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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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 the density of water