EFFECT OF AMMONIA/WATER RATIO IN THE PERFOMANCE ABSORPTION CHILLER

KAMARUL ARIFFIN BIN IDRIS

UNIVERSITI MALAYSIA PAHANG (UMP)

“I declare that I have read this thesis and in my opinion this thesis is adequate in terms of scope and quality for the purpose awarding a Bachelor’s Degree of Chemical Engineering (Gas Technology).”

Signature : ....

Supervisor’s Name : Associate Professor Zulkafli Bin Hassan

Date : ....

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KAMARUL ARIFFIN BIN IDRIS

A thesis submitted in fulfilment of the
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I declare that this thesis entitled 'Effect of ammonia/water ratio in the performance absorption chillers' is the results of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted candidature of any other degree.

Signature : ………………………………………

Name : Kamarul Ariffin Bin Idris

Date : 16 May 2008

Special dedicated to my beloved father, mother and my whole family members

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ABSTRACT

The main objective of this study is to determine the coefficient of performance (COP) for absorption chillers. By using a reversible Carnot cycle process the optimum coefficient of performance (COP) and ammonia/water ratio are obtained. Gas Absorption Refrigeration Unit (Model: RF 10) is a complete laboratory bench top unit for the demonstration and analyze the performance on effect of ammonia/water ratio in performance for absorption chillers. In this experiment the refrigerant is anhydrous ammonia and the absorber is water. The ammonia/water ratios used are in the range of 5% to 30% ammonia in water base on volume percentage in the solution. Assuming the absorption unit has complete cycle and stable system after 8 hours and the performance of the absorption chillers unit is constant for each experiment the value of coefficient of performance COP is calculated for each hour depending on the refrigerant/absorber ratio. Then, the graph for value of coefficient of performance (COP) verses time (hour) is plotted and analyzed. The COP increased with increasing generator temperature and with decreasing absorber and condenser temperatures for all the systems. Also, the lowest temperature at the evaporator is important in order to control the temperature for all the system cycle that affects the value of COP in absorption chillers. In conclusion, the optimum ammonia/water ratios that obtained in this experiment are 30% ammonia purity with 2.97 coefficient of performance.

ABSTRAK

Tujuan utama penyelidikan ini ialah untuk menentukan nilai akan prestasi yang alat penyerapan kesejukan. Dengan menggunakan proses yang dapat berbalik Carnot jumlah maksimum nilai akan prestasi dan nisbah ammonia/air dapat diketahui. Selain itu, unit gas penyerapan kesejukan (Model RF 10) ialah alat makmal yang sesuai digunakan untuk menunjukkan dan menganalisis kesan nisbah ammonia/air kepada alat penyerapan kesejukan. Dalam penyelidikan ini ammonia bertidak sebagai bahan penyejuk manakala air sebagai bahan penyerap. Nisbah ammonia dan air yang digunakan adalah diantara 5% hingga 30% ketulenan ammonia mengikut peratusan isipadu larutan. Tambahan pula, dengan beraggapan alat penyerapan membuat kitaran lengkap dan sistem yang stabil selepas 8 jam serta, prestasi alat penyerapan kesejukan sama pada setiap penyelidikan nilai akan prestasi dapat dikira pada setiap satu jam yang bergantung pada nisbah bahan penyejuk dan bahan penyerap. Kemudian, graf nilai akan prestasi melawan masa (jam) dilukis dan dianalisis. Nilai akan prestasi akan meningkat sekiranaya suhu alat pembangkit tenaga bertambah serta penurunan suhu pada alat penyerap dan alat kondensasi. Juga, suhu yang rendah pada alat penyerap penting untuk mengawal suhu pada keseluruhan sistem yang mempengaruhi nilai untuk prestasi alat penyerapan kesejukan. Sebagai kesimpulan, jumlah maksimum nilai untuk prestasi nisbah ammonia/air adalah pada 30% ketulenan ammonia dalam larutan dengan nilai 2.97 nilai untuk prestasi.

TABLE OF CONTENTS

LIST OF SYMBOLS

g	-	Gram
L	-	Liters
ml	-	Milliliters
Q	-	Heat transfer
S.G.	-	Standard gravity
T	-	Temperature
W	-	Work
η	-	Efficiency

LIST OF ABBREVIATION

COP	-	Coefficient of performance
CFC	-	Chlorofluorocarbon
CHP	-	Combine Heat Power
DCC	-	Double condenser couple
HFMAE	-	Hollow fiber membranes absorber heat exchanger
PHEFFA	-	Plate heat exchanger falling film type absorber
DACM	-	Diffusion absorption cooling machine
VAR	-	Vapor absorption refrigeration
CGS	-	Co-generation systems
HFC	-	Hydro fluorocarbons
HCFC	-	Hydro chlorofluorocarbons
ODP	-	Ozone depleting potential
GWP	-	Global warming potential

LIST OF FIGURE

LIST OF TABLE