

Name: \_\_\_\_\_

Chem 10, Section: \_\_\_\_\_

Lab Partner: \_\_\_\_\_

Experiment Date: \_\_\_\_\_

### Titration of Vinegar

#### Experimental Data

	Trial 1	Trial 2	Trial 3
(a) Initial Buret Reading			
(b) Final Buret Reading			
(c) Volume of NaOH (aq) used			
(d) Molarity of NaOH (aq) used			
(e) Volume of Vinegar used			
Color at equivalence point – to be recorded by <i>your instructor</i>			

#### Data Analysis

Write the balanced equation for the neutralization reaction between aqueous sodium hydroxide and acetic acid.

#### *The Molarity of Acetic Acid in Vinegar*

Use your two best sets of results (with the palest pink equivalence points) along with the balanced equation to determine the molarity of acetic acid in vinegar. Show all work for each step in the spaces provided.

Data used $\Rightarrow$	Trial _____	Trial _____
Moles of NaOH used in titration		
Moles of HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub> neutralized in vinegar sample		
Molarity of HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub> in vinegar		
Average Molarity		

### The Mass Percent of Acetic Acid in Vinegar

Use your two best sets of results along with calculated values in the previous table to determine the mass percent of acetic acid in vinegar. Show all work for each step in the spaces provided.

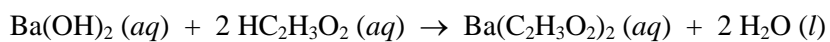
Data used $\Rightarrow$	Trial _____	Trial _____
Mass of $\text{HC}_2\text{H}_3\text{O}_2$ in vinegar sample		
Mass of vinegar sample (assume density = 1.00 g/mL)		
Mass Percent of $\text{HC}_2\text{H}_3\text{O}_2$ in vinegar		
Average Mass Percent		

### Questions

- 1) What was the purpose of the phenolphthalein indicator in this experiment? Be specific.
  
- 2) Suppose you added 40 mL of water to your vinegar sample instead of 20 mL. Would the titration have required more, less or the same amount of NaOH (aq) for a complete reaction? Explain.
  
- 3) Consider a 0.586 M aqueous solution of barium hydroxide,  $\text{Ba}(\text{OH})_2$  (aq).
  - a. How many grams of  $\text{Ba}(\text{OH})_2$  are dissolved in 0.191 dL of 0.586 M  $\text{Ba}(\text{OH})_2$  (aq)?

- b. How many *individual* hydroxide ions ( $\text{OH}^{-1}$ ) are found in 13.4 mL of 0.586 M  $\text{Ba}(\text{OH})_2$  (*aq*)?
- c. What volume (in L) of 0.586 M  $\text{Ba}(\text{OH})_2$  (*aq*) contains 0.466 ounces of  $\text{Ba}(\text{OH})_2$  dissolved in it?
- d. If 16.0 mL of water are added to 31.5 mL of 0.586 M  $\text{Ba}(\text{OH})_2$  (*aq*), what is the new solution molarity?

- e. Suppose you had titrated your vinegar sample with barium hydroxide instead of sodium hydroxide:



What volume (in mL) of 0.586 M  $\text{Ba}(\text{OH})_2$  (*aq*) must be added to a 5.00 mL sample of vinegar to reach the equivalence point? Use your average vinegar molarity (see page 1) in this calculation.