

# **Removal of Copper from Wastewater Containing Citric Acid**

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## Abstract

Citric acid and copper are often found in the waste streams from semiconductor manufacturing. They are likely to form complexes, which modify copper speciation. This can lead to changes in sorption mechanisms and the sorption capacity. PEI-agarose adsorbents in a packed bed column are capable of removing these anionic complexes, but the competitive binding between these organic ligands and PEI for copper is not well understood and needs to be explored. The current work focuses on investigating copper sorption by PEI-agarose adsorbent in the presence of citrate ions. Copper binding capacity and copper breakthrough curves are compared and contrasted to results without additional chelator present. The presence of citric acid at any molar ratio to copper enhances the total copper uptake in a continuous column. This is a great advantage when wastewater streams contain either low or high amounts of citric acid ligand.