

CHAPTER 7

Conclusion

Thermal performance analyses of an absorption heat transformer coupled with a vapor compression heat pump recovering heat at the AHT condenser and supplying the heat back to the AHT evaporator are carried out. The conclusions of the study are as follows:

1. The suitable working fluid of the single-stage vapor compression heat pump system is R-123 and the CAHT could generate hot water at a temperature of around 70-80 °C. For two-stage cascade vapor compression heat pump which takes R-134A and R-123 as refrigerants, the hot water temperature could be up to 80-90 °C. The latter is more appropriate to combine with the AHT due to its higher COP, especially at a higher temperature.
2. The overall COP of the CAHT cycle is around 0.8 compared with that of the normal AHT which is around 0.5.
3. For 10 kW_{th} heat rate with the absorber temperature over 80 °C, the number of the solar collectors units of the solar-CAHT could be decreased about 50 % which is 18 units instead of 35 units of the normal solar-AHT. Under the climate of Chiang Mai, the annual exergy costing of the solar-CAHT unit is cheaper than the solar-AHT unit which is around 95,178 Baht/kW·y compared with 144,366 Baht/kW·y of the normal one.
4. The developed models could be used to predict the system performances. The simulated results agree well with those from the experiments.
5. A set of simplified models are developed. The calculated results could perform a set of performance curves that could be used to predict the heating capacity of the CAHT and the upgraded temperature of the working fluid at the CAHT absorber.

Further Study

For further study, the recommendations are as follows:

1. Use of different working fluid in the AHT system such as water-Carrol™ mixture which has a higher solubility and COP but less crystallization risk compared with the water-Lithium Bromide solution.
2. Combining the AHT condenser with the VCHP evaporator and the AHT evaporator with the VCHP condenser to reduce heat loss as shown in Figure.

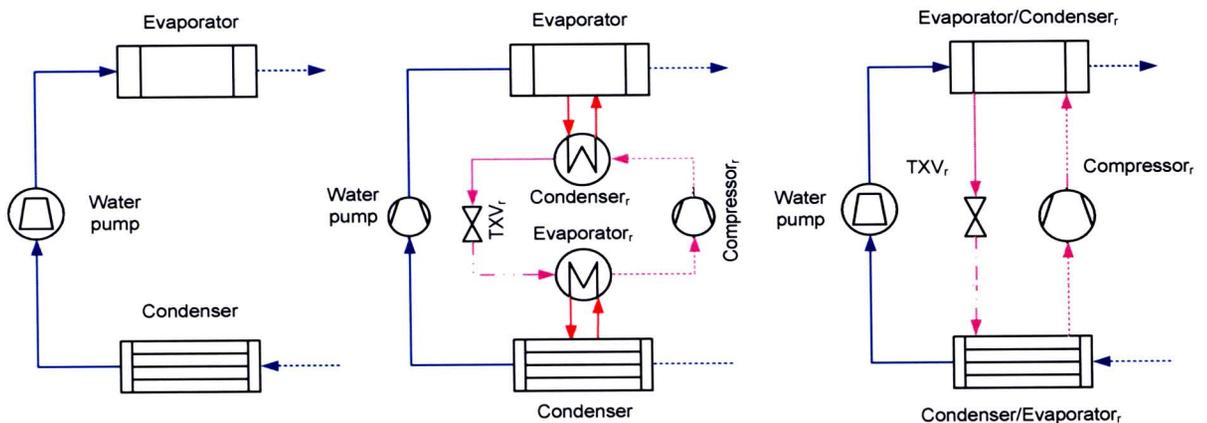


Figure 7.1 Combining of the main components in the AHT system and the VCHP system.

