clean burning alternative fuel

Biodiesel Technology

FENIX®

ООО «ТИ-СИСТЕМС» ИНЖИНИРИНГ И ПОСТАВКА ТЕХНОЛОГИЧЕСКОГО ОБОРУДОВАНИЯ
Интернет: www.tisys.ru www.tisys.kz www.tisys.by www.tesec.ru www.ти-системс.рф
Телефоны: +7 (495) 7774788, 7489626, 5007155, 54 Эл. почта: info@tisys.ru info@tisys.kz info@tisys.by

BioDiesel Fuel - Growing a new energy economy.

A biodegradable and eco-friendly product, biodiesel fuel provides one answer to future fossil fuel shortages.

Devastating long-term ill-effects of limited fossil fuel reserves, industrial & automotive emissions and greenhouse gases have focused the attention of policy makers and others throughout the world to search for alternative energy sources.

Solar radiation, wind and biomass are resources for generation of alternative energy in vast quantities of which biomass is already proven for techno-economic viability for commercial production of a major alternative energy - BIODIESEL. The U.N. framework for climate change [Kyoto Protocol, 2005] mandates member nations to reduce greenhouse gas emission through increasing use of biofuels i.e. bioethanol and biodiesel.

Global production of biofuels is growing steadily and will continue to do so despite financial slowdown. The world biofuel market's value is likely to attain a CAGR of around 14.7% during 2006-2016. The rapid development of the global biodiesel industry has been closely observed by countries interested in stimulating economic growth, improving the environment and reducing dependence on imported oil.

Chemically speaking, biodiesel is the methyl ester of long chain fatty acids derived from vegetable oils and animal fats. It can be used in compression ignition engines (diesel engines) directly, the engine needing minor or no modifications.

Raw Material for Biodiesel Production :

Biodiesel can be commercially produced from various sources (edible as well as non-edible oil seeds, dead wood and leaves, agri-wastes, food processing wastes – both kitchen and industry ,etc.). Oil seeds are the most important, abundantly available and low-cost raw material.

Different regions of the world do not have the benefit of possessing the same vegetable oil or animal fat in plentiful supply. Thus raw materials for biodiesel production have become geographically region-specific. Palm oil seeds in Malaysia, animal fats in Japan, soybean seeds and animal fats in the US, canola seeds in Canada and rapeseed and animal fats in Europe are examples. India has taken up Jatropha [Jatropha curcas] seeds as the major raw material. The plant may yield more than four times as much fuel per hectare as soybean, and more than ten times that of maize (corn). One crop of jatropha from a hectare produces about 1890 litres of biodiesel.

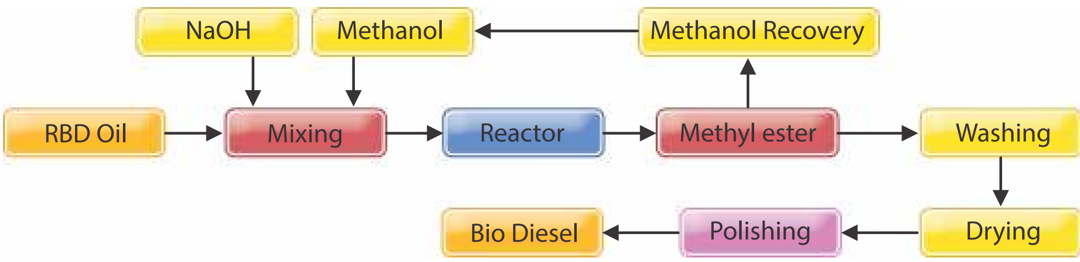
Advantages of Biodiesel Over Petrodiesel :

- Less dependence on limited fossil fuel reserves
- Improved ignition
- Higher engine efficiency
- Better lubricity
- Much lower greenhouse gas emission
- Lower particulate emission
- Not toxic, free of sulphur
- Safest fuel to store and handle
- Much higher flash point
- No aromatics or carcinogens
- Biodegradable

Fenix Technology for Biodiesel :

Fenix biodiesel process uses trans-esterification reaction followed by neutralization and washing steps. The two-step trans-esterification converts nearly 100 percent of the triglycerides in the oil or fat to biodiesel (methyl ester). The excess methanol is recovered, and the biodiesel dried in the same step. Finally, the biodiesel is filtered to remove potential impurities formed below the process temperature. In essence, the steps are, trans-esterification, washing, drying and polishing.

FENIX BIODIESEL : PROCESS FLOW DIAGRAM



Glycerine Recovery

Glycerine generated in the two-step trans-esterification reaction is recovered and neutralized. The excess methanol is recovered and the glycerine dried in the same step. This recovered glycerine is “crude” as it is less than 99 percent pure and contains more than the 0.01 percent salts which is the maximum permissible limit allowed in technical grades of glycerine. The salts are formed from the reaction of the caustic and the acid used in the trans-esterification process. The salts are removed when the glycerine is distilled or refined to a technical or better grade.

Water Recovery

Water recovered from the water wash decanter, strippers, and methanol distillation is recycled back in the Fenix process for washing the biodiesel and diluting the acid and caustic.

Feedstock Quality

Fenix trans-esterification process is most efficient when the content of phosphorus and fatty acid of the feedstock is nearly equivalent to that of RB oil (refined and bleached oil). Removing phosphorus and fatty acids is critical to producing high quality of biodiesel at the lowest cost. Phosphorus and fatty acids are inhibitors to the reaction and decrease conversion and yield resulting in increased processing cost.

Methanol Recovery

For higher conversion of triglycerides in the reactor, about 100 percent excess methanol is used. This excess methanol must recovered and reused for two reasons : (i) Cost of methanol is comparatively high with respect to that of biodiesel and (ii) ASTM standard for biodiesel dictates a high flash point which means allowable methanol content must be minimal.

In the Fenix process for biodiesel, practically all excess methanol is recovered by fractionation and recycled back to the trans-esterification reactor. Highly efficient structured packing of Fenix is used in the fractionating column.

Fatty Matter Recovery

A separate fatty matter recovery step is incorporated in the Fenix process if the feedstock has a high free fatty acid (FFA) content. Otherwise, the small amount of fatty matter like mono- and di-glycerides generated in the trans-esterification reaction is skimmed off or decanted from the glyrerine storage tank.

Energy

Fenix design minimizes the energy required by using gravity both for separation and flow from vessel to vessel. The design incorporates heat economizers to cool one stream while heating the other.

The Fenix - Shutek Process for Biodiesel:

Fenix has exclusive technology collaboration with M/s Shutek Oleo S A of Costa Rica for Biodiesel.

Shutek Oleo has developed its unique process which meets all international quality standards parameters at optimal cost of operation. The Shutek process is cost wise very competitive. The process consists of the following steps which guarantee maximum yield and better quality.

- Feed preparation
- Catalyst preparation
- Trans-esterification (Batch/Continuous)
- Separation of Glycerols
- Continuous countercurrent washing of ester
- Vacuum drying
- Filtration
- Methanol recovery and rectification
- Vent scrubbing
- Glycerine purification

A FENIX-SHUTEK BIODIESEL PLANT RECENTLY COMMISSIONED

Advantages of Shutek Process

1. Zero effluent & Zero emission of gases - environment friendly
2. Built in accordance to API standards - increased safety
3. 100% Methanol recovery - lower operating cost
4. Continuous Glycerin separation - increased yield
5. Flexibility for batch and continuous operation
6. More than 98 % conversion
7. Incorporated heat recovery system - lower energy consumption
8. Advance process control with high degree of instrumentation - increased reliability
9. Vertical start of the plant, operator friendly layout - short project duration
10. Cost competitive with best quality product – comparatively low capital investment
11. Multi feed stock
12. Can handle any level of FFA

FENIX®

Fenix Process Technologies Pvt. Ltd.

K 6/1, Malini
Erandwane Co-op. Housing Society
Near Mangeshkar Hospital
Opp. Sevasadan School, Erandwane
Pune - 411004. India.

Representative: