

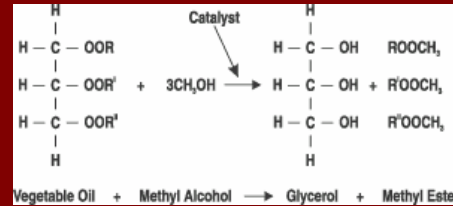
Development of a Pilot Plant to Produce Biodiesel from Waste Cooking Oil to Fuel the Campus Shuttle Bus System



Lynn Bresnahan, Dave Camerota (Class of 2007) and Prof. B. Wayne Bequette (Advisor)

The Reaction...

Vegetable oil is too viscous for direct use in diesel engines without modification. Transesterification of triglycerides produces methyl esters, which are a suitable replacement for petroleum diesel.



The Process...

1. Waste Vegetable Oil (WVO) is filtered to remove any remaining solid particles
2. Sodium Hydroxide and Methanol are mixed to make Sodium Methoxide



Unfiltered WVO



3. Sodium Methoxide and WVO are combined and mixed
4. After the reaction is complete, the products are transferred to a separation flask



Finished Biodiesel floating on a layer of glycerol

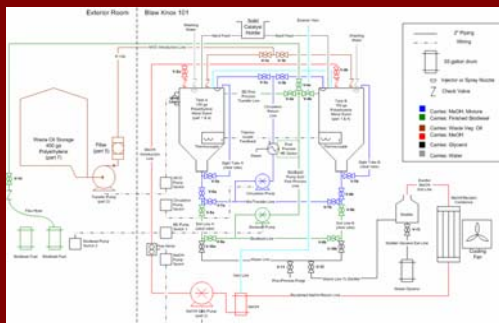
5. Biodiesel separates from the water-soluble glycerol bi-product
6. The biodiesel is washed with water to remove contaminants



Washed biodiesel separating into two phases

Methoxide mixing with WVO

Proposed Plant Design



Process Room in Blaw Knox before renovation

Future Work

- WVO feedstocks can vary greatly from batch to batch
- Triglycerides may form Free Fatty Acids (FFA)
- FFA form soaps during base catalyzed transesterification
- An acid catalyzed pre-step will be developed to esterify FFA
- Alternative uses for glycerol are being explored