Quantitative Analysis of Vinegar Lab Name: _____

How much acetic acid is in vinegar???

In this lab, you will determine the % by weight of acetic acid in vinegar. This is determined by titrating a measured mass of vinegar with NaOH using phenolphthalein as an indicator.

$$\mathbf{HC_2H_3O_2}\ \text{(acetic acid)} + \mathbf{NaOH} \longrightarrow \mathbf{NaC_2H_3O_2} + \mathbf{H_2O}$$

At the endpoint in the titration, the # of moles of NaOH equals the # of moles of acetic acid. As you can see from the balanced equation, they react in a 1:1 ratio.

Procedure:

1. Obtain ca. 10~15 mL of vinegar (brand #1) in a graduated cylinder. Pour into a clean, 50-mL flask & record the mass of the solution. Add 2 drops phenolphthalein indicator.
2. Set-up a single buret. Prime it & fill it with 0.550 M NaOH solution.
3. Titrate until the endpoint. **Be careful!** You won't be able to back-titrate in this lab. Record initial & final volumes.
4. Repeat with vinegar brand #2.

Data Table:

brand #1: _____

mass of vinegar: _____

initial volume NaOH: _____

final volume NaOH: _____

volume NaOH used: _____

brand #2: _____

mass of vinegar: _____

initial volume NaOH: _____

final volume NaOH: _____

volume NaOH used: _____

Calculations:

The mass of acetic acid titrated in the vinegar is determined this way:

$$\text{Liters } OH^- \times \frac{\text{mol } OH^-}{\text{L}} \times \frac{\text{mol } H^+}{\text{mol } OH^-} \times \frac{\text{g } HC_2H_3O_2}{\text{mol}} =$$

Finally, the % acetic acid in the vinegar is calculated:

$$\frac{\text{g } HC_2H_3O_2}{\text{g vinegar}} \times 100\%$$

% acetic acid in brand #1:

% acetic acid in brand #2: