MINIMIZATION OF BUTANES PERCENTAGE IN LPG TO REDUCE THE IMPORT GAP IN EGYPT

By

Ahmed Mostafa Sadek Shahin

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

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Title of Thesis:

MINIMIZATION OF BUTANES PERCENTAGE IN LPG TO REDUCE THE IMPORT GAP IN EGYPT.

Key Words:

LPG; Volatility; Iso-Pentane; Minimize; Dynamic simulation.

Summary:

The objective of this study is to investigate the possibility of adding other relatively volatile hydrocarbons as ethane, n-pentane and pentanes' isomers (Iso-pentane and neo-pentane) and/or utilizing relatively volatile oxi-hydrocarbons mainly di-methyl ether to increase LPG production without affecting its specification and this will lead to reduce the import gap of LPG in Egypt. The new LPG mixture is adjusted to meet the Egyptian specification of LPG

Disclaimer

I hereby declare that this thesis is my own original work and that on part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledge all sources used and have cited them in the references section.

Name: Date:

Signature:

Dedication

This thesis is dedicated to my mother hoping I am on track to fulfilling her dreams for me. I also dedicate this to my wife.

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Thanks are due to my professor Prof.Dr. Ahmed Soliman for suggesting theses point, follow up, supervising, continuous support, for his patience, motivation, and immense knowledge and for having great trust in me to complete this work. His guidance helped me in all the time.

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Nomenclature

LPG	Liquefied Petroleum gas
NGL	Natural Gas Liquid
J-T	Joule Thomson
ES	Egyptian Standard
ASTM	American Society for Testing and Materials
GPSA	Gas Process Suppliers Association
OVHD	Over Head
DME	Di Methyl Ether
TEG	Tri Ethylene Glycol
2,2DMP	2,2 Di Methyl Propane
RON	Research Octane Number
VOC	Volatile Organic compound

Abstract

LPG becomes popular in the 20th century as source of energy since it is economically feasible to be produced, transported, sold, and stored as a liquid fuel. Extensive researches are performed to increase the production of LPGeither by increasing the recovery of LPG from natural gas processing plants or refineries.LPG in Egypt is considered one of the most important domestic fuels. Egypt imports half of its LPG fuel demand. Many researchers have been developed to increase the production of LPG in Egypt by increasing the productivity of the refineries.

The objective of this study is to investigate the possibility of adding other relatively volatile hydrocarbons as ethane, n-pentane and pentanes' isomers (Iso-pentane and neo-pentane) and/or utilizing relatively volatile oxi-hydrocarbons mainly di-methyl ether to increase LPG production without affecting its specification and this will lead to reduce the import gap of LPG in Egypt. The new LPG mixture is adjusted to meet the Egyptian specification of LPG.

The objective of the current research is achieved through the implementation of the following methodology.

1. Built up the simulation model (Steady stat and dynamic Hysys model) to simulate LPG weathering test (ASTM D-1837) to determine the weathering of LPG sample.

2. Validate simulation models by comparing the simulation output with ASTM D-1837 experiment data that collected from different refineries.

3. Adding relative volatile components as ethane, normal pentane, Iso-pentane, neo-pentane and DME separately to LPG. The volatility of new LPG mixture has been calculated by using the dynamic model of LPG weathering.

4. Various mixtures have been tested and the mixtures that meet Weathering and vapor pressure specificationhave been selected and its cost and heating valuehave been calculated.

5. The effect of adding new components to LPG has been determined and compared to select the applicable blends.

6. Since the neo-pentane gives the optimum result and it does not produced in industrial scale, These provides supposed process scheme for neo-pentane production.