
Interaction of Uranyl Ions with Synthetic Zeolites of Type A and the Formation of Compreignacite-Like and Becquerelite-Like Products

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Abstract: Uranyl acetate solutions, ranging in concentration from about 100 ppm to 3700 ppm, were re-acted with the Na-, K-, and Ca- forms of zeolite A. The crystalline products from the Na- and K-A zeolites resembled compreignacite ($K_2O \cdot 6UO_3 \cdot 11H_2O$) and from the Ca-A, becquerelite ($CaO \cdot 6UO_3 \cdot 11H_2O$). With higher concentrations of uranyl acetate, only X-ray-amorphous products were obtained. The compreignacite-like products gave sharp X-ray powder diffraction patterns and were indexed with orthorhombic, quasi-hexagonal unit cells which showed a significant variation of the axial ratio b/a from values just greater than, to values just less than $\sqrt{3}$. The becquerelite-like phase was always accompanied by unreacted zeolite. Compreignacite was synthesized from uranyl acetate and KOH solutions at room temperature over a period of several days.

Key Words: Becquerelite • Compreignacite • Synthesis • Uranium • X-ray powder diffraction • Zeolite A

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