

# CHAPTER 6

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## CONCLUSIONS AND RECOMMENDATIONS

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### Conclusions and Recommendations

#### 6.1 Conclusions:

This study identified that [the gel type strong base Diaion SA20A resin] can be utilized for the removal of Cr(VI) ions from aqueous solution.

The effect of process variables, such as pH, resin amount, concentration of Cr (VI), temperature and phases contact time, on the sorption of Cr (VI) was investigated. The Cr (VI) removal efficiency is highest in solutions of initial pH at 4.28 and decrease with increasing Cr(VI) concentration and increases with the rise of resin dose, solution temperature and phases contact time. The equilibrium data were better correlated with the Langmuir isotherm indicating chemisorption process in a monolayer on homogeneous active sites of the resin particles (ionic exchange). Kinetic calculations of the experimental data shows that sorption of Cr (VI) on the studied resin follows the pseudo-second order equation and is controlled by film diffusion in the initial stage of the sorption and by intra particle diffusion in the later stage.

Uptake of Cr(VI) through a fixed-bed column was dependent on the bed depth and flow rate. The adsorption capacity was increased with increasing bed depth, and decreasing flow rate. The column sorption process was found to perform better at lower flow rate and higher bed depth. The Thomas and Yoon–Nelson models were both successfully used to predict the breakthrough curves, indicating that they were very suitable for [Diaion SA20A resin] column design.

#### 6.2 Recommendations:

- The use of Diaion SA20A resin for Cr<sup>+6</sup> removal is a recommended technique for in treatment of industrial wastewater containing Cr<sup>+6</sup> since it provides many advantages over other techniques

The suggested fixed bed reactor has proved to be an efficient configuration for conducting liquid-solid diffusion-controlled reaction.

- Further studies are needed to study Cr<sup>+6</sup> removal in presence of other anion ions to optimize the conditions for Cr<sup>+6</sup> removal.

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