Ni(II) adsorption characteristics of commercial activated carbon from synthetic electroless plating solutions

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\begin{abstract}
Literature data with respect to Ni(II) adsorption from real process streams is scarce. The present work addresses the effect of solution complexity of electroless plating solution on the adsorption efficiency of commercial activated carbon adsorbent. Specific complexity refers to the inclusion of trisodium citrate in a basic medium. For all adsorption studies, the Ni(II) solution concentrations were varied from 50 to 500 mg/L in the pH range of 2–14. For these experiments, the adsorbent dosage was varied from 0.5 to 4 g/L. The optimum time or adsorption was evaluated prior to 120 min. The point of zero charge for the adsorbent was experimentally evaluated to be 10.23 and the optimum pH for Ni(II) adsorption was 10.55, which is in good agreement with the pH of the Ni(II) ELP solutions. The optimum adsorbent dosage was evaluated to be 4 g/L. The optimum percentage removal of Ni(II) was 44.54% for a maximum adsorption capacity of 17.75 mg/g. These values were significantly lower than those determined for aqueous solutions as reported in the literature. The Fourier transform infrared analysis indicates strong possibilities of chemisorption. The measured equilibrium and kinetic data indicate the fitness of Freundlich isotherm and pseudo-second-order model, respectively.

\Keywords: Activated carbon; Electroless plating solution; Adsorption; Ni(II) removal
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