Abstract Submitted
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Insight into the mechanisms of metal ion binding in hexagonal tungsten bronze SHANE KENNEDY, SUZANNE SMITH, MAXIM AVDEEV, ALEX FUCHS, Bragg Institute and Institute of Materials Engineering Science, Australian Nuclear Science and Technology Organisation, Lucas Heights, NSW, Australia — Tungsten trioxides and their alkali-metal-intercalated products M_zWO_{3+} show potential for application in electrodes, as ion exchangers, catalysts and the treatment of radioactive waste. Hexagonal tungsten bronze (HTB) was selected for the present work because its structure features hexagonal channels, of diameter ∼0.54 nm, that may be useful for selective and reversible binding of metal ions. X-ray and neutron powder diffraction were used to provide an insight into the mechanisms of metal ion binding of the Mo doped HTB's. Combined Rietveld refinement of the X-ray and neutron diffraction shows that doping with Mo degrades the crystallinity of HTB, in particular by creating a high degree of disorder in the a-b planes. Structural information combined with solution chemistry indicates several potential mechanisms of binding and metal ion exchange sites. This type of investigation provides invaluable information for new strategies in the design of inorganic sorbents and their optimization for metal ion separation.

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