

**PRELIMINARY DESIGN OF PROPYLENE GLYCOL PLANT
FROM PROPYLENE OXIDE AND WATER USING ACID CATALYST
CAPACITY OF 60,000 TONS/YEAR**



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Hereby declare that I am the sole author of this project report, except the quotes, data, summaries, and other materials which I clearly cite their references.

I understand that if it is proven otherwise, my degree may be confiscated.

Surakarta, December 2016



Diah Ayu Anggraeni

MOTTO

DO THE BEST

DEDICATION

I dedicate this work to:

My parents, my beloved mother (Tati Haryati) and my beloved father (Sarjono) who always give support. Thank you for your prayers, love, and support you've given.

My beloved sister, Laras Niken Dwi Cahyani and Retno Ningtyas Tri Wardani who give support.

Thanks to my grandmother who helped take care of me

Thanks also to my future, Hari Prasetyo who always gives support for me

Aisyah Hanifah as a partner working on the final project,, thank you for your cooperation and patience so that you have completed the final project,,

To my classmate Delta, Nanik, Mala, Renda, Anggie and Salam,, thanks for being classmates for four years of college here,,

Friends arms of Chemical Engineering in 2012,, spirit force a friend to get this title,,

PREFACE

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5. Aisyah Hanifah as my partner in final project
6. Family and friends who have given endorsement and prayer
7. Everyone who has supported

Due to the limitations in the preparation of this report. Author aware that this report might have some shortcomings, therefore suggestion and constructive criticism to improve this report are welcome. Author wish this report will be useful for all those who concern.

Surakarta, November 2016

Diah Ayu Anggraeni

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ABSTRACT

Propylene glycol is produced through the hydration reaction of propylene oxide and water with sulfuric acid catalyst. The reaction takes place in the liquid phase under a temperature of 30°C and a pressure of 1 atm. To purify propylene glycol, distillation process is carried out in order to obtain products of propylene glycol with a purity of 99.99%.

Propylene glycol plant with a capacity of 60,000 tons per year requires the raw material propylene oxide of 55,508.77 tons per year and as much water as 5.87 tons per year. The plant was planned to be established in Gresik, East Java with land area of 8,575 m². Utilities supporting processes include water supply of 42,505.13 kg per hour which are processed from Bengawan Solo River, provision of saturates steam per hour 87,545,513.56 Btu/h. The plant's electricity requirements are 286.46 kW, in the form of diesel fuel requirements 2,349.48 liters/hour and the requirement for compressed air for instrumentation 179.99 m³/h.

The economic analysis results show that Percent Return On Investment (ROI) before tax is 32.37% and after tax is 22.66%. Pay Out Time (POT) before tax is 2.36 year and Pay Out Time (POT) after tax is 3.06 year. Break Even Point (BEP) of 46.64%, Shut Down Point (SDP) amounted to 22.74%, and Discounted Cash Flow (DCF) of 30.28%, were obtained from the data result of feasibility analysis can be concluded that the plant is profitable and feasible to be established.

Keywords: Propylene glycol, the hydration reaction, acid catalyst