Biodiesel Production - A Meat and Potatoes View

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by

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Basic Biodiesel Decisions

Five most important questions

- What technology do I use?
- Where do I get my feedstock and what does it cost?
- What am I going to do with my biodiesel and byproducts?
- Can I make it safely and protect the environment while still making a profit?
Biodiesel Production Schematic

- **Reactor**
  - Oil
  - Methanol
  - Catalyst

- **Separator**
  - Methyl Ester
  - Glycerin (50%)

- **Acidulation and Separation**
  - Acid
  - Free Fatty Acids

- **Methanol Removal**
  - Crude Glycerin (85%)

- **Neutralization and Methanol Removal**
  - Wet Methanol

- **Impurity Removal**
  - Acid
  - Resin, absorbent or water

- **Dryer**
  - Used Resin, absorbent or water
  - Water

- **Finished Biodiesel**
  - Methanol Storage
Biodiesel Technologies

What technology do I use?

- Basic technology – mixing + catalyst + washing
  - Versatile, batch or continuous, cheap

- New emerging technologies
  - There always is a trade off
  - New type of mixing, different type of catalyst, different way of removing impurities
  - Technologies from other processes
Biodiesel Feedstocks

Where do I get my feedstock and what does it cost?

- Seed or plant oil
- Animal fats
- Waste Vegetable Oil (WVO)
- Other…
  - Off spec, waste products, opportunistic
Feedstock Type Comparison

Animal fats
- Less expensive
  $0.34/lb average
- Higher sulfur
- FFA 5-50%
- Less available
- Higher gel temp.
- More stable
- Lower Sterol Glycosides

Seed oil
- More expensive $0.42/lb average
- Lower or no sulfur
- FFA <5%
- More plentiful
- Lower gel temp
- Less stable
- Higher Sterol Glycosides
Biodiesel and Byproducts

What am I going to do with my biodiesel and byproducts?

- Biodiesel for your own use or to sell
  - ASTM D6751, Government regulations, incentives, purity level of products, taxes

- Byproducts for your own use or to sell
  - Government regulations, purity level of products, disposal concerns
Production and Regulations

Can I make it safely and protect the environment while still making a profit?

- Knowledge of the process, technology, and chemicals used
- Understand the safety concerns of the process and equipment
- Research the government and environmental regulations – local, state, federal
Problem Solving Tips

- What goes in must come out
- Do mass balances
- Make test batches in the lab
- Make it wrong in the lab
- Visual appearance - first check of quality
- Know the affects of temperature on your product, process and reactions
Problem Solving Tips

- Free Fatty Acid (FFA) can be a problem
- Minimize water in reaction phase
- Understand the process and equipment
- Feedstock determines the biodiesel properties
- Soap produced is difficult to remove
- Sample and test frequently when troubleshooting
Some Final Advice

- Details do matter
- Feedstock preparation is so important
- Everything in the process is inter-related
- Ask an expert – it will save you time and money in the long run
- Know your market and customer
- Do what is best for the biodiesel industry
What is on the Horizon?

• Solid catalyst
• New feedstocks
• Small niche plants
• Low energy plants
• Integration with other processes and plants
• New or different technologies to make biodiesel
Resources

Rudy Pruszko, John Van Gerpen, Davis Clements, Brent Shanks, and Gerhard Knothe, *Building a Successful Biodiesel Business*

Available from [http://www.biodieselbasics.com](http://www.biodieselbasics.com)
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