CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Dehydrogenation of ethylbenzene to styrene was studied in this research. The following conclusions can be drawn from the investigation.

1. In the study on the performance of the reactors, in the membrane reactor hydrogen was continuously removed from the reaction zone , and as a result, the extent of reaction and the selectivity increased thereby the performance was superior to the fixed-bed reactor.

2. Dehydrogenation of ethylbenzene was endothermic reaction. The non-isothermal condition and radial dispersion of mass and heat transfer were included in the model, because omission of them would induce an overestimation of the temperature profile and the performance of the reactors.

3. In the membrane reactor studies,
    - 3.1 The membrane reactor with catalyst packed in the shell side provided superior performance to the one with the catalyst packed in the tube side.
    - 3.2 Application of vacuum in separation side showed the highest partial pressure difference of hydrogen between the reaction side and the separation side.
    - 3.3 Application of reactive sweep gas in separation side had higher ethylbenzene conversion, but selectivity conversely dropped.
    - 3.4 The effect of radial diffusion were more pronounced with the increasing reactor size.

Recommendations

This work studied the dehydrogenation of ethylbenzene in palladium membrane reactor using computer simulation. One of the factors enhancing the hydrogen permeation through the membrane was property of the membrane. The results indicated that the diffusion of hydrogen through the palladium film was slow, therefore it controlled the rate of hydrogen removal. The further, study should be explored the effect of the membrane properties.