

## Titration Test of UCO, Using Oilybits Titration Kit

Titration is the process used to find out how much catalyst is required to make biodiesel out of waste vegetable oil

The most common catalysts used are Potassium Hydroxide (KOH), or Sodium Hydroxide (NaOH - AKA Lye) Oilybits always recommend using KOH as it is more forgiving than NaOH, and produces a liquid glycerol waste which is less difficult to dispose of and will not block your reactor pipe work should it solidify

You should titrate using the same catalyst that you are using to make your biodiesel

The chemistry of what's going on during a titration is to see how much of a base it's going to take to neutralize the free fatty acids (FFA's) in a sample of the same oil you're using to make biodiesel

### Materials Required:

3x Mixing Beakers, 100 ml capacity  
3x Syringes, 1 ml (For Oil), 5 ml (For Titration Solution), and 10 ml (For Isopropanol)  
Isopropanol (Isopropyl Alcohol)  
Potassium Hydroxide (KOH) or Sodium Hydroxide (NaOH) Titration Solution, 0.1 % Catalyst With Water  
Phenolphthalein PH Indicator solution

### Label Bowls:

Bowl 1- Titration Solution (For ease of dispensing only)  
Bowl 2- Isopropanol (Isopropyl Alcohol) (For ease of dispensing only)  
Bowl 3- Titration Test

### Prepare The Bowls:

Half fill Bowl #1 with Titration Solution for ease of sucking into 5 ml Syringe  
Half fill Bowl #2 with Isopropanol (Isopropyl Alcohol) for ease of sucking into 10 ml Syringe  
Using 1 ml Syringe, add 1 ml of Oil to Bowl #3  
Using 10 ml Syringe Add 10 ml of Isopropanol (Isopropyl Alcohol) from Bowl #2 to Bowl #3  
Mix the oil & Isopropanol together until it's a consistent solution  
Using Bottle Dropper add 4 drops of Phenolphthalein to Bowl #3

### Titration Process:

Using 5 ml Syringe, draw 5 ml of Titration solution from Bowl #1  
Add Titration Solution slowly from the syringe into Bowl #3, watching for a colour change  
Holding the bowl in your hand, swirl the mixture around as the Solution is added  
If the color change goes away, add more solution from the syringe  
Repeat above until the color change stay's for at least 30 seconds  
Record from the scale on the Syringe, how many ml of Titration solution you added to Bowl #3 to maintain the color change

### Titration Calculation – For UCO (Used Cooking Oil) Only:

If you're using KOH (Potassium Hydroxide) - Add 7 to the result from the Titration Process  
If you're using NaOH (Sodium Hydroxide) - Add 5.5 to the result from the Titration Process  
The result will be how many grams of catalyst you require per litre of oil

### Example:

If 100 liters of oil to be converted to biodiesel

If titrated to 4

If KOH, add 7 to 4 = 11 grams/liter X 100 liters = 1100 Grams  
If NaOH, add 5.5 to 4 = 9.5 grams/liter X 100 liters = 950 grams

So, Add 1100 grams of KOH or 950 grams of NaOH to the methanol to make biodiesel using this oil

### Accounting For Catalyst Purity:

In many cases it will be difficult to find 100 % pure KOH or NaOH. To account for this, divide the "BASE" by the purity;

If KOH is used and it's 90 % pure, then divide 7 by .90 (7/.90 = 7.8)  
If NaOH is used and it's 95 % pure, then divide 5.5 by .95 (5.5/.95 = 5.8)

Now, instead of using 7 or 5.5, use the "corrected" numbers to calculate how much catalyst is needed

### Comments:

It is recommended to perform a titration 3 times and record the results. If the results are close (+/- 0.25), then you can proceed. If they are not close, you should repeat the tests ensuring that you follow the steps exactly until your results are close

Only use one syringe / bowl for one purpose, so as not to cause cross contamination. The Oilybits Titration Kit features 3 sizes of syringe and 3 bowls, to both ensure the best accuracy in measuring, and to ensure that the risk of cross contamination is reduced

To save using a calculator or, or getting these instructions out every time, install the FREE Oilybits Titration Calculator "Web-App" for Iphone and Android - visit our website for instructions and find the app in your mobile browser at [www.oilybits.com/app](http://www.oilybits.com/app)

