Preparation and Characterization of Cryptomelane Prepared from Manganese Dioxide

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Abstract

The cryptomelane ($K \leq {}_2Mn_8O_{16}$) is well known a-manganese dioxide and microporous tunneling structure. It was prepared by chemical conversion synthetic method and sol-gel method. In chemical conversion synthetic method, native manganese dioxide ore was used as the starting material. In this preparation, the reaction process consists of three steps, such as, manganese dioxide to potassium manganate, potassium manganate to potassium permanganate, and potassium permanganate to cryptomelance. In sol-gel method, the precursor was obtained by mixing of $KMnO_4$ solution with disaccharide (sugar). Then the product was calcined at 490˚C (763 K). The time of calcinations is very importance to the formation of birnessite (K-exchange) or cryptomelane. Thus, completion of calcination must be needed to 64 hrs calcinations time at 490˚C (763 K). The prepared compounds were identified and characterized by conventional and modern technique of XRD, EDXRF, FT-IR, FT-IR (Raman), microscopic and SEM, respectively. The synthetic cryptomelane can be used as sorption media to remove the trace elements As, Cd, Cu, Fe, Pb in the water samples.

Key words: Cryptomelance, chemical conversion synthetic method, sol-gel method, calcined, sorption

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