CHAPTER V

CONCLUSIONS AND SUGGESTIONS

5.1 Conclusions

It is concluded here that the of adsorption of carbonyl sulfide on Selexsorb® COS obtained from the experiment by variation of COS concentration and variation of COS mass flow rate at 313 K, is :-

$$-r_{COS} = k\,[\,COS\,]^{1.04} \qquad (5.1)$$

The corresponding rate constant at various temperature was calculated using the above correlation. The apparent activation energy and the frequency factor are 22.4 $kJ.mol^{-1}$ and 498.7 $kg^{-1}.s^{-1}$.

The reaction is clearly the first order of reaction with respect to COS concentration which concurred with the Langmuir adsorption at low reactant pressure, P_{COS} or concentration, [C] (. COS. concentration between 1 to 7 wt. ppm at atmospheric pressure).

Based on the experimental result, the rate limiting step are both the external diffusion and the chemical reaction, but there is no limitation to the internal diffusion

There were three factors that obtained the effect on the reaction rate similarly. These are the COS concentration, the space time and the temperature. The higher these factors are, the higher the reaction rate are.

5.2 Suggestions

5.2.1 This study ignored the effect of unknown active metal compounds that were impregnated onto Selexsorb COS by the supplier (Alcoa). If any information becomes available, it will be most beneficial to study their effects on the rate limiting steps.

5.2.2 The material that is used in the handling of carbonyl sulfide should be able to withstand the attack by sulfur compounds. the recommended materials used in this study were Teflon and/or 316 stainless steel.

5.2.3 For the further work, the optimun space time should be lower than 500 $kg.s.mol^{-1}$ .On the other hand the COS mass flow rate should be higher or the adsorbent amount may less than 1 gram.