Chapter V

Summary and suggestion

5.1 Summary

From the results of experiment to identify the optimum operational parameters on the photo-reduction of chromium (VI) with fixed bed photoreactor, the major findings can be summarized as follow:

5.1.1 Optimum pH of wastewaters in the photo-reduction of chromium (VI) was pH 3. As at pH 7 fixed bed photoreactor could not remove chromium (VI) effectively and spent longer irradiation time. At pH 11, neither adsorption nor reduction took place.

5.1.2 The highest efficiency of chromium (VI) removal was observed at the flow rate equaled to 80 mL/s. At this flow rate the highest amount of adsorbed chromium (VI) and highest efficiency in chromium (VI) removal with no mass transfer limitation were occurred.

5.1.3 The optimum water level for fixed bed photocatalytic reactor was found at 4 cm. With lower of higher level of water in the reactor, the chromium (VI) removal efficiency was decreased. The less UV light intensity is expected to be the major factor affect on chromium (VI) removal efficiency in high water.

5.1.4 From the investigation of TiO_2 coating surface area, it found that the photo-reduction efficiency of chromium (VI) with fixed bed photoreactor increased when TiO_2 coating surface area increased which according to the reason that at high TiO_2 coating surface area the high amount of TiO_2 can enhance the photoactivity of chromium (VI) removal which affected on photoactivity.

5.1.5 From the investigation of initial concentration, the degradation rate constant has decreased with the increasing of initial concentration of chromium (VI). The chromium (VI) degradation in the range of initial concentration of 25-100 ppm was followed zero order pattern. The chromium (VI) degradation in the range of initial concentration of 150-500 ppm was followed pseudo first order pattern. The fixed bed photoreactor with 18 plates could remove the chromium (VI) with maximum concentration as 100 ppm. Finally, it could find the adsorption equilibrium constants (K) and degradation rate constants (k) were $0.2620\ \frac{l}{mg}$ and $0.3486\ \frac{mg}{l.\min}$, respectively.

5.2 Suggestion

5.2.1 The recovery of catalyst and life times of recoverable catalyst.

5.2.2 The investigation of economic worthiness of recovery of catalyst and life times of recoverable catalyst.

5.2.3 The comparison of economic worthiness between fixed bed and rotating disc photoreactor.