



Cairo University

# **DESIGN OPTIMIZATION OF A PROPYLENE ABSORPTION REFRIGERATION CYCLE USING COMMERCIAL HYDROCARBON CUTS**

By

**Yara Magdy El Said Ahmed**

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the Degree of  
**MASTER OF SCIENCE**  
in  
**Chemical Engineering**

FACULTY OF ENGINEERING, CAIRO UNIVERSITY  
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Under the Supervision of  
  
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Approved by the  
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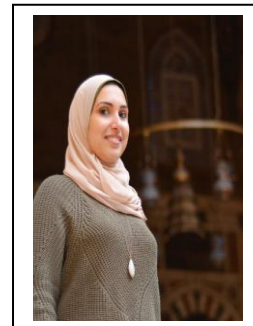
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**Title of Thesis:**

Design optimization of a propylene absorption refrigeration cycle using commercial hydrocarbon cuts

**Key Words:**

Absorption Refrigeration; Commercial Hydrocarbon Cuts; COP; Solvent-refrigerant pairs.

**Summary:**

This work aims to demonstrate the behavior and efficiency of single effect VARC using commercial propylene as a refrigerant along with six commercial Cuts (Stabilized Condensate, Heavy Reformate, Reformate, Light Reformate, Heavy Naphta and Light Naphta). Different operating conditions (evaporation and absorption temperatures) were studied to demonstrate their effect on the cycle COP and pumping power requirements.

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## **Dedication**

I dedicate this thesis to my father, mother and sister hoping that I'm on the right track for fulfilling their dreams for me and making them as proud of me as I can.

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# Nomenclature

|      |                                                                     |
|------|---------------------------------------------------------------------|
| VCRC | Vapor compression refrigeration cycle                               |
| VARC | Vapor absorption refrigeration cycle                                |
| COP  | Coefficient of performance                                          |
| CFCs | Chlorofluorohydrocarbons                                            |
| SRP  | Solvent-Refrigerant pairs                                           |
| CRP  | Cut-Refrigerant Pair                                                |
| UOPK | Factor determining the nature of oil                                |
| API  | The density of a liquid oil relative to the<br>the density of water |