

CHAPTER IV

RESULTS AND DISCUSSION

In this study, the effect of amounts of water used for flushing are studied in order to compare the effects that can occur to the regenerated carbon. The efficiency of the carbon after regeneration by using the regenerant solution of Sodium Dodecyl Sulfate (SDS) at 0.025 M in a feed concentration is also investigated, which it was fed through the 30 grams carbon bed with the constant flow rate of 40 mL/min. The temperature was kept constant at 50 °C in drying step and used 30 °C for other steps.

4.1 TCE Loading on Fresh Carbon

The breakthrough curves for Trichloroethylene (TCE) adsorption on the fresh carbon are shown in Figure 4.1. In the first period the effluent TCE concentration are nearly zero and gradually increasing for a while after that the curves are sharp until the fresh carbon saturated from the TCE loading which can be investigate from the effluent concentration reached to the feed concentration around 1000 ppm. The time used for reaching equilibrium was approximately 1150 minutes. The equilibrium amount of TCE adsorbed was calculated from a mass balance on the breakthrough curve and was approximately 7.312

gram of TCE/25 gram of activated carbon or 0.292 gram of TCE/gram of activated carbon.

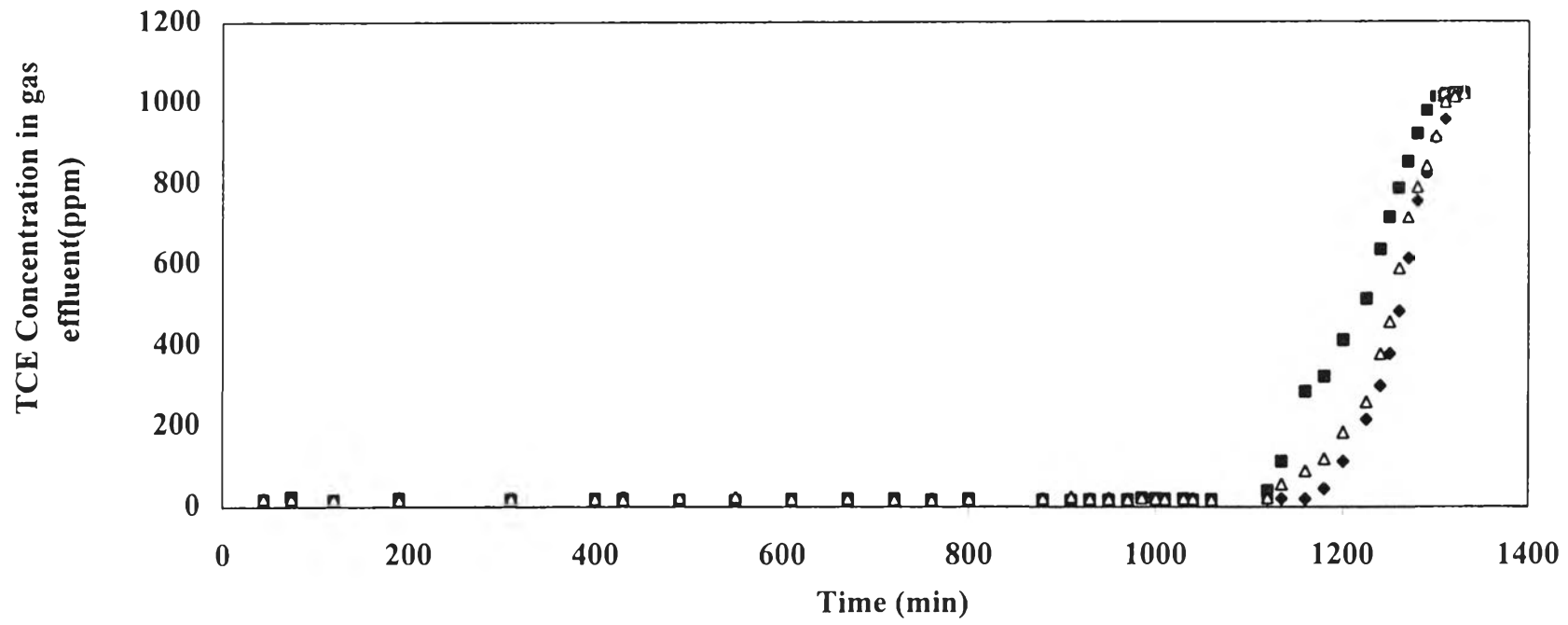


Figure4.1 Breakthrough curves for the fresh carbon at 3 different runs.

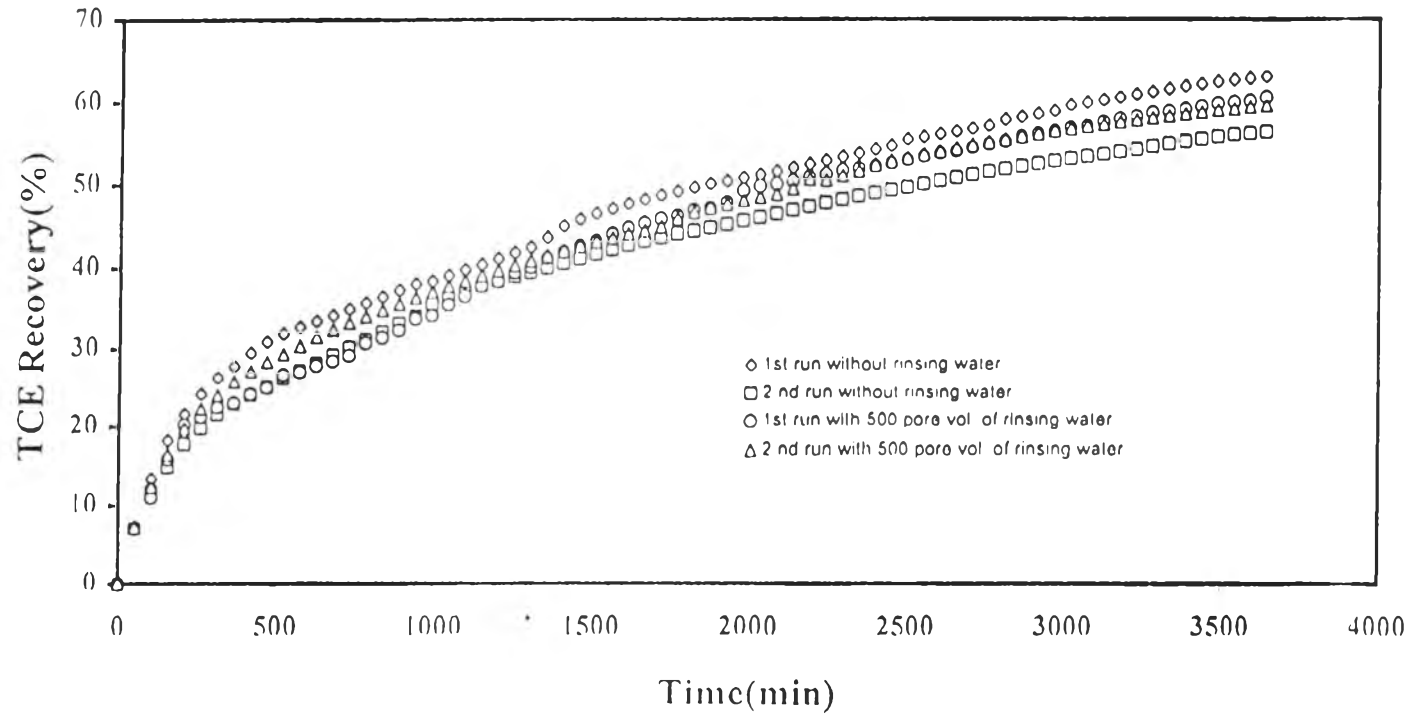


Figure 4.2 TCE recovery during regeneration step at different operational time for with and without rinsing water.

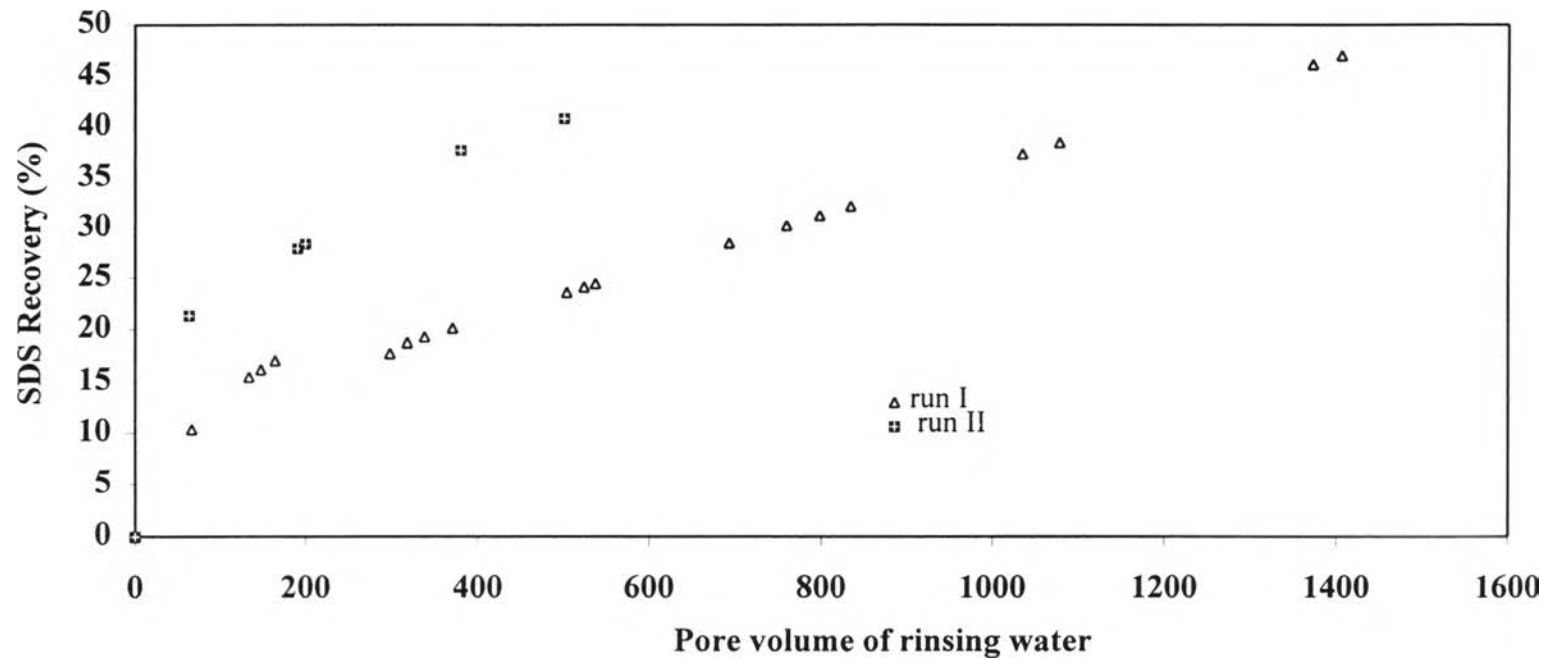


Figure 4.3 SDS recovery during regeneration step at different operational time for with and without rinsing water.

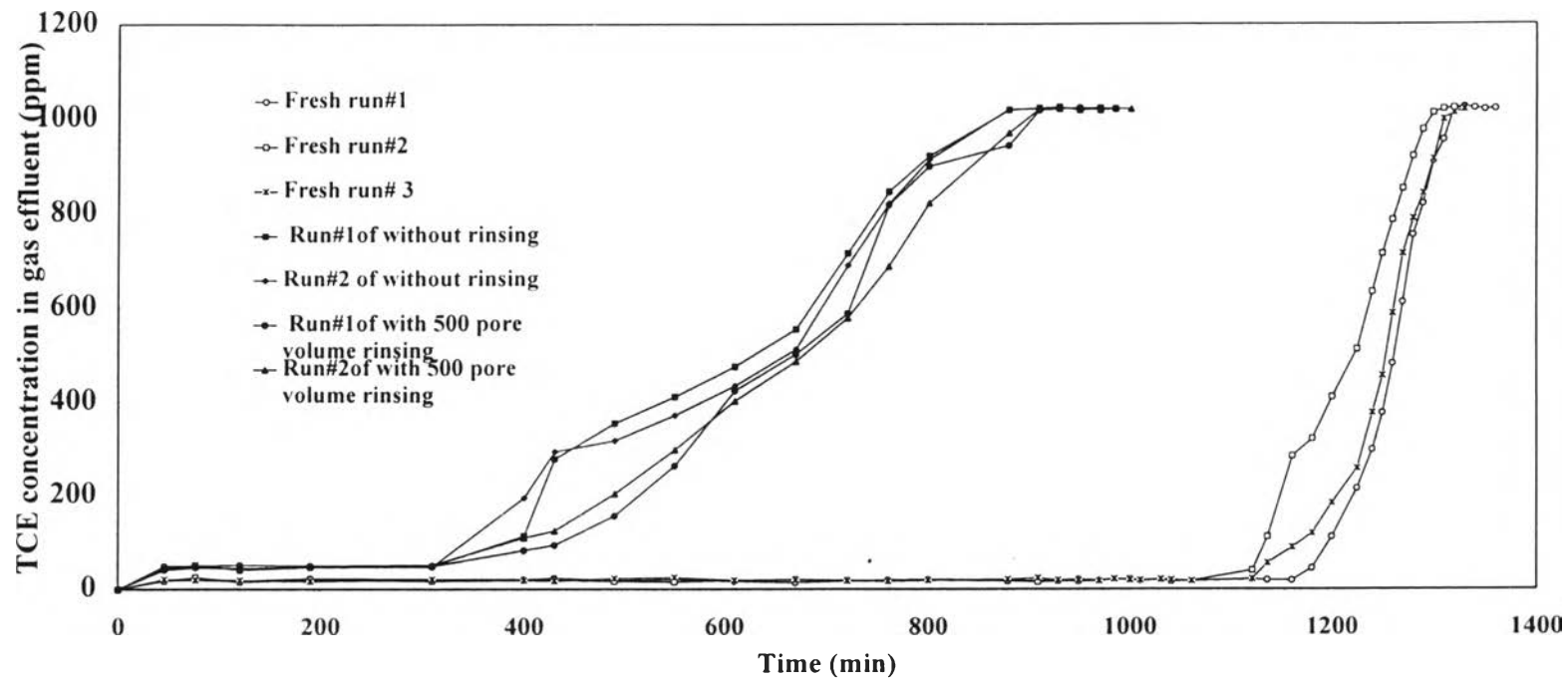


Figure4.4 Breakthrough curves of the fresh activated carbon compared with activated carbon regenerated with and without rinsing water

4.2 Amount of Rinsing Water on TCE Removal

As seen in Figure 4.2, the curves are similar and have in the same trend since the flushing step was treated after the regeneration step. It means that the amount of water flushing has no any effect on the TCE recovery.

4.3 Effect of Amount of Rinsing Water on SDS Removal

The fraction of surfactant (SDS solution) that could be removed during the rinsing step are shown in Figure 4.3 with a water rinsing flow rate of 10 mL./min. The effect of the volume of water in the rinsing step following the regeneration can affect the percentage of SDS recovery. If 500 pore volumes of rinsing water is used, the percentage of SDS recovery is near to 40% and for 1400 pore volume of rinsing water, the percentage of SDS recovery is 47%.

4.4 Breakthrough Curve for TCE Adsorption on Fresh Carbon and Regenerated Carbon

Figure 4.4 illustrated in adsorption capacity of carbon after regeneration and fresh carbon. There are 4 curves that came from 2 conditions varying in the amount of water flushing with 500 pore volume (15 L) and without, from the result, the effect from amount of flushing water seem to be negligible. In this experiment, the equilibrium adsorption efficiency of the regenerated carbon decreased about 50 % from 0.292 gram of TCE /gram of carbon to 0.145 gram of TCE /gram of carbon after regeneration.