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REMOVAL OF ARSENATE (V) BY SURFACTANT-MODIFIED ACTIVATED CARBON

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Abstract

Cationic surfactants, cetylpyridinium bromide and cetyltrimethylammonium bromide, were applied to modify granular activated carbon (CPB-C and CTAB-C) in order to provide efficient adsorbents for the removal of arsenate (V). The adsorption in the first 120 min was fast. From 120 min to 360 min, the adsorption became slower and gradually reached equilibrium at 24 h. The percentage removal by 0.1 g CTAB-C and CPB-C in 10 ml 700 µg/L arsenate (V) solution could achieve 90% and 82%, respectively. The adsorption kinetics could be satisfactorily described by the pseudo-second order model. The adsorption isotherms could be better described by Langmuir model. The percentage removal remained constant at initial concentration of 100-1000 µg/L and pH range 2-10, which were of significance for practical application. The optimum adsorbent dosage for CPB-C and CTAB-C were 0.12 g and 0.08 g per 10 mL solution, respectively. CTAB-C was more efficient than CPB-C in terms of initial adsorption rate, maximum arsenate uptake, pH and adsorbent dosage. The improvement of the adsorption capacity by cationic surfactants could be attributed to be the exchangeable anion provided by the adsorbed surfactants.

Key words: activated carbon, Arsenate (V), cetyltrimethylammonium bromide, cetylpyridinium bromide, surfactant

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