

PRELIMINARY PLANT DESIGN OF
RICINOLEIC ACID FROM CASTOR OIL
CAPACITY 1 TONNE/DAY



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2003

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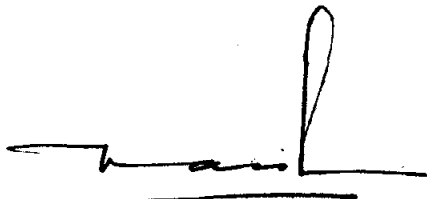
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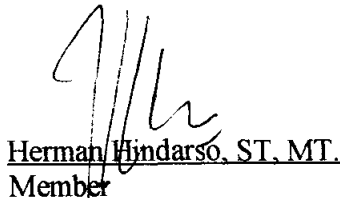
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Surabaya, 23rd of August 2003



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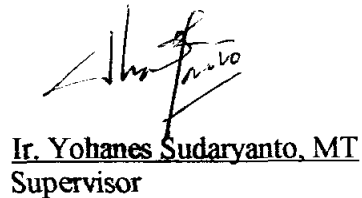
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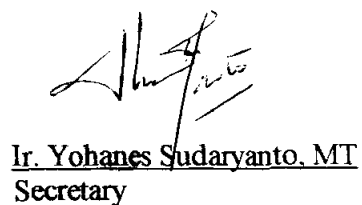


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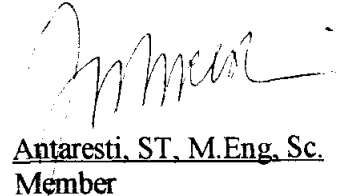
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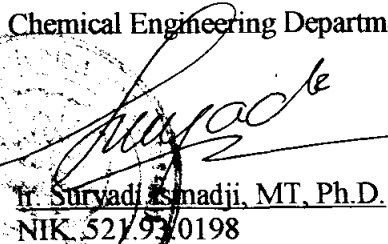
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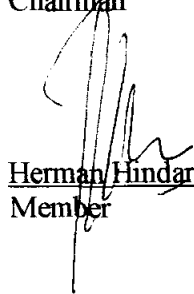
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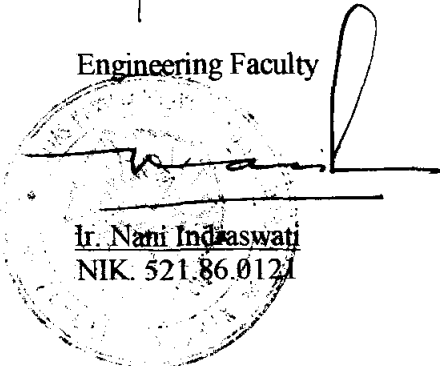
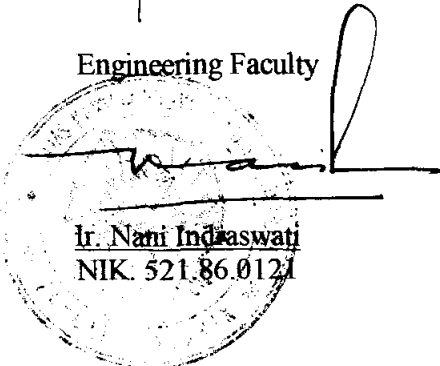


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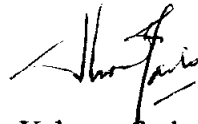
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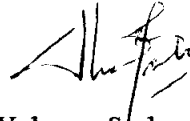


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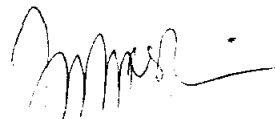
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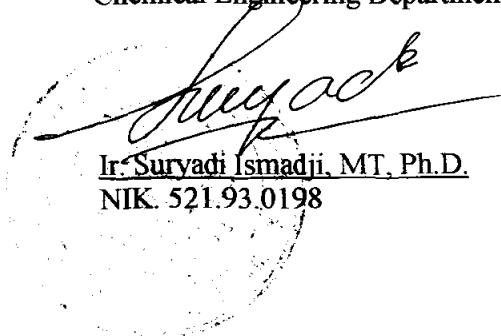
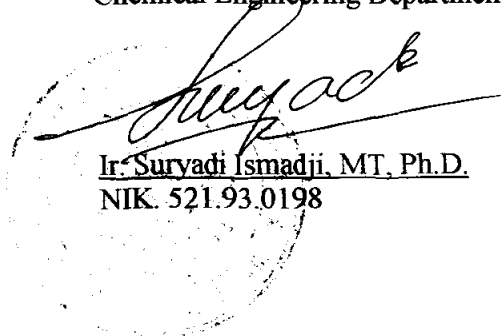
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PREFACE

High quality matter with less expensive price is always needed and wanted. The Ricinoleic acid we produced fullfils this statement. In the future we hope that our final assignment, "Ricinoleic Acid Plant Design", would be able to help the bad economical situation in Indonesia.

We would like to express our appreciation to the followings,

1. Ir. Nani Indraswati, Dean of Engineering Faculty
2. Ir. Suryadi Ismadji, Ph.D, Head of Chemical Engineering Department
3. Ir. Yohanes Sudaryanto, MT, Supervisor
4. Widya Nugraha, for her helpful reviews
5. Our teachers, friends and also to those who are too many to be listed by name that has contributed their kind assistances.

Any further comments and suggestions for the improvement of this final assignment would be gratefully received.

Surabaya, August 2003

Writers

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ABSTRACT

Castor oil is the main source of ricinoleic acid because of its high concentration of triglyceride ricinoleate. There is many uses of ricinoleic acid in chemical industries such as raw material for nylon polyester, grease, synthetic lubricant, paint additives, and many other usage. In Indonesia the needs of castor oil become high these days, it can be seen at BPS import data which can be predicted the need in 2006 is about 2250 tonne.

The splitting of ricinoleic acid from castor oil starts with the hydrolysis process, where triglyceride fatty acid splits to fatty acid. Then, ricinoleic acid separated in distillation column from other fatty acid and unsplit triglyceride.

This plant is feasible to be built because of the abundance of the raw material used, where most of these raw materials are produced in Semarang. Semarang is an industrial area; therefore the product's marketing is easier and cheaper. Thus, Semarang is chosen to be the plant location. From the process, this plant is feasible because the process is simple and does not require complex equipments.

Based on our planning, this plant is feasible to build technically, environmentally, and economically. Technically, this plant can be built using the condition in this plant design. Environmentally, this plant produce harmless treated-waste product (no pollution). Economically, this plant is profitable. The plant's Total Capital Investment (TCI) is Rp. 5,976,366,185,727.22, where the Fixed Capital Investment (FCI) is Rp. 17,091,612,935.12 and the Working Capital Investment (WCI) is Rp. 5,959,274,572,792.10.

| | |
|-----------------------------|----------------|
| Rate of Return before taxes | : 52.28 % |
| Rate of Return after taxes | : 48.96 % |
| Rate of Equity before taxes | : 78.1 % |
| Rate of Equity after taxes | : 73.24 % |
| Pay Out Time before taxes | : 1.9841 years |
| Pay Out Time after taxes | : 2.1078 years |
| Break Event Point | : 53.89 % |