

Name: _____

Date: _____

Vinegar/Base Titration

Objective: To use a standardized base solution to determine the concentration of vinegar.

Equipment:

burets buret clamp ring stand stir plate
magnetic stir bar volumetric flasks

Materials:

Molarity of Base: _____ Name of Base: _____

phenolphthalein distilled water

Procedure:

1. Rinse two burets thoroughly with distilled water before beginning the titration.
2. Obtain about a volumetric flask of standard base solution from under the hood. Obtain the same amount of vinegar in a volumetric flask. Record the molarity and identity of the base in your lab book.
3. Partner one: Pour about 10 mL of vinegar into one of the burets and rinse the inside of the surface thoroughly. Allow the vinegar to run out of the buret tip. Fill the buret to slightly above the 0 mL mark. Turn the stopcock until the volume is just below this mark. Record the volume as "Trial 1 initial volume of vinegar."
4. Partner two: Pour about 10 mL of base into one of the burets and rinse the inside of the surface thoroughly. Allow the base to run out of the buret tip. Fill the buret to slightly above the 0 mL mark. Turn the stopcock until the volume is just below this mark. Record the volume as "Trial 1 initial volume of base."
5. Position the burets in the clamps. Label one "vinegar" and the other "base."
6. Place a stir plate underneath the stopcock of the vinegar buret.
7. Place an Erlenmeyer flask (the smaller the volume, the better) under the vinegar stopcock. Add approximately 10.00 mL (± 0.01 mL) to the flask. Record the volume in the vinegar buret as "Trial 1 final volume of vinegar."
8. Add approximately 10 mL of distilled water to the flask and three drops of phenolphthalein. **DO NOT FORGET THE PHENOLPHTHALEIN!**
9. Place the flask on top of the stir plate under the base buret. Slide a magnet into the flask, try not to splash vinegar solution on the sides. Hold a piece of white paper behind the flask so a color change will be easily noticed.
10. Turn on the stir plate. Allow the magnet to freely turn, but not so much that the solution splashes. Dropwise, slowly add base from the buret into the flask. Allow the base to be added until a faint pink color is obtained. The color **MUST** be permanent. This means that it will not go away after moderate shaking, and remains pink for at least 30 seconds.

* IF THE COLOR IS DEEP PURPLE, ASK FOR ASSISTANCE ON WHAT TO DO NEXT!

11. Record the volume of the base buret as “Trial 1 final volume of base.”
12. Discard the solutions and repeat the titration until time is called. Note that the final volumes of trial one will become the initial volumes of trial two. If the burets look like they may run out during the next trial, refill and record the volume of the refilled buret as the initial volume.

Calculations:

1. Write the balanced equation for this vinegar/base reaction.

For EACH trial:

2. Determine the volumes of vinegar and base used. This is found using the initial and final volumes.
3. Determine the number of moles of base used.
4. Use the equation to determine the number of moles of vinegar used.
5. Calculate the molarity of the vinegar solution.

After all trials are complete:

6. Perform a Q Test to determine if the outermost piece of data is an outlier. Use a 95% confidence level.
7. Report a final average of all concentrations that remain.

Conclusion:

Comment on anything that may have caused a deviation from the “true value.” Since you do not know what the “true value” is, you will want to report all significant errors and possible errors.

For further reading:

http://www.sciencebuddies.org/science-fair-projects/project_ideas/Chem_p045.shtml