

## **Unmodified starch as water-soluble binding polymer for Chromium ions removal via polymer enhanced ultrafiltration system**

### **Abstract**

Background: In this study the removal of Chromium (III) and Chromium (VI) ions are investigated via polymer enhanced ultrafiltration under important process parameters. This study proposes the use of unmodified starch as a novel polymer in the ultrafiltration process and its performance on the removal of chromium ions was compared with a commonly used polymer, polyethylene glycol. Methods: The experiments were carried out at 1.5 bar and different pH values by using 10 kDa hollow fiber membrane operating in a cross-flow mode. Results: The best chromium ions removal obtained approached 99% for Chromium (III) ion by unmodified starch at alkaline pH region and at pH 7 for Chromium (VI) ions retention by polyethylene glycol. Permeate flux behavior are fluctuated for both chromium ions tested at high metal ion concentrations. Low concentration of unmodified starch is applied to reduce gelatinization behavior. Conclusions: The findings suggest that binding of chromium ions by unmodified starch is related to granule structure which is probably a principal indicator of the non-ionic behavior of unmodified starch.

### **Keywords**

Complexation; Metal ions removal; Polyethylene glycol; Polymer-enhanced ultrafiltration; Unmodified starch