Project Synopsis

Project Title		
Production of Biodiesel from different sources by Immobilized Microbial Lipase-catalyzed enzymatic transesterification as well as Base-catalyzed chemical transesterification and Comparison of the biodiesels in terms of cost-effectiveness and quality.		
Duration		
60 Days (Sep 20, 2010 – Nov 20, 2010)		
Team		
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Primary Objectives of the Project

Production of biodiesel from Soybean oil, Rapeseed oil, Waste Vegetable Oil (WVO) and *Jatropha curcas.*

Production of biodiesel by Immobilized Microbial Lipase-catalyzed enzymatic transesterification and also by Base-catalyzed chemical transesterification.

Comparative studies on the cost-effectiveness of using different transesterification processes for the production of biodiesels from different sources.

Comparative studies on the quality parameters of the biodiesels produced from different sources using different transesterification processes.

Secondary Objectives of the Project

Production & conservation of glycerin for its suitable use.

Production & conservation of Bio-oil.

Drafting methods for the production of Biogas.

Design & Process Simulation of the manufacturing plant for the industrial production of biodiesel.

Proposal and analysis of the use of genetically modified microorganisms for higher expression of lipase.

Technical Details

Biodiesel is a major source of renewable energy and bears utmost importance for its use as a substitute of petro-diesel in automobile engines.

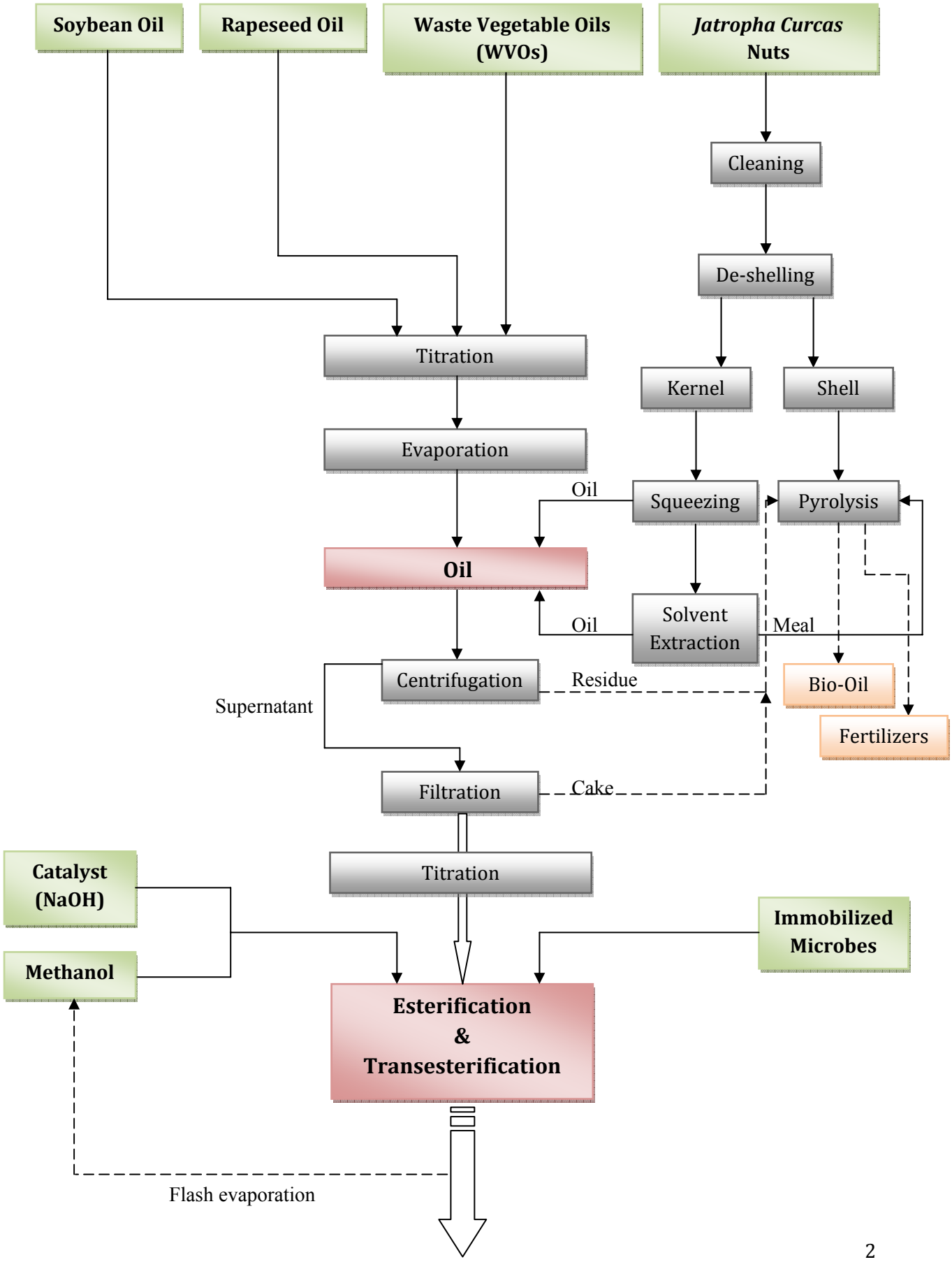
Chemically, biodiesel can be characterized as Fatty Acid Methyl Esters (FAME).

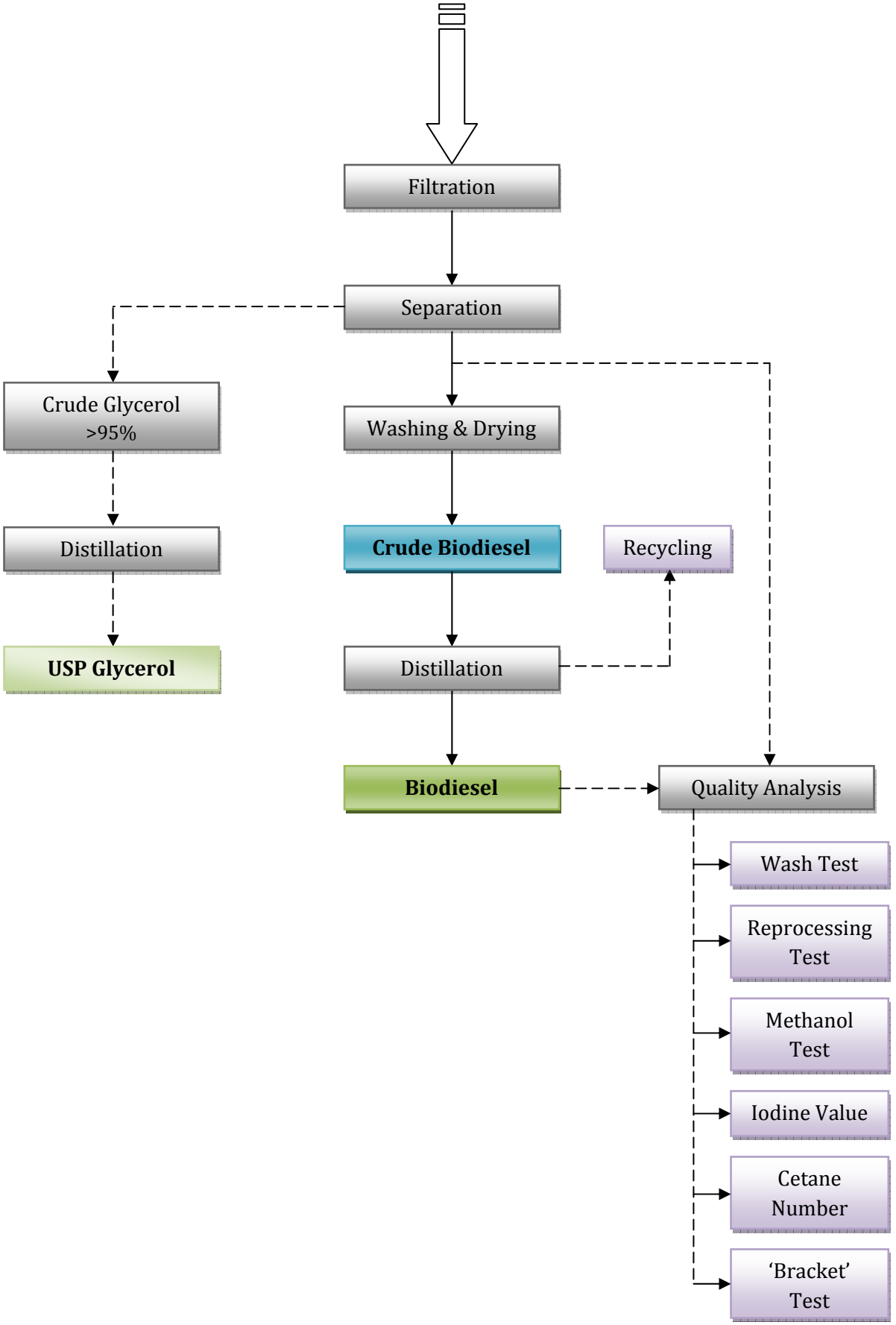
It can be produced from plant oils or animal fats or triglycerides by the process known as transesterification, along with the production of glycerin as byproduct.

Transesterification can be done chemically as well as enzymatically.

In this process chemical transesterification will be carried out using methanol and base (NaOH/KOH) as catalyst; and enzymatic transesterification will be carried out with immobilized microbial lipases.

Process Flow Diagram




Filtration
Separation
Crude Glycerol >95%
Washing & Drying
Distillation
Crude Biodiesel
Recycling
USP Glycerol
Distillation
Biodiesel
Quality Analysis
Wash Test
Reprocessing Test
Methanol Test
Iodine Value
Cetane Number
'Bracket' Test

Innovativeness

KOH will be used as catalyst in chemical transesterification for its easy use and better performance compared to NaOH.

Following are the microorganisms that will be tested for there performance in enzymatic transesterification as whole cell biocatalyst:

- *Candida antarctica* immobilized with Hydrotalcite or Zeolite
- *Arthrobacter sp.* Immobilized with Celite
- *Pseudomonus fluorescens* immobilized with Kaolinite.

Effectiveness

This project will focus on the analysis of overall production cost and the comparative quality of biodiesels produced from different sources using different transesterification processes, keeping the Indian economical and agricultural aspects in purview.

Market Potential & Competitive Advantages

Upon successful completion of this project entrepreneurial initiatives can be imparted on the medium scale production and marketing of biodiesel economically.