Green Biodiesel

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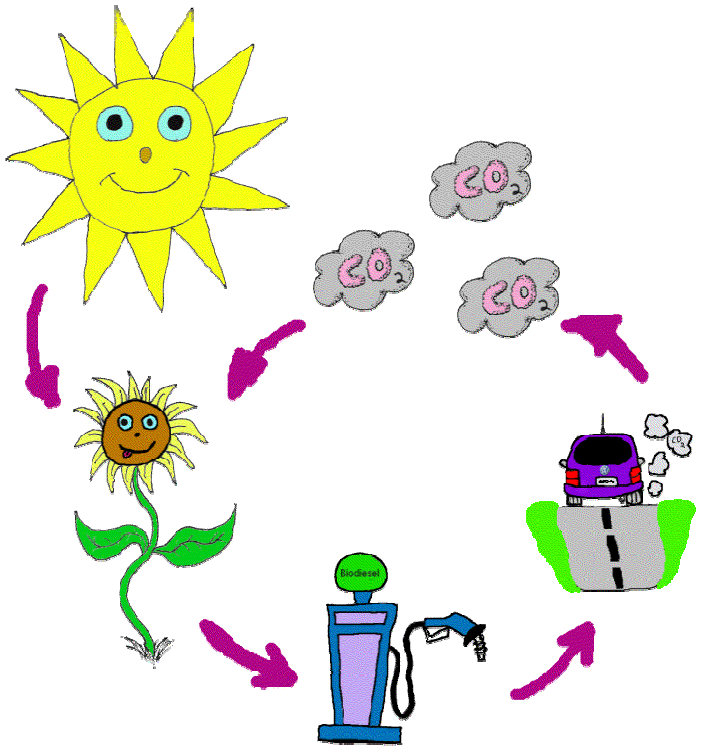
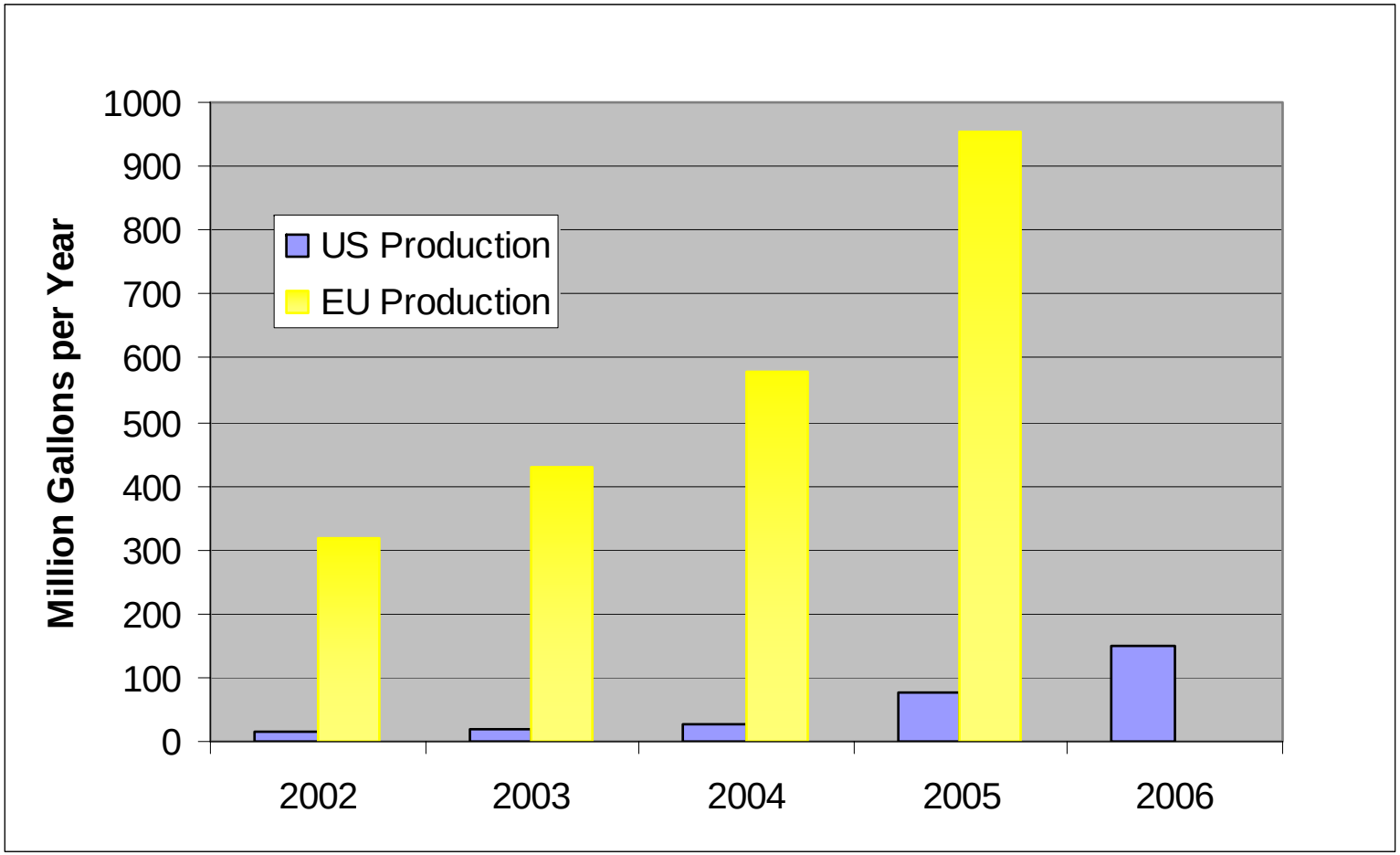
Overview

- Biodiesel and its importance
- Comparison of biodiesel production processes
- Current and future research

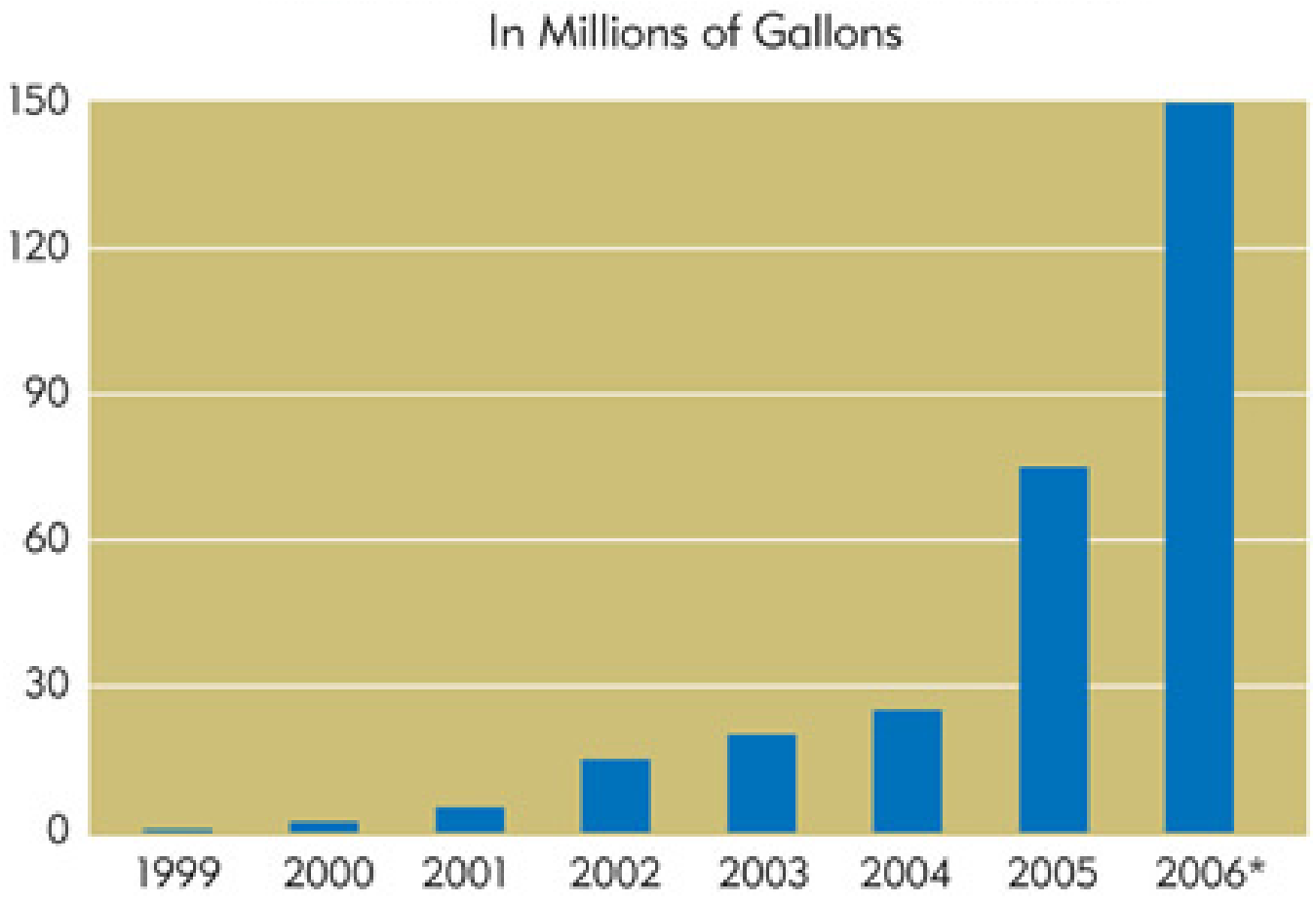


Biodiesel Production



Source: European Biodiesel Board, National Biodiesel Board

US Biodiesel Production



*Projected estimate
Source: National Biodiesel Board estimates

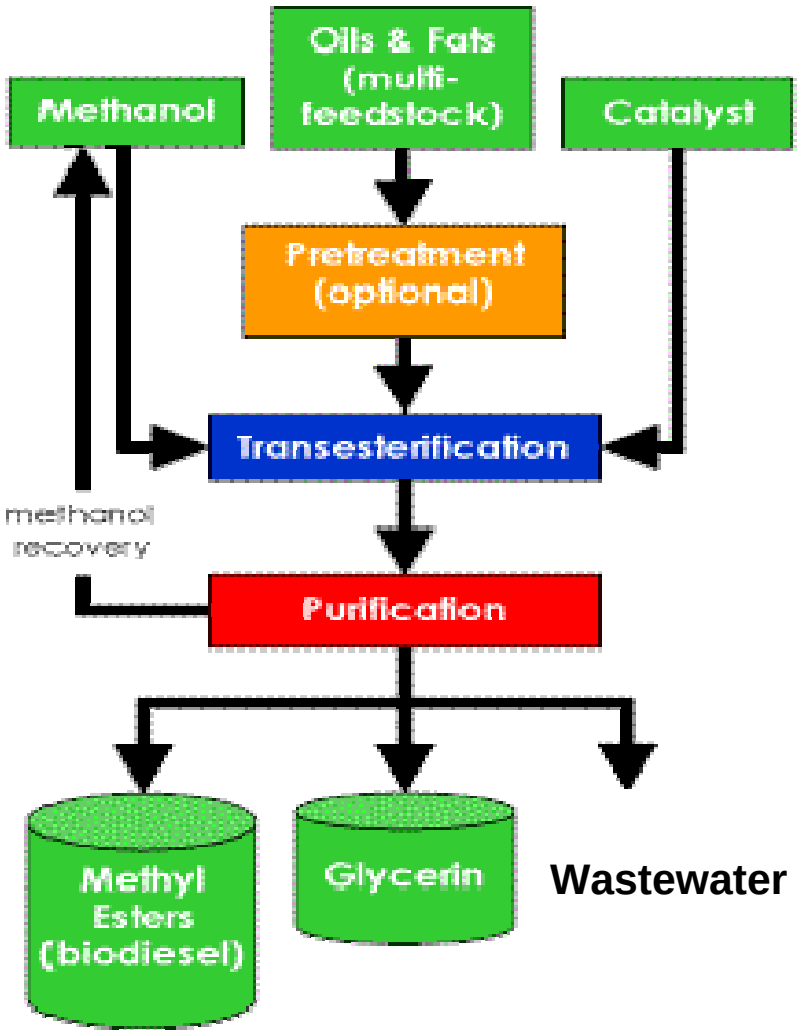
Vegetable Oil Feedstocks

- Corn
- Soy
- Palm
- Cottonseed
- Canola
- Jatropha
- Algae

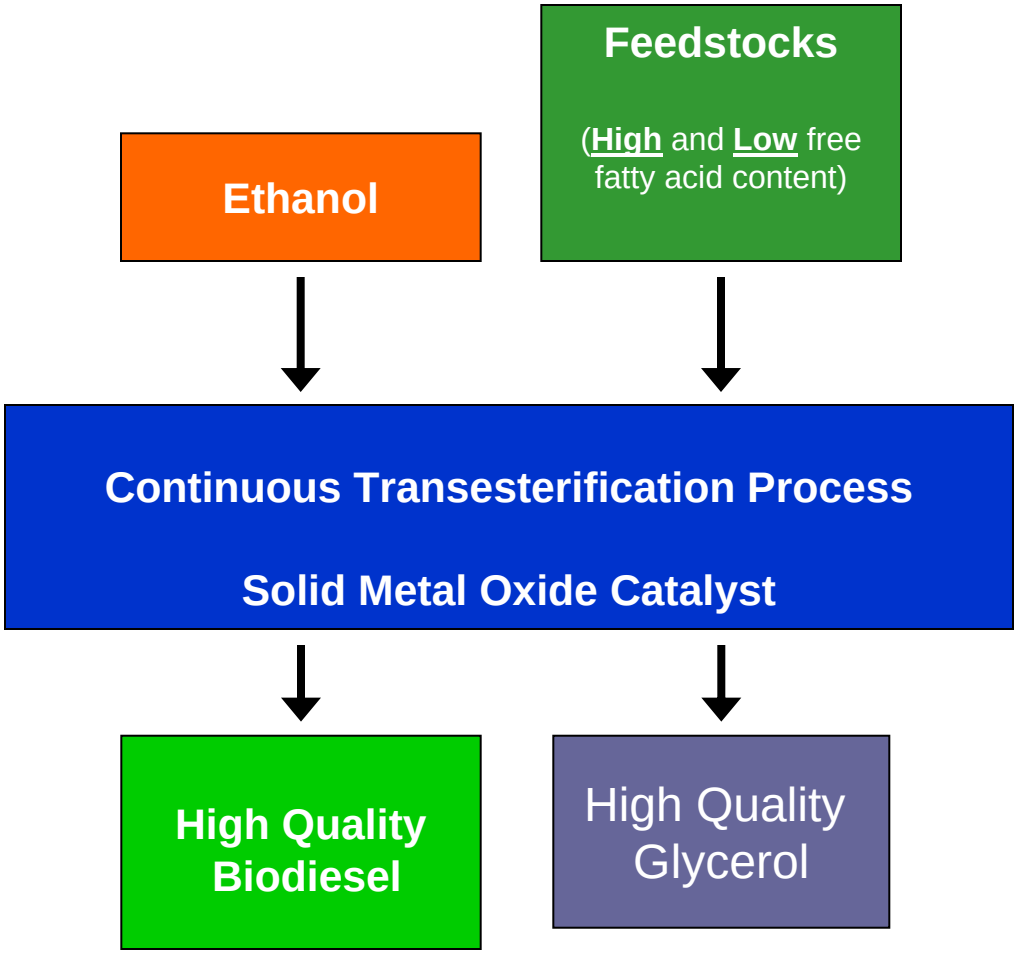
Biodiesel Chemistry

- Veg.oil (fatty acids) + m(ethanol) > glycerol + biodiesel
- Reactants immiscible – reaction at interface
- Liquid catalyst versus solid catalyst
- Low pressure/temperature versus high press/temp

Conventional Biodiesel Process



Green Biodiesel Continuous Process Using Solid Catalysts



Conventional vs. Green Comparison

	Conventional	Green
Process Type	Batch	Continuous
Catalyst Life	Short (consumed)	Long
Conversion Time	100 minutes	10-20 minutes
Impurities (ASTM)	Catalyst, soap, water, glycerol, glycerides	Glycerol, glycerides
Pretreatment of Fatty Acid (waste oils)	Y	N
Catalyst Mixing Unit	Y	N
Distillation of Glycerol	Y	N
Washing & Wastewater	Y	N

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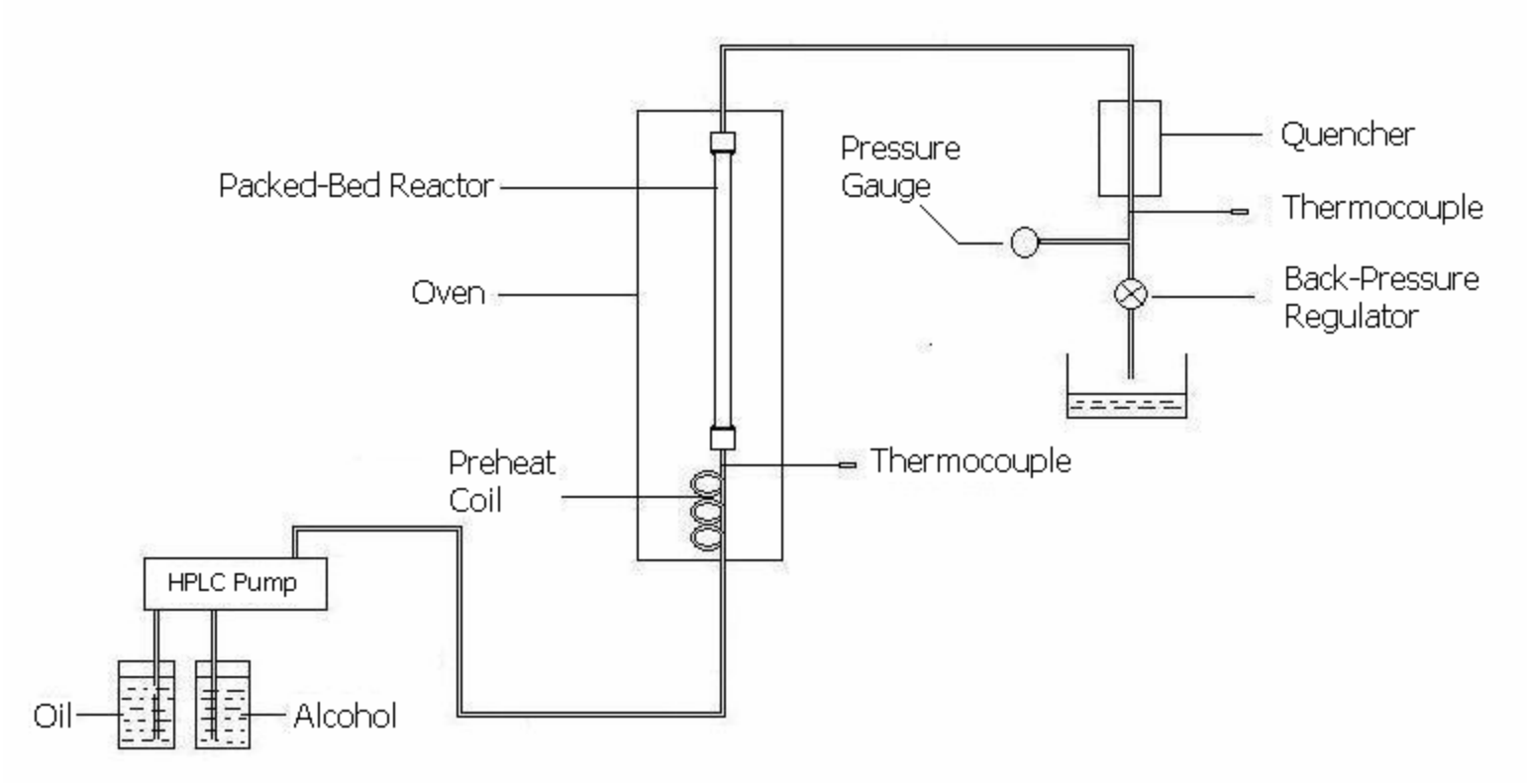
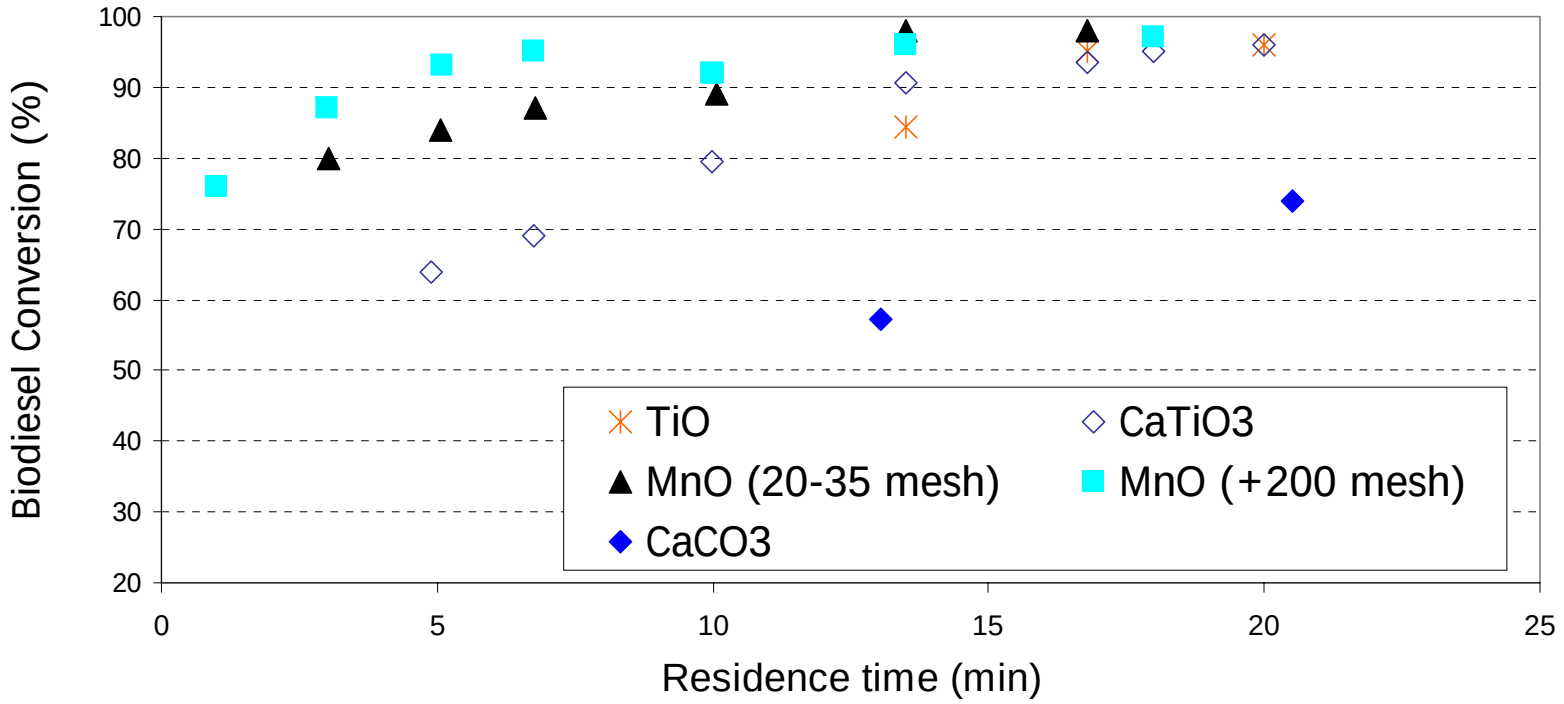
Continuous Packed-Bed Reactor



Schematic Diagram of Lab-Scale Reactor

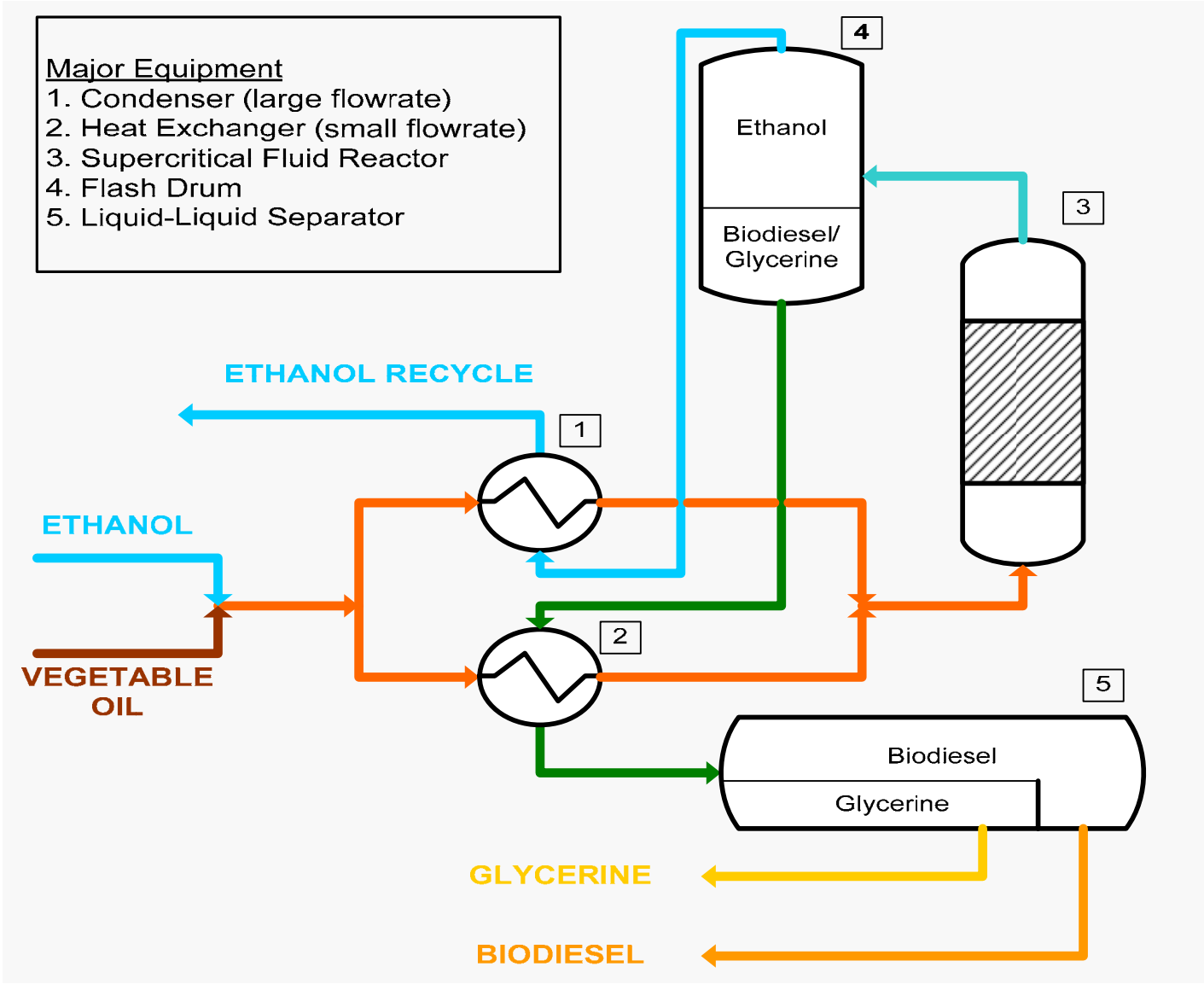
Packed-Bed Reactor Results



Studies

- Rate Constant and Residence Time analysis of catalysts
- Longevity of Catalysts, Regeneration
- Feedstock impacts on product
- Catalytic hydration and hydrogenation

Full Scale Process Diagram

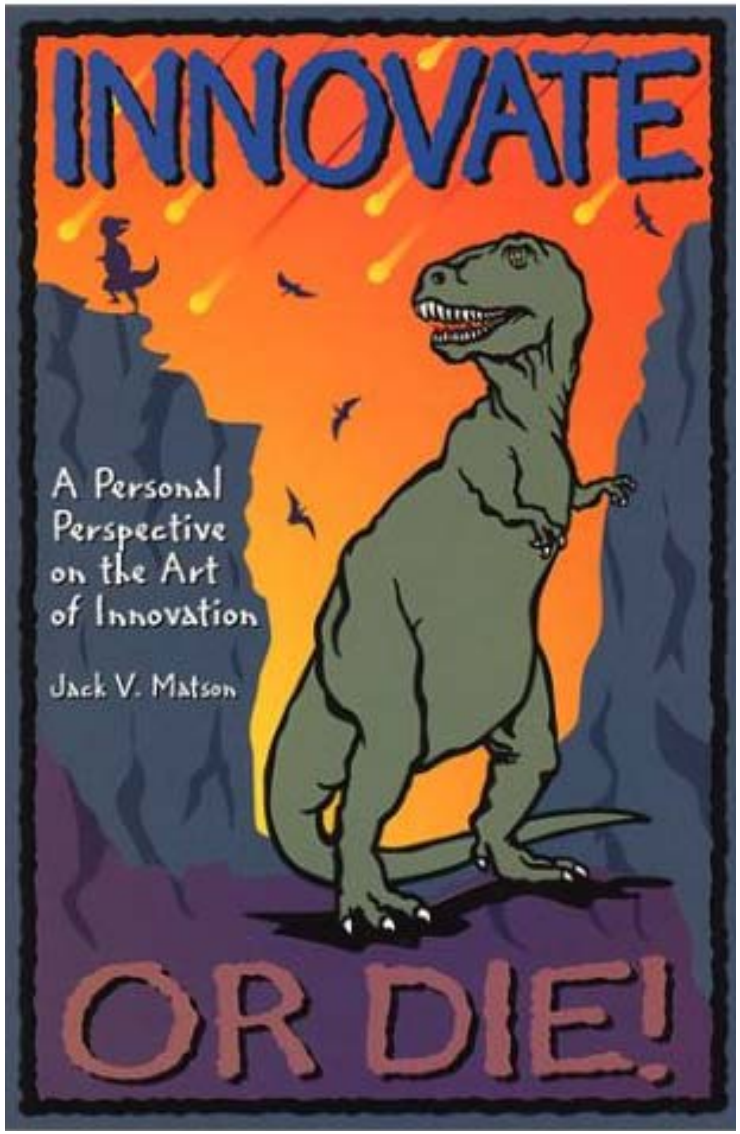


Research and Development Timeline

- Test Catalysts and Reactor Conditions using Bench-scale reactor (4/07 - 10/07)
- Design of Commercial Reactor and Pilot Production Facility (6/07 - 1/08)
- Construction of Pilot Production Facility (3/08)

Summary

- Process accepts all feedstocks w/o pretreatment, producing no **wastewater,**
- **Pilot plant** planned for 2008
- Patent Applied For: June, 2007
- **Partners** to commercialize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