



CHAPTER 4

EXPERIMENTS ON REFRIGERATION PLANT WITH "FREON 22" REFRIGERANT CHARGED

4.1 DESCRIPTION OF APPARATUS

The refrigeration plant used for this experiment is the same as that used for the previous one. The additions of the apparatus are :

4.1.1 HIGH VACUUM PUMP

The vacuum pump used for the experiment is DUO SEAL VACUUM PUMP, manufactured by W.M.Welch Manufacturing Co. This vacuum pump can produce vacuum of .0001 mm Hg. The vacuum pump which used in the experiment is shown in Photograph 6 in Appendix IV.

4.1.2 CHARGING VALVE AND PRESSURE GAGE

The valve consists of two pressure gages, low and high range, and three connecting tubes, Photograph 7 in Appendix IV shows the valve with two pressure gages and two connecting tubes.

4.1.3 "FREON-22" REFRIGERANT CONTAINER.

4.2 TEST PROCEDURE

The original refrigerant charged in the plant is "Freon-12", then the plant must be recharged with "Freon-22", the procedure for replacement of the refrigerant are as follow:

After the "Freon-12" refrigerant was purged, the charging tube on suction gage was connected to the charg-

ing connection on the regulator stop valve and the middle charging tube to vacuum pump, all valves throughout the system were wide open. The vacuum pump was allowed to run for about three hours until the vacuum reached to near absolute zero. During this process the moisture and "Freon 12" vapor were sucked out completely.

When evacuation was complete, the plant was ready for charging. The stop valve or charging valve was shut. The tube from the vacuum pump was removed and connected it to the "Freon-22" gas bottle valve. Before charging, some gas was allowed to purge through the connecting tube, to remove air in it. Then "Freon-22" refrigerant vapor only was charged into the system. During charging, the machine must be started up. The plant was fully charged when the sight-glass fitted in the liquid line was full of liquid. The amount of refrigerant charged into the system is about 3.500 kg.

The test procedure was carried out under two conditions:

1. At constant suction temperature (superheat temperature), and varying the evaporator pressure.

This test involved various settings of the suction pressure from 25 - 43 psig for constant refrigerant suction temperature of 85 F and the condensing pressure was kept around 200 psig throughout this set of tests. All readings were recorded as shown in Table 4.1 in Appendix I.

2. At constant evaporator pressure and varying degree of superheat, of suction temperature.

The evaporator pressure of 43.3 psig was maintained constant by the pressure constant expansion valve and the degree of superheat was varied from 37 F to about 76 F. The condensing pressure was also maintained at 200 psig. Table 4.2 in Appendix I shows all readings of each test.

4.3 TEST RESULTS

The results of experiment on "Freon - 22" plant, at constant suction temperature and varying the evaporator pressure, are shown in Table 4.3, Graph 5, and Graph 6 in Appendix III. And Table 4.4, Graph 7, and Graph 8 in Appendix III show the results which test at constant evaporator pressure and varying degree of superheat. of suction temperature.