3] Pertlik, F. (1987). *J. Solid State Chem.* **70**, 225–228.
- [4] Pertlik, F. (1988). *Monatsh. Chem.* **119**, 451–456.
- [5] Garavelli, A., Mitolo, D., Pinto, D. & Vurro, F. (2013). *Am. Mineral.* **98**, 470–477.

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