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# THERMAL EXPANSION OF MONOCLINIC NATROJAROSITE: A COMBINED TIME-OF-FLIGHT NEUTRON AND SYNCHROTRON POWDER DIFFRACTION STUDY.

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Jarosites and related minerals are of great interest to a range of mineral processing and research applications. In some industrial settings jarosite formation is encouraged; for example to aid the removal of iron species from solutions in hydrometallurgical processes. There has been a recent resurgence in interest in jarosite minerals since their detection on Mars by the MER rover Opportunity. In this context, the presence of jarosite has been recognised as a likely indicator of the presence of water on Mars in the past. It is hoped that study of their formation mechanisms, stability and thermoelastic properties will provide insight into the environmental history of Mars as well as informing terrestrial industrial concerns. To this end we are engaged in a program to study jarosites, their formation and stability behaviour, over a range of conditions.
This contribution describes in situ powder diffraction experiments to determine the thermal expansion of a deuterated natrojarosite. Data were collected on the HRPD beamline at the ISIS spallation source where the natrojarosite sample was heated from 10–700K, and at the powder diffraction beamline at the Australian synchrotron where the sample was heated from 80-700K.
Equations of state have been fitted to the data and the thermal expansion tenor determined. Full structural refinements show that anisotropic expansion of the structure is driven by the hydrogen bonding network. Details of the combined neutron-synchrotron analysis approach will be discussed.

## Keywords

Jarosite, Mars, in situ, powder diffraction, thermoelastic properties, neutrons

**Primary author(s) :** Dr BRAND, Helen (Australian Synchrotron.)

**Co-author(s) :** Dr GREY, Ian E. (CSIRO); Dr KNIGHT, Kevin S. (ISIS neutron and Muon source); Ms SCARLETT, Nicola (CSIRO)

**Presenter(s) :** Dr BRAND, Helen (Australian Synchrotron.)

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