

# Abstract for Biodiesel Production

*Ensymm abstract for biodiesel production considering feasible low capacity micro diesel production line*



# MICRO BIODIESEL ABSTRACT

Consumption and demand of petroleum products increases every year due to growing population, living standard as well as urbanization. Today's diesel engines require clean burning and stable fuel that performs efficiently under the variety of operating conditions. Biodiesel is the only alternative fuel that can be used directly in any existing unmodified diesel engine. Due to its similar properties to diesel fuel, biodiesel can be blended at any ratio with conventional diesel fuel. In many industrialized countries, biodiesel is produced from soybean, rapeseed, sunflower, peanut, etc., which are essentially edible. Among various vegetable oil sources, non-edible oils are suitable for biodiesel production (edible oils are already

in demand and too expensive than fuel). Biodiesel is a mixture of ester-based, oxygenated fuels derived from natural, renewable biological sources such as vegetable oils. Biodiesel operates in compression ignition diesel requiring no essential engine modifications. Moreover, it can maintain the payload capacity and range of conventional diesel. Biodiesel fuel can be made from new or used vegetable oils and animal fats. Unlike fossil diesel, pure biodiesel is biodegradable, nontoxic and essentially free of Sulphur and aromatics.



## Advantages of Biodiesel

1. Produced from sustainable / renewable biological source
2. Ecofriendly and oxygenated fuel
3. Sulphur free, less CO, HC, particulate matter and aromatic compounds emissions
4. Income to rural community
5. Fuel properties similar to the conventional fuel
6. Used in existing unmodified diesel engines
7. Reduce expenditure on oil imports
8. Non toxic, biodegradable and safety to handle

# BIODIESEL FACTS

- Fuel created from vegetable oil or animal fat
- Small-scale producers generally use vegetable oil
- Able to use in traditional diesel engines
- Can be blended with diesel fuel
- Produced in small or large quantities



## Major Oilseed Crops

- Soybean
- Cotton seed
- Sunflower
- Canola/Rap seed
- Flax seed
- Safflower

## Other Oil Producing Crops

- Corn
- Peanut
- Camelia
- Palm
- Olive
- Coconut

## Process Technology-Two General Methods

### 1. Solvent Extraction

- Standard technology for facilities with daily capacities of greater than 300 tons per day

- Commonly used in conjunction with some form of mechanical extraction

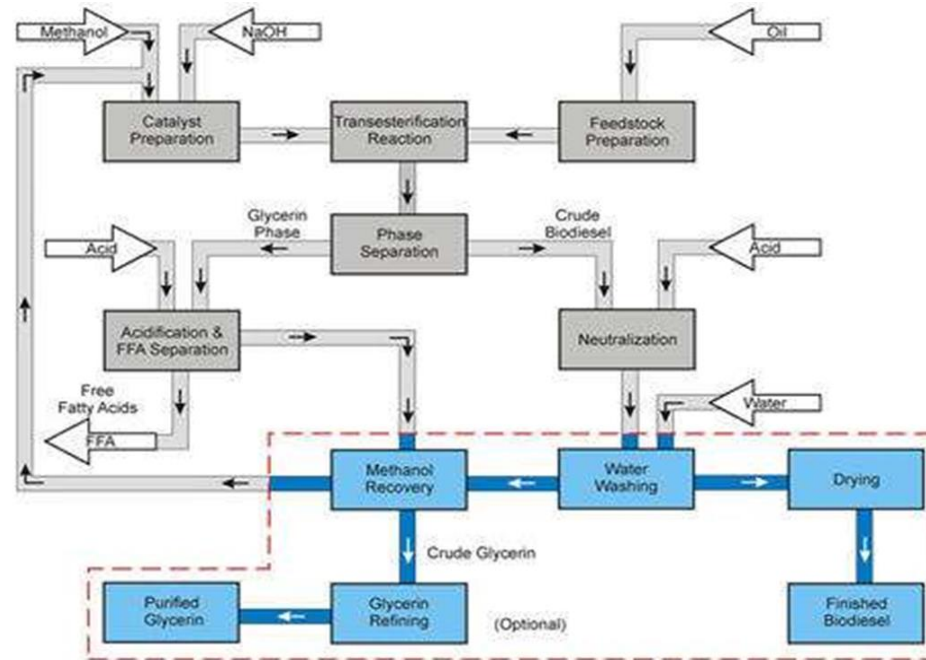
### 2. Mechanical Extraction

- Typically used for facilities with daily capacities of less than 150 tons per day



# BIODIESEL PROCESS

- Basic Overview
  - Inputs: Oil, Alcohol & Catalyst
  - Outputs: Biodiesel & Crude Glycerin
  
- Sample Recipe
  - Oil 100 parts
  - Alcohol 10 to 20 parts
  - Catalyst 0.5 to 3 parts
  
- Outputs
  - Biodiesel 100 parts
  - Crude Glycerin 10-20 parts



# PROCESS EQUIPMENT

## ❖ Pre-Reaction Equipment

- Oil storage tank
- Alcohol storage tank
- Catalyst storage
- Biodiesel “reactor”
- Pumps, filters, plumbing

## ❖ Post-Reaction Equipment

- Settling tanks and/or separating equipment per batch
- Washing equipment
- Drying equipment
- Biodiesel storage tank
- Glycerin storage tank in the package varies
- Pumps, filters, plumbing

## Biodiesel Equipment

- Small scale
- 75 to 300 gallons
- Fewer
- Usually not sold as “kits”
- Accessories included
- Typically higher



## Biodiesel Production Units

As *Micro Diesel Production Lines* become more and more popular, ensymm offers these units for different capacities and with different features. This kind of Biodiesel production units can be operated simply and close to raw material sources also in rural regions.

ensymm introduces two different price efficient production units (see following table). Furthermore, ensymm offers sophisticated production lines with much higher capacities (please ask in case of interest).

# BIODIESEL OPERATION

Model	Capacity/Batch (90min)	Feature
e-250-A	250 l	Without electric controller
e-250-B	250 l	Electric controller
e-250-Plus	250 l	Electronic controller, internet remote control
e-1000	1000 l	Electronic controller, internet remote control

The given pictures show how simple the Biodiesel operation basically works. The first picture shows a pressing unit: oil gets worn out of a natural source like e.g. peanuts or olives. The second picture illustrates the reactor in which the oil (also cooking fat or pig fat could be used) gets refined within 90 min per batch by adding chemicals and heat.

The third picture shows also a reaction boiler. On the last picture, the control unit can be seen.



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