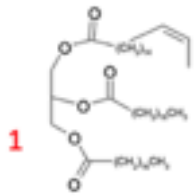
Name_____

Report Worksheet for Biodiesel

Lab Period_____

1. Fill in the Reaction table…



1

Triacylglycerol (Triglyceride)

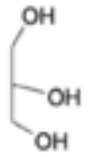
$C_{57}H_{106}O_6$

3

$HO-CH_3$

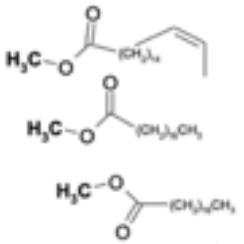
Catalytic

NaOH



1

Glycerol



1

1

1

$\sim C_{19}H_{36}O_2$

Amt.						
Conc.	~0.9g/mL, ~880g/mol	0.79g/mL, 32.0g/mol	40.0 g/mol	0.88g/mL, 130.2g/mol	~300g/mol	
mmol						
Equiv.			Not Applicable	Not Applicable	Not Applicable	

Calculation Tips: The KOH is catalytic so it will not be your limiting reagent and should not be apart of the equiv. calculation.
Note that 1 mole of Triglyceride reacts with 3 moles of CH_3OH.

Example Calculation

If you have 1 mmol Triglyceride (TG), 2 mmol Methanol and 0.5mmols of KOH, the Methanol is the limiting reagent….

The KOH is catalytic, it keeps getting used then regenerated in the mechanism, it will not runout.

The 1 mmol Triglyceride (TG) would be the limiting reagent if the reaction stoichiometry was 1 to 1 but its not…

$$\frac{2\text{mmol Methanol}}{} \left| \frac{1\text{ mmol Triglyceride}}{3\text{ mmol Methanol}} \right. = 0.67 \text{ mmol Triglyceride will react, then the Methanol will fun out.}$$

We have 1 mmol TG in this example so, Methanol is the limiting reagent and equivalent and yield calculations should be based on it.

For this example; 1 Equiv. of Methanol was used and 3 Equiv. of Triglyceride: (2 mmol TG/(2mmol CH_3OH/3) ~← Notice how I divided the Methanol by 3.

Theoretical yield of the Glycerol:

$$\frac{2\text{mmol Methanol}}{} \left| \frac{1\text{ mmol Glycerol}}{3\text{ mmol Methanol}} \right. = 0.67 \text{ mmol Glycerol}$$

Theoretical yield of the Biodiesel:

$$\frac{2\text{mmol Methanol}}{} \left| \frac{3\text{ mmol Biodiesel}}{3\text{ mmol Methanol}} \right. = 2 \text{ mmol Biodiesel (all the moles of different Biodiesel)}$$

2. Did the Glycerol IR suggest you made Biodiesel? Why?

3. Why did I state that the Biodiesel IR and the Vegetable Oil IR should be so familiar?

4. How long did the Control steel wool ball burn? _____

5. What color was the smoke off the control ball? _____

6. How long did the Biodiesel steel wool ball burn? _____

7. What color was the smoke off the Biodiesel ball? _____

8. Did the Biodiesel gel? ____

9. At what temp. did the Biodiesel gel (If it didn't gel, report the lowest temp. it reached)? _____

10. Would our Biodiesel gel in your car engine on a cold winter day at your home?

11. In commercial production of Biodiesel Fuel, 1.20×10^3 Kg of Vegetable Oil produces 1.10×10^3 Kg of Biodiesel Fuel. This means the weight/weight percent of biodiesel to Vegetable oil produced is… 1.10×10^3 Kg / 1.20×10^3 Kg * 100 = 91.7% Calculate your weight/weight percent yield of Biodiesel from Vegetable oil (assume your Vegetable oil has a density of 0.9g/ml). How does your yield compare to this?