

## **CHAPTER V**

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Conclusions**

The polyelectrolyte-enhanced ultrafiltration (PEUF) can be operated at relatively low pressure and temperature. When the concentration ratio of QUAT to anion increases, the rejection percentage of anions increases. Highly effective rejection is obtained at low QUAT concentration in retentate (less than 150 mM), while increasing QUAT concentration in retentate beyond 150 mM rather reduce the rejection percentage. The PEUF operation in the presence of other anions gives the rejection percentage that is dependent on ionic valent number.

The decrease in flux with increasing concentration of QUAT in retentate indicates that concentration polarization is present under the conditions studied. The concentration polarization developed reduces the flux due to the increase in resistance to flow caused by the highly viscous solution. However the concentration polarization is not a severe problem in PEUF as long as the retentate concentration of polyelectrolyte is lower than the gel polarization concentration.

#### **5.2 Recommendations**

If several ppm of oxyanions (e.g.,  $\text{CrO}_4^{2-}$ ) are the interested species to be treated in a waste stream, then the concentration of a number of toxic metal cations such as lead ( $\text{Pb}^+$ ) should be low. Otherwise, precipitates such as lead chromate ( $\text{PbCrO}_4$ ) will be formed. Other cations at high concentrations could

also interfere due to ionic strength effects and these effects will need to be considered. It is possible to use ultrafiltration as a prior step utilizing an anionic polyelectrolyte to reduce the concentration of multivalent cations (e.g.,  $\text{Cu}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Al}^{3+}$ ) in the incoming stream. This may be another aspect for future study.