

Original

Impregnation of Insoluble Cobalt Ferrocyanide onto Poly-(vinylbenzyl)trimethylammonium-chloride Chain Grafted onto 6-Nylon Fiber for the Removal of Cesium Ions from Freshwater

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Summary

(Vinylbenzyl)trimethylammonium chloride was graft-polymerized onto a commercially available 6-nylon fiber. First, ferrocyanide ions ($\text{Fe}(\text{CN})_6^{4-}$) were bound to quaternized ammonium salt groups before the precipitation induced by immersing the fiber in a solution containing both cobalt ions (Co^{2+}) and alkaline metal ions (A^+). The insoluble cobalt ferrocyanide was impregnated onto the 6-nylon fiber at various contents by adjusting the amount of $\text{Fe}(\text{CN})_6^{4-}$ bound to the strongly basic anion-exchange group. The content of insoluble alkaline metal cobalt ferrocyanide ($\text{A}_2\text{Co}[\text{Fe}(\text{CN})_6]$) in the fibrous adsorbent ranged from 2.5 to 11%. The removal rate of cesium ions from freshwater was high in the order of $\text{K}^+ > \text{Na}^+ > \text{Li}^+$. When the $\text{K}_2\text{Co}[\text{Fe}(\text{CN})_6]$ -impregnated fiber was contacted with 10 mg-Cs/L CsCl solution at a liquid-to-fiber ratio of 100, the cesium concentration decreased to below 0.2 mg-Cs/L for 30 min.

Key Words: Impregnation, Insoluble cobalt ferrocyanide, (Vinylbenzyl) trimethylammonium chloride, 6-Nylon fiber, Cesium removal, Freshwater
