

CHAPTER 3 EXPERIMENTALS

Evaporator of Colgate Palmolive has been modified and improved the capacity to serve the sales volume. So, the modification was made in 3 phases as following.

3.1 Original Model of Treated Lye Evaporator

An original design of treated lye evaporator for soap plant of Colgate Palmolive (Thailand) Co., Ltd. is double effect evaporator that is operated under vacuum. The condition of the first separator is 0.9 kg/cm^2 110-120 degree C and the second one is 70 mm.Hg., 80 degree C.

Four control valves are used as following :

- The level of the first evaporator is adjusted by the quantity of treated lye input and be drained to the second evaporator.
- The level of the second evaporator is adjusted by the quantity of crude glycerine output.
- The vacuum of the second evaporator is adjusted by the quantity of the cooling water that flow into the barometric condenser.
- The temperature of the second evaporator is adjusted by the steam input to the second heat exchanger. (See Fig 3.1)

3.2 Modified Model of the Treated Lye Evaporator

Because of the expansion of the soap market that make the quantity of treated lye is surplus too high for the original evaporator can handle. The factory try to increase the capacity of evaporator by changing the operation system from double effect evaporator to two single

effect evaporator ,direct heating with the steam ,adding another barometric condenser for the first evaporator.

First evaporator condition is 0.7 kg/cm² and 100 degree C.

Second evaporator condition is 70 mm.Hg.and 80 degree C.

The control system is the same as the original one .

(See Fig 3.2)

3.3 Improved Model of Treated Lye Evaporator

An improvement of the present model is following :

- Add another larger entrainment separator attached to the first evaporator. (See Fig.3.5)

-Add other two control valves at the steam line to the first heat exchanger and the connection line between entrainment separator of the two evaporator.

-Add the "IF" condition to the controlling program to check the temperature and vacuum of the first and second separator before working or adjusting the control valve of the half-crude glycerine line and crude glycerine output.

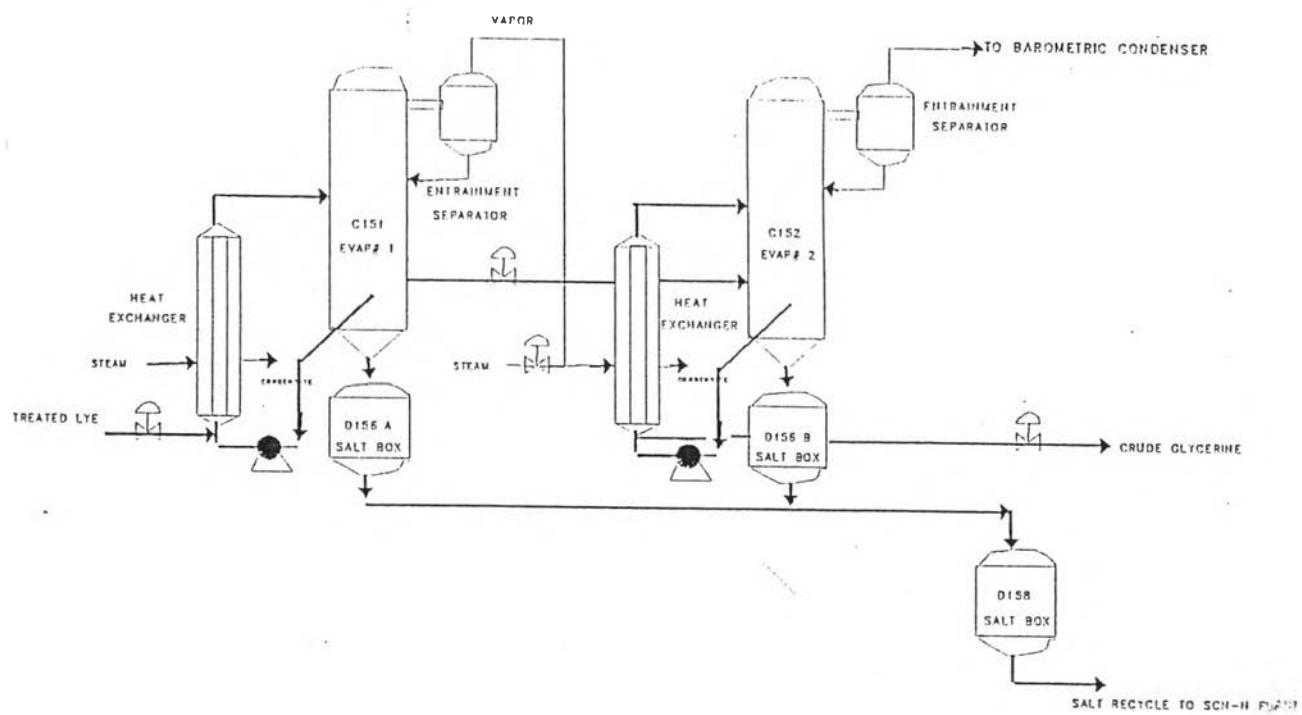


Fig 3.1 Original Model of Treated Lye Evaporator (Edger Woollatt, 1982)

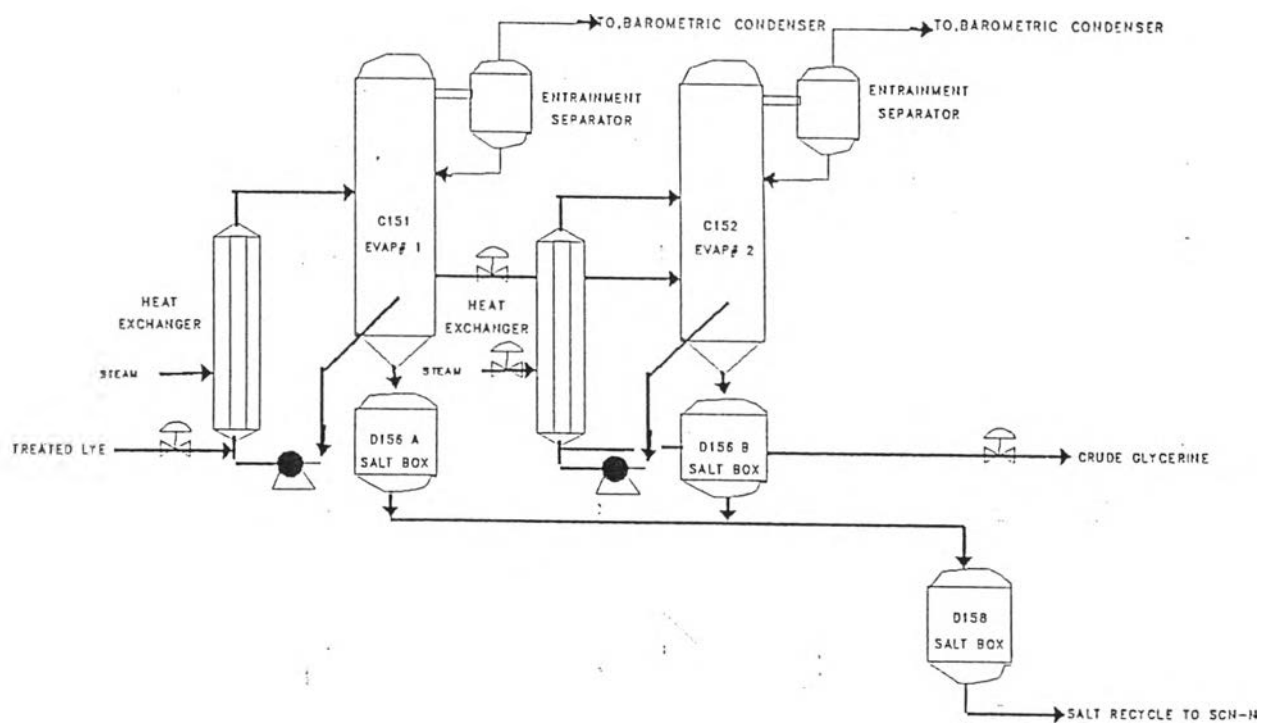


Fig 3.2 Modified Model of Treated Lye Evaporator

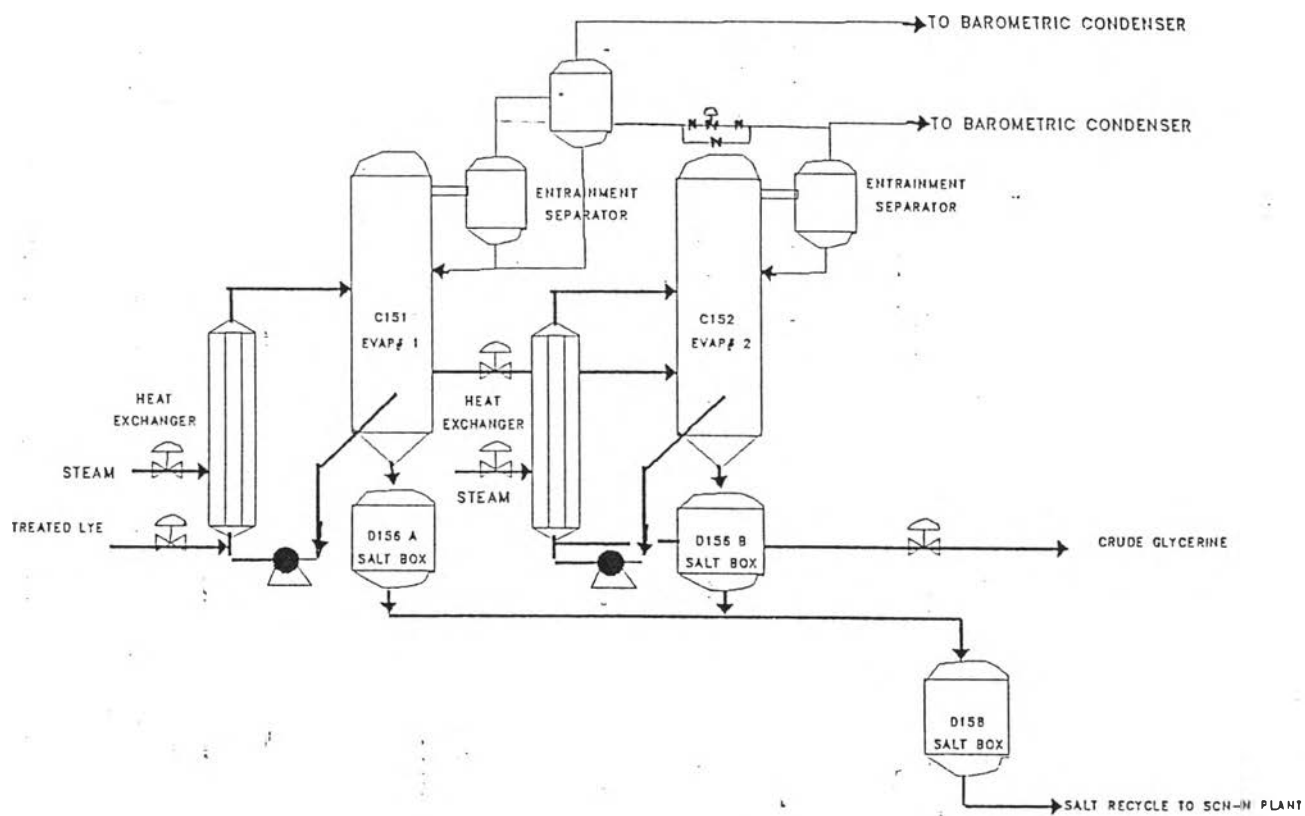


Fig.3.3 Improved Model of Treated Lye Evaporator

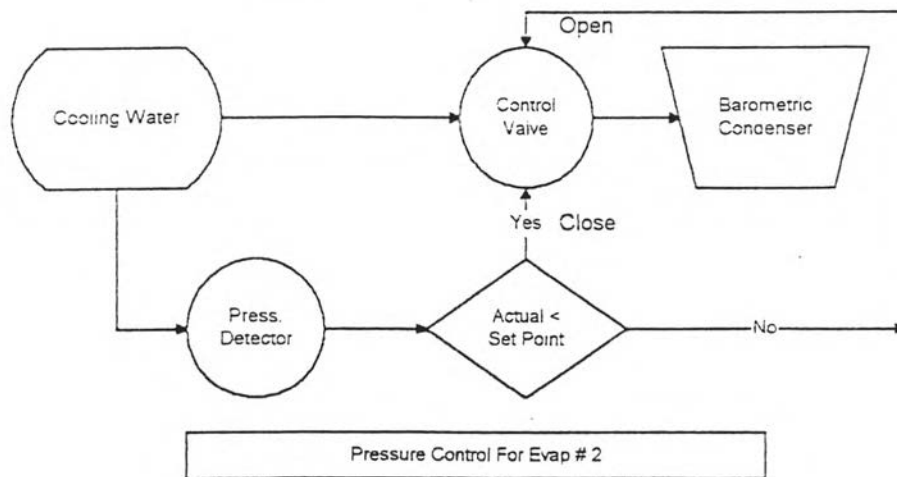
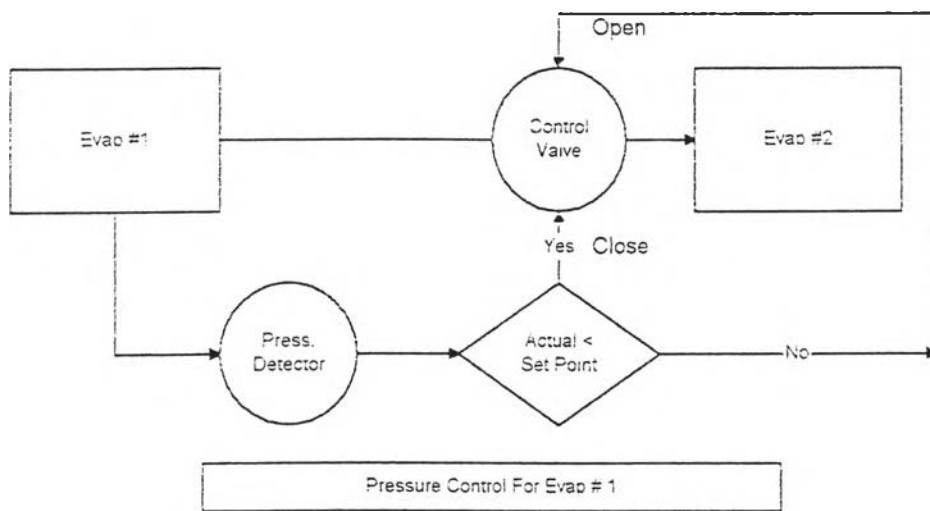
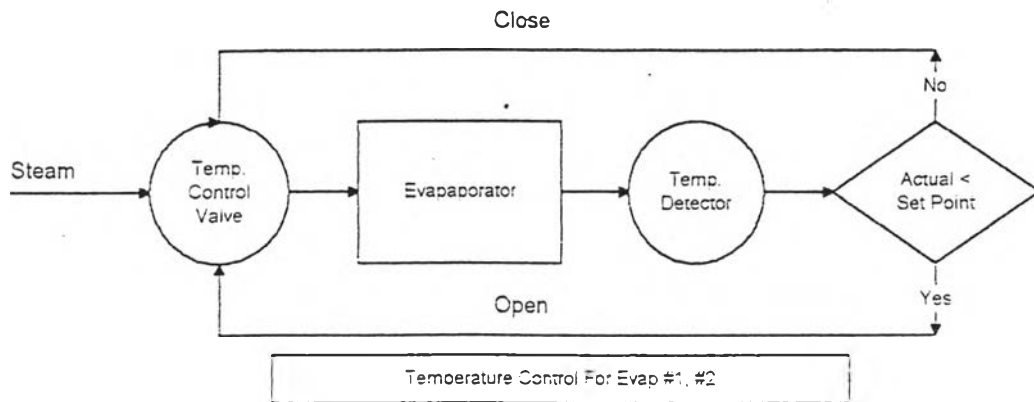


Fig.3.4 Temperature and Pressure Control System

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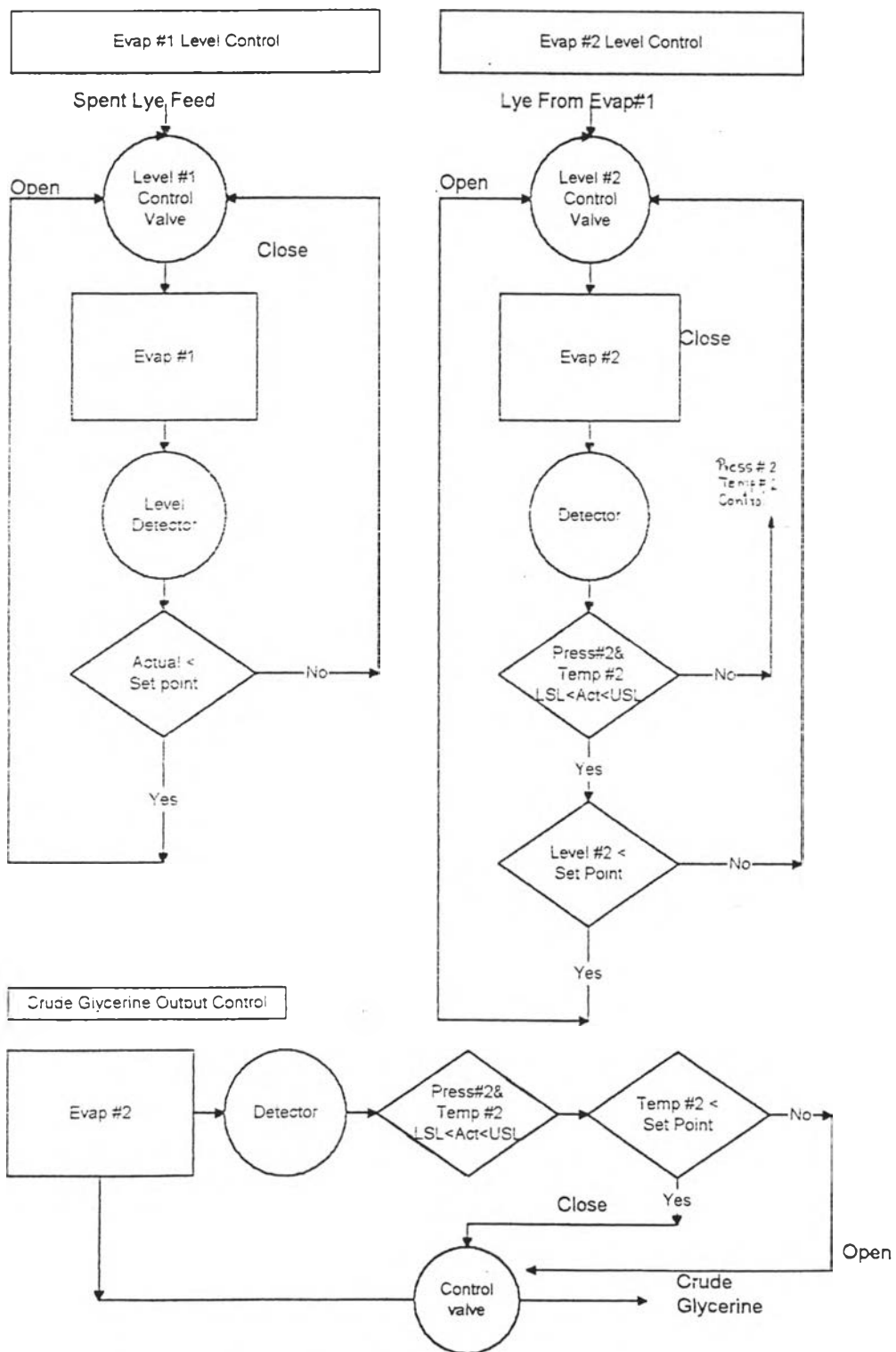


Fig.3.5 Level and Crude Glycerine Output Control System

Fig.3.6 Show the HDPE Paching Ring Packed bed which is installed to the first entrainment separator .It was modified to fit the entrainment separator and we can adjust the packed bed height .This modification was expected that it could trap glycerine that carry over to the vacuum system.

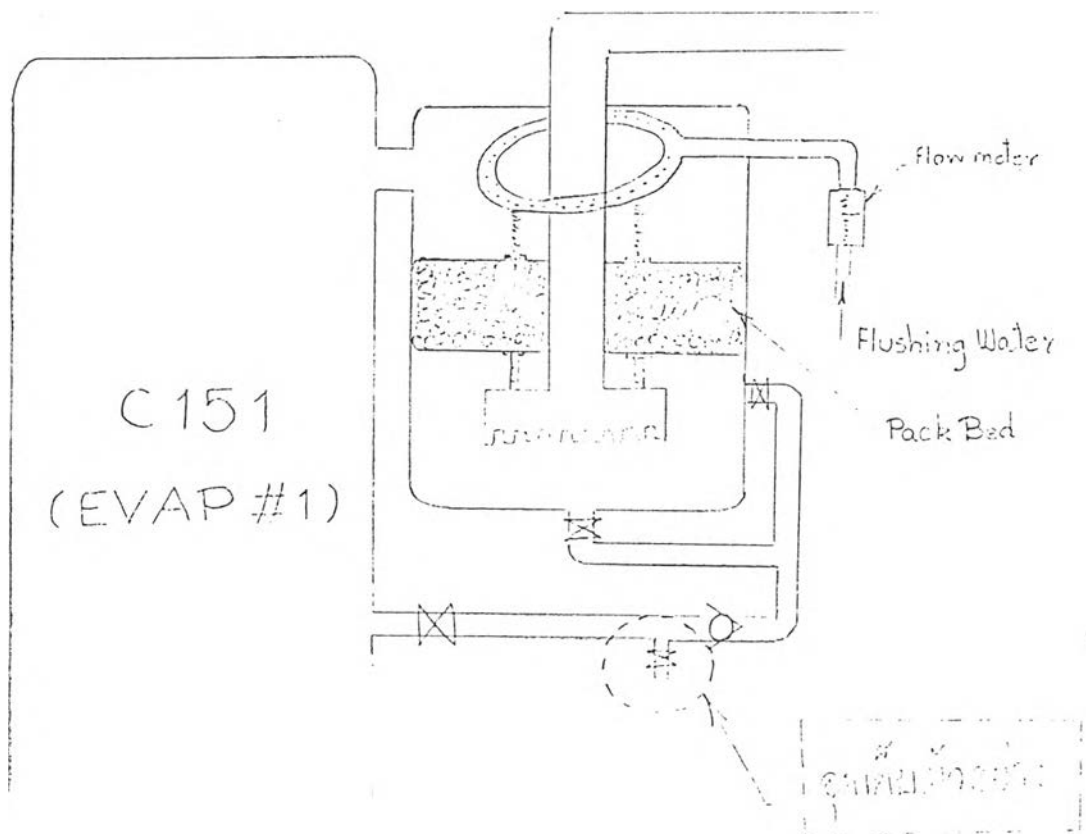


Fig.3.6 Packed Bed with HDPE Raching Ring

Fig.3.7 Shows the larger entrainment separator which is installed to the first evaporator. It was modified from the old design only adding the baffle at the separator wall that will make an excellent scrubbing of glycerine mist by flushing water and its volume is three times to the old one.

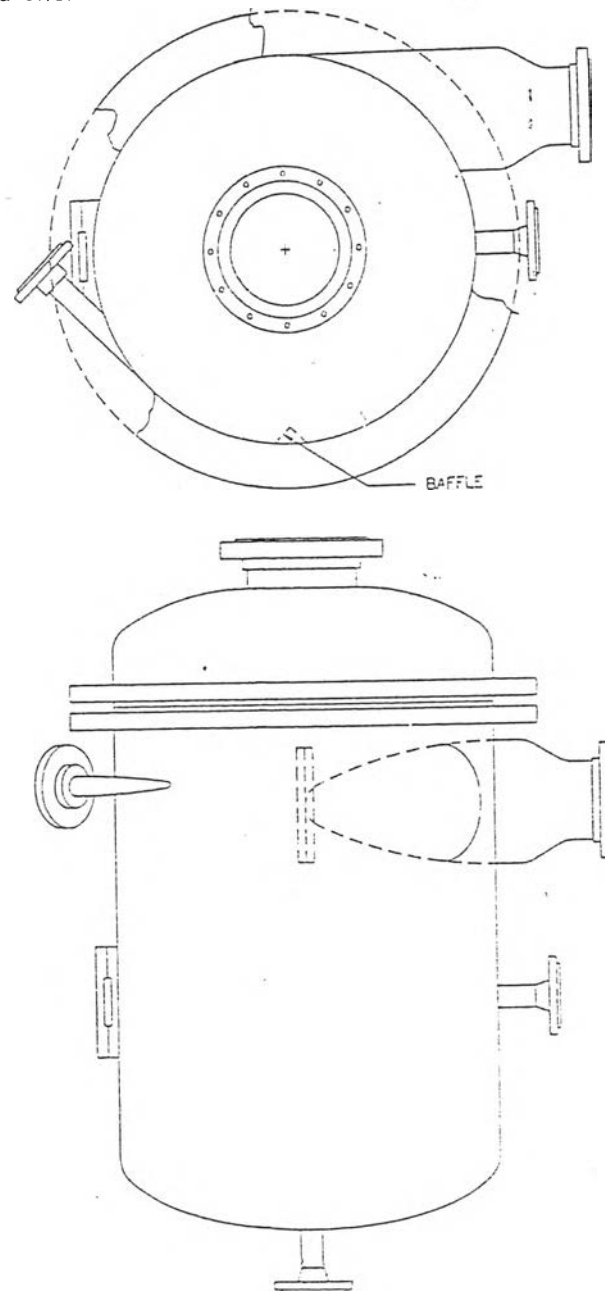


Fig.3.7 Larger Entrainment Separator

3.4 Experimental Procedures

1. Collect the former data about glycerine loss in treated lye evaporator .
2. Study present performance of the evaporator in separation and control system .
3. Improve the control system by :
 - Study the temperature and pressure control system .
 - Select and design the proper control system .
 - Installation
 - Experiment the new control system .If the system is out of control , return to Step 3 .
4. Improve the vapour-liquid separator system by :
 - Study vapour-liquid separator system .
 - Select and design the vapour-liquid separator .
 - Installation
5. Experiment and collect data to find the glycerine loss and optimum condition .
6. Analyze the data and conclusion .

(See Fig 3.8)

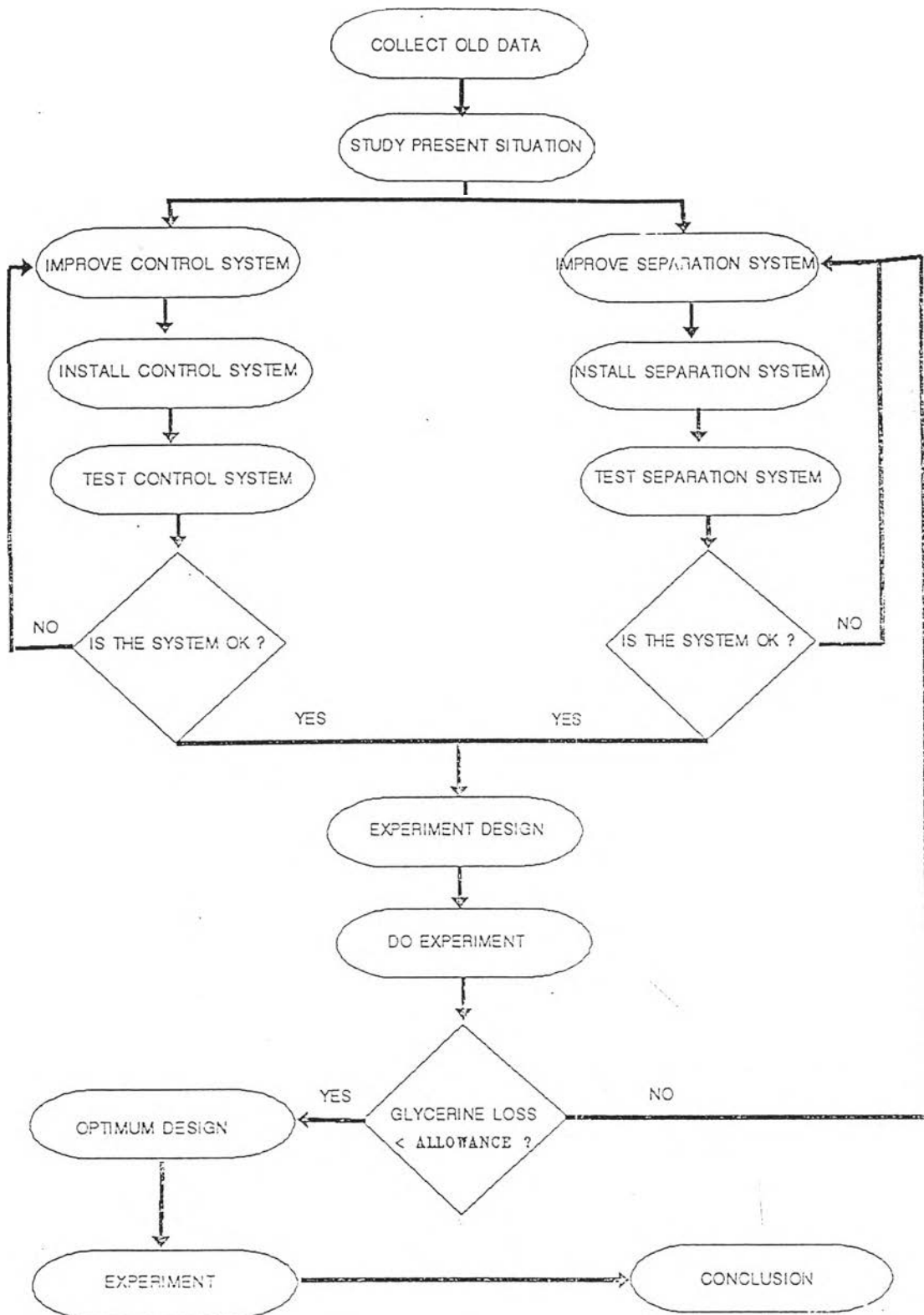


Fig.3.6 Flow diagram of Experiment Procedure