# UTAH BIODIESEL SUPPLY

**Biodiesel 101: How To Make It**

## The Basic Recipe (New Oil)

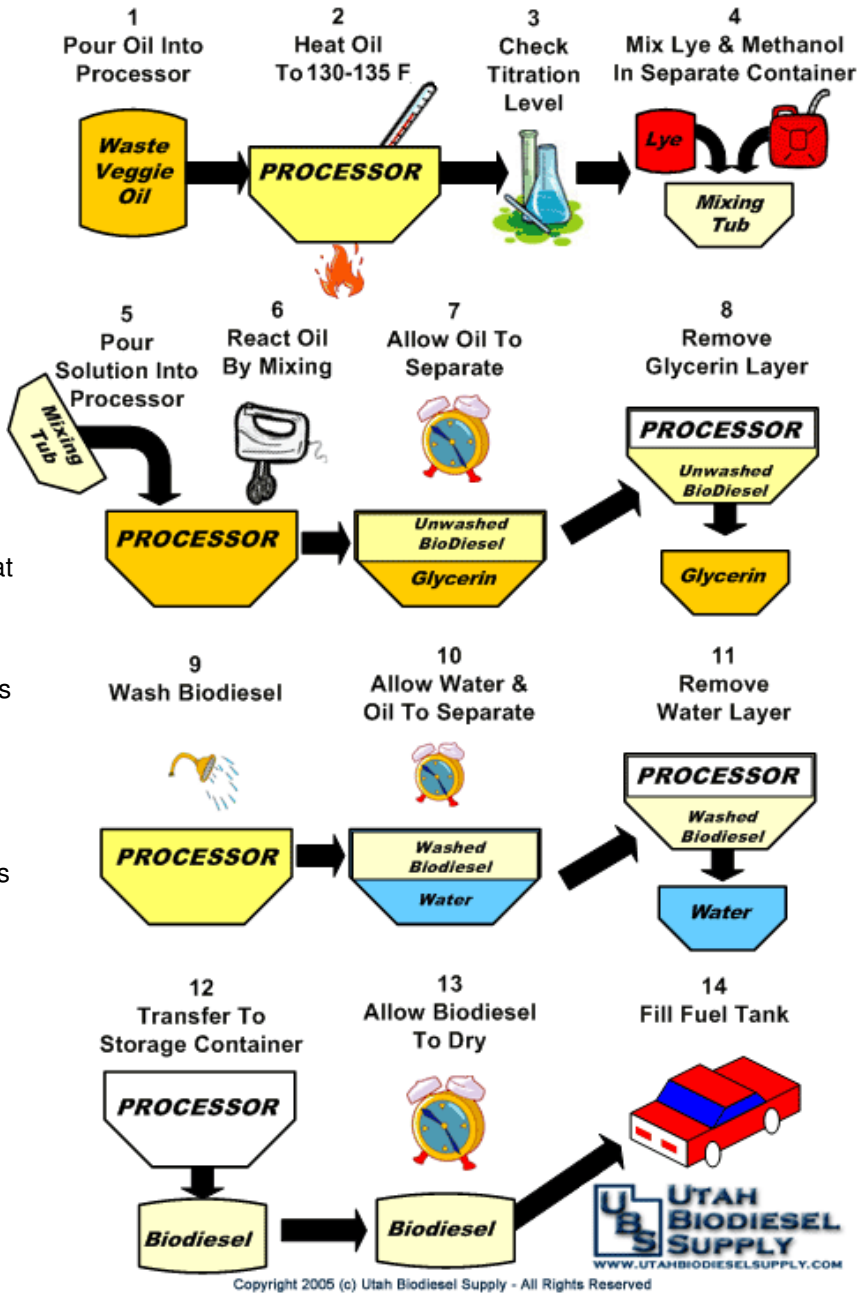
1 liter New Vegetable Oil
200 mL Methanol (Yellow bottle of Heet, racing fuel, etc)
7.0 Grams Potassium Hydroxide (KOH) a.k.a. Caustic Potash a.k.a. “The Catalyst”
*OR*
5.5 Grams Sodium Hydroxide (NaOH) a.k.a. Caustic Soda a.k.a. Lye a.k.a. “The Catalyst”
1- Dissolve Catalyst into Methanol (this is called Methoxide)
2- Heat Oil to 120-130 deg F
3- Turn off heat & add “Methoxide” to Heated Oil
4- Stir Methoxide into heated oil
5- Allow to sit for about 2-4 hours
6- Drain off Glycerin & Wash with water

## Recipe For Used Oil

1- Start with a known amount of oil.
2- Oil Amount X 0.20 = Methanol required
3- Titrate Oil = Strong Base required
4- Mix Methanol & Strong Base together until fully dissolved
4- Heat oil to 130-135 ° F
5- Kill heat source & add methoxide to oil
6- Mix for 2 hours
7- Allow to sit for 18-24 hours
8- Drain off glycerin
9- Wash out excess contaminants
10- Remove any water by drying the Biodiesel
11- Add final product to diesel tank
12- Drive away!

## EXAMPLE:

1- Add 100 liters of oil to processor & turn on the heat
2- Measure out 20 liters of Methanol
3- Titrate oil using KOH as strong base
4- Assume a Titration of 3.
5- 3 + 7 = 10 grams per liter. 10 X 100 = 1,000 grams
4- Add 1,000 grams of KOH to the methanol
5- Allow the KOH to fully dissolve
6- Once the oil hits 130 deg F, kill the heat
7- Slowly add the KOH/Methanol mixture to the processor
8- Mix everything in the processor for at least 2 hours
9- After 2 hours, allow it to sit for 18-24 hours
10- After it's sat, drain off the glycerin
11- Transfer it to a wash tank
12- Wash and dry the Biodiesel
13- Once dry, add it to the fuel tank & drive away!



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## ADDITIONAL RESOURCES:

**Utah Biodiesel Suply – www.utahbio.com**
**Collaborative Tutorial – biodieseltutorial.utahbiodieselsupply.com**
**Make-Biodiesel – www.make-biodiesel.org**

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## Titrating Used Oil For FFA% Content

### The Basic Method

**Items Needed**

- 1 Pint of Isopropyl Alcohol (the higher the % purity the better)
- 1 Liter of distilled water
- 1 Gram of Catalyst (either NaOH or KOH-should be the same as what you'll make your biodiesel with)
- 3 Small Cups
- 3-4 Small Syringes
- Ph Indicator (Phenol Red, Phenolphthalein, or Turmeric Powder)
- Sample of oil to titrate
- Calculator & some paper

**Make Titration Solution**

1- Add 1 Gram "Catalyst" to 1 liter distilled water
2- Mark as POISONOUS!!!

**Prepare Titration**

1- Add 10 mL Isopropyl Alcohol to titration cup
2- Add 1-2 drops of pH Indicator
3- Add small amount "titration solution" to "blank the titration"
4- Add 1 mL Oil Sample to titration cup
5- Dissolve Oil & Alcohol (heat can be your friend)

**Perform Actual Titration**

1- Fill second cup with 30 mL Titration Solution
2- Fill a syringe with 10 mL Titration Solution
3- Add 1 mL Titration Solution to Titration Cup & watch for color change
4- Repeat adding Titration Solution until color changes & stays changed for 30 seconds or more
5- Record amount of solution used to change color

**Calculating Catalyst Required**

X = Amount of solution used in mL
7 = KOH as catalyst
5.5 = NaOH as catalyst
O = Oil to be converted in liters

**Formula:**

If using NaOH for catalyst
(5.5 + X ) * O = Total Grams of Catalyst to use

**Helpful Information:**

3.87 liters to 1 gallon

**Example:**

Using a KOH solution, it took 5 mL titration solution to turn the indicator
We have 40 gallons of oil we want to convert to Biodiesel
A) 40 gal * 3.87 = 155 liters
B) 155 Liters X .20 = 31 liters of methanol
C) 7 (base) + 5 (titration value) = 12 grams (So for every liter of oil, we'll use 12 grams of KOH)
D) 155 X 12 = 1860 grams

**So, to make this into Biodiesel…..**

155 liters of oil
31 liters of methanol
1860 grams of KOH
Heat, Stir, Let Settle & Wash

**ADDITIONAL RESOURCES:**

**Utah Biodiesel Supply – http://www.utahbiodieselsupply.com/titrating.php (example videos and details)**
**Collaborative Tutorial – http://biodieseltutorial.utahbiodieselsupply.com (then click on Titrating Oil)**
**Murphys Machines – http://www.murphysmachines.com (click on How To Do A Biodiesel Titration)**