

Chemistry Lab
Microscale Acid/Base Titration
Percentage of Acetic Acid in Vinegar

Acid/base indicators, like the phenolphthalein used in this experiment, change colors depending upon the amount of acid or base in a solution. Phenolphthalein indicator is colorless in acidic solutions like vinegar. Acetic acid is CH_3COOH . It is a weak acid that donates one hydrogen ion in an acid/base reaction. When an excess of base (like sodium hydroxide) is added to acetic acid, the phenolphthalein will turn pink.

In an acid/base titration, generally, the amount of base needed to neutralize a given amount of acid is determined experimentally. In this experiment, the number of drops of sodium hydroxide will be counted until all the acid is neutralized and the indicator turns pink.

Procedure:

- 1) Place the 24-well reaction plate on a piece of plain white paper to help you more clearly see the results of this activity.
- 2) Find the Beral-type-pipet labeled vinegar. Squeeze very gently and place ten drops of vinegar into one of the reaction plate wells.
- 3) Find the Beral-type-pipet labeled phenolphthalein. Squeeze very gently and place one drop of phenolphthalein indicator solution into the well to which you just added the vinegar. Stir with a toothpick. You should observe a colorless solution.
- 4) Find the Beral-type-pipet labeled sodium hydroxide. Add to the same well, one drop at a time, the sodium hydroxide solution. Count each drop, until the colorless sample turns pink and stay pink. You must stir the solution after each drop of sodium hydroxide has been added to obtain the proper results. As you approach the endpoint (the point at which the solution turns and stays pink) you will notice an increase in the amount of stirring necessary to return the solution to its colorless state.
- 5) Record the number of drops of sodium hydroxide solution used. Repeat the procedure five (5) more times in separate wells in the reaction plate, then average the number of drops of sodium hydroxide solution used.

Name _____

Period _____

Microscale Acid/Base Titration

Data:

Number of drops of base required:

Test 1 _____

Test 2 _____

Test 3 _____

Test 4 _____

Test 5 _____

Test 6 _____

Average number of drops of NaOH = _____ drops

Concentration of NaOH = _____ Molar

Number of drops of vinegar per trial = _____ drops

Molecular weight of acetic acid = _____ grams/mole

Assume in acetic acid that 1 liter = 1000g

Post Lab Questions:

1. Calculate the percent of acetic acid in vinegar. Use the following formula:

$$\% = \frac{(\text{_____ drops NaOH}) (0.20\text{M NaOH}) (60 \text{ g/mole Acetic acid})}{(10 \text{ drops vinegar}) (1000 \text{ grams/liter acetic acid})} \times 100 \% =$$

2. Look at a bottle of vinegar. Does your answer to number one make sense?

3. Is it very dangerous to get vinegar on your skin?