DESIGN PROJECT REPORT

PRELIMINARY DESIGN OF BUTYL OLEATE PLANT FROM MOLEIC ACID AND BUTANOL CAPACITY 15,000 TONS/YEAR

BY:
AGUNG DWI PRANOTO
D. 500 102 003

SUPERVISORS:
1. Ir. NUR Hidayati MT., PhD
2. EMI ERAWATI S.T., M.Eng.

CHEMICAL ENGINEERING DEPARTMENT
FACULTY OF ENGINEERING
UNIVERSITAS MUHAMMADIYAH SURAKARTA
2014
THE APPROVAL PAGE
UNIVERSITAS MUHAMMADIYAH SURAKARTA
DEPARTMENT OF CHEMICAL ENGINEERING
FACULTY OF ENGINEERING

Name : Agung Dwi Pranoto
NIM : D 500 103 003
Title : Preliminary Design of Butyl Oleate Plant from Oleic Acid and Butanol with Capacity 15,000 tons/year.
Supervisor : 1. Ir. Nur Hidayati M.T., Ph.D.
             2. Emi Erawati S.T., M.Eng.

Surakarta, December 2014

Approved by,

Supervisor I
Ir. Nur Hidayati, M.T., Ph.D.
NIK. 975

Supervisor II
Emi Erawati S.T., M.Eng.
NIK. 989

Dean of Engineering
Ir. Sri Sugiono, M.T., Ph.D.
NIK. 682

Chairman of The Department
of Chemical Engineering
Rois Fatoni, S.T., M.Sc., Ph.D.
NIK. 892
STATEMENT OF AUTHENTICITY

I, the undersigned below:

Name : Agung Dwi Pranoto
NIM : D 500 102 003
Study Program : Chemical Engineering
Final Project Title : Preliminary design of Butyl Oleate Plant from Oleic Acid and Butanol with Capacity 15,000 tons/year

Stating the fact that the final project results that I make and submit this is the result of my own work, except for quotations and summaries that everything I have explained the source. If the final project is plagiarism and other scientific or research work, then I am ready to accept the sanction both academically and law.

Surakarta, December 2014
Author,

Agung Dwi Pranoto
ABSTRACT

Chemical plant of Butyl oleate from Oleic acid and Butanol as raw material with a capacity of 15,000 tons per year is planned to operate for 330 days per year. Butyl oleate-production process is carried out in a Continuous Stirred Reactor Tank (CSTR) with liquidphase catalytic esterification with $\text{H}_2\text{SO}_4$. In the reactor the reaction takes place in the liquid-liquid phase, reversible, exothermic, nonadiabatic and isothermal at 110°C temperature and pressure of 1 atm. This plant is classified as a low risk because of its moderate operating conditions of atmospheric and easy product sales.

Oleic acid requirement for this plant is 1532.29 kg per hour and needs butanol 450.12 kg per hour to produce butyl oleate is 1893.94 kg per hour. The plant was planned established in Gresik, East Java with a land area of 20,000 m². The selection of location due to some consideration, i.e. as raw material of butyloleate plant, butanol, to be imported from the United States and oleic acid, imported from Australia through the port of Tanjung Perak. While sulfuric acid raw material from PT. Sulfindo Adisaha and sodium hydroxide was purchased from PT. Sidowaru. The number of employees 110 people. Utilities supporting processes include water supply of 5,605.24 kg per hour which are processed from Bengawan Solo River, provision of saturated steam per hour 1,567.04 kg. The plant's electricity needs of 500 kW, in the form of diesel fuel requirements of 238.1 liters/hour, and the need for compressed air for instrumentation of 50 m³/h.

Chemical plant of Butyl oleate using fixed capital as much as Rp 369,418,206,279.36 and working capital as much as Rp 141,928,507,967.97. From the economic analysis of this plant showed a profit before tax of Rp 84,782,608,336 per year and after taxes 30% profit reached Rp 59,347,825,835 per year. Percent Return On Investment (ROI) before tax 22.95% and 16.07% after tax. Pay Out Time (POT) before tax 3.03 years and after tax 3.84 years. Break Even Point (BEP) of 53.9%, and Shut Down Point (SDP) of 27.92%. Discounted Cash Flow (DCF) as much as 38% From the data above feasibility analysis concluded that the plant is profitable and feasible to set up.

Keywords: Butyl Oleate, Oleic Acid, Butanol, Continuous Stirred Reactor Tank (CSTR), Sulfuric Acid ($\text{H}_2\text{SO}_4$)
MOTTO

“Surely Allah will not change the fate of a people so that they change their own destiny”
(QS : 13. 11)

No problem that can not be resolved as long as there is a will and, commitment to solve it.

Be strong like a reef hit by waves. Do something useful to you and others.

Life only once, always remember God anytime and anywhere you are, for to him you will return and to him you seek help.
FOREWORD

Assalamu’alaikum Wr. Wb.

Praise beto Allah SWT over abundance of grace, his guidance so Author has been able to complete there port of Preliminary design of chemical plant with the title "Preliminary designof Butyl Oleate Plant from Oleic Acid and Butanol Capacity of 15,000 Tons/Year" well..

This task of pre-design factory of butyl oleateis a task that must be completed by the end of every student Department of Chemical Engineering, Faculty of Engineering, University of Muhammadiyah Surakarta as aprerequisite for completing under graduate studies degree. With this task, the expected ability of reasoning and the application of the theories that have been acquired during the lectures can be developed and can be well understood.

The preparation of this report will not run smoothly without the assistance of the relevant parties. Therefore, Authors wish to thank:

1. Mr.Rois Fatoni ST, M.Sc, PhD, as Chairman of the Department of Chemical Engineering, Faculty of Engineering, University of Muhammadiyah Surakarta.
2. Dr.Ir. H.Herry Purnama, MT, as Academic Advisors.
3. Ir. Nur HidayatiMT., PhD, as the SupervisorI.
4. Ms.Emi Erawati ST, M.Eng, as SupervisorII.
5. Mr.andMrs. Lecturer in Chemical Engineering, University of Muhammadiyah Surakarta for all the guidance and direction.
6. Father, mother, sister, and brother beloved, and the whole family for all the prayers and support.
7. Teammates, Umar Bandi, who patiently and faithfully work together from the beginning to the completion of The Task of this Preliminary design.
8. All friends of Chemical Engineering class of 2010.
9. All parties who help to the completion of The Task of this Preliminary design of Butyl Oleate plant.
Due to the limitations in the preparation of this report. Author aware that this report might have some shortcomings, therefore suggestions and constructive criticism to improve this report are welcome. Author wish this report will be useful for all those who concern.

Wassalamu’alaikum Wr. Wb

Author
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