

Chapter VIII

CONCLUSION

The main conclusion of the present investigation is that the efficiency of the double pipe heat exchanger was increased by cyclic operation as compared to conventional operation. This agreed with the part results, which showed that the efficiencies of sieve plate and packed plate distillation, and liquid-liquid extraction were improved greatly by controlled cycling as compared to conventional operation. The fundamental factor in the improvement was the eddy diffusivities which developed in the heat exchanger by controlled cycling operation.

In the cyclic operation, over all heat transfer coefficients were improved, because the cyclic manner reduced the thickness of boundary layer or the resistance of heat transfer by turbulent diffusivity or eddy diffusivity. So the temperature gradients were also higher. Thus, the heat transfer coefficient in controlled cycling operation was higher. The optimum condition which obtained from the experiments was fraction open of 0.7. at the cycle time of 10 seconds. This condition increased over all heat transfer coefficients up to 480% as compared with the conventional operation.

The controlled cycling operation can be applied to various unit operations of heat transfer such as evaporators, condensers, heat exchanger and reboilers. They are compact and small in size for a required heat transfer. The improvement in heat transfer by controlled cycling operation will be achieved with an increased power requirement necessary to maintain the cyclic operation and also an increase in the capital cost for the provision of electric timers and controlled valves.