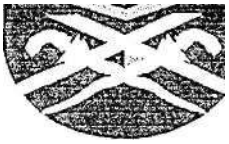

MARA UNIVERSITY OF TECHNOLOGY
FACULTY OF MECHANICAL ENGINEERING

FINAL YEAR PROJECT REPORT
BACHELOR (HONOUR) IN MECHANICAL ENGINEERING

ABSORPTION REFRIGERATION CYCLE FOR RESIDENTIAL AIR-CONDITIONING UNIT, BY USING COMBUSTION OF NATURAL GAS AS AN ENERGY SUPPLY

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ABSTRACT

This thesis relates to an improved refrigerating system for air conditioning, using absorption principle, which is particularly applicable to residential unit. A purpose of this thesis is to provide the system, which efficiently utilize combustion of natural gas for source of operating system and employing water and Lithium Bromide as a working fluid.

First of all, the understanding about the 1st law and 2nd law of thermodynamics has been emphasised, because the analysis is based on these principles. Then the research about the absorption cycle has been understood more precisely. Several assumptions have been done, in order to make calculation more accurately such as assuming the pressure of the condenser and generator is at saturation pressure corresponding to the generator temperature.

After that, the required parameters can be analysed using Irreversibility method. From here all the equations to get amount of heat, mass flow rate and other essential properties are obtained. In order to get enthalpy and temperature at generator and absorber **Duhring Rule [9]** has been applied.

By adopting an open system and considering conservation of mass in generator, mass flow rate for strong solution or weak solution can be obtained. Coefficient of performance (COP) of the system has been determined as cooling load divided by generator heat input.

Those equations have been solved using computer. This project uses **Visual Fortran Professional v6.5** that is available in UiTM laboratory. In order to make the computer program easier to understand, the flow chart is provided.

Besides heat, results also show the COP, efficiency, temperature and mass flow rate of the cycle. The particular program can only show entire parameters is in an optimum condition.

For the next step, this thesis emphasise heat transfer concept in order to design every components of heat exchanger. The concept of Forced Convection, Boiling and Condensation has been understood more accurately to determine the number of tubes, by determining heat transfer coefficient and description of every component. The equations

are programmed into Program Generator, Program Condenser, Program Evaporator, Program Absorber and Program Heat Exchanger.

Results show descriptions that those heat exchangers are unreasonable to produce, because *the* size of *the* every component is two times bigger, compared to conventional vapour compression air-conditioning unit.

However, there a lot of improvement that can be done such as, change air-cooled components into water-cooled components and use Lithium Chlorate and Chloric Acid with water, whereby the working fluid can obtain situation at a temperature of minus 10℃ in evaporator.

Finally the author hopes this work can be a stepping-stone to our inventors in order to improve or extend their work into this field.

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