Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour \_\_\_\_\_

**Titration of an Acid and a Base**

(Honors Chemistry)

**Objectives**

* To observe the quantity of solution remaining in a burette when the equivalence point is reached
* To gain experience in calculating the Molarity of an unknown solution.

|  |  |
| --- | --- |
| **Materials**   * Solution of 0.1-*M* NaOH * Solution of HCl - A (Unknown concentration) * Solution of HCl - B (Unknown concentration) * Solution of HCl - C (Unknown concentration) * Phenolphthalein indicator * Erlenmeyer Flask, 125 mL * Burette * Burette Clamp * Ring Stand * 10-mL graduated cylinder * 100-mL beaker | Burette containing Base  Flask containing acid and indicator |

**Procedure**

1. Set up the apparatus as shown above.
2. Place approximately 50-mL of NaOH solution into a clean, dry beaker.
3. Obtain exactly 10-mL of HCl – A in a 10-mL graduated cylinder.
4. Pour the 10-mL of HCl – A into a clean Erlenmeyer flask.
5. Add 20-mL of distilled water to the Erlenmeyer flask. *(This volume will not be used in your calculations!)*
6. Add 2 drops of phenolphthalein indicator to the Erlenmeyer flask containing the HCl solution.
7. Add 50-mL of 0.1-*M* NaOH to the Burette.
8. Place the flask under the Burette.
9. Turn the stopcock and begin to slowly add NaOH to the HCl. Go very slow!
10. As you are adding the NaOH to the HCl, swirl the flask gently to mix the acid and base.
11. When the indicator changes color, immediately stop adding NaOH to the flask.
12. Record your results in the table below.
13. Repeat steps 3 – 12 for determining the concentration of HCl – B and HCl – C

**Perform all work on this back of this page and then fill in the chart below:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **HCl - A** | **HCl - B** | **HCl - C** |
| Molarity of NaOH |  |  |  |
| Volume of NaOH |  |  |  |
| Moles of NaOH |  |  |  |
| Molarity of HCl |  |  |  |
| Volume of HCl |  |  |  |
| Moles of HCl |  |  |  |

1. Write a balanced equation for the acid-base reaction that occurred during the titration.
2. How many milliliters of 0.1-*M* NaOH solution was needed to neutralize the 10-mL of HCl solution?

|  |  |  |
| --- | --- | --- |
| HCl-A | HCl-B | HCl-C |

3. How many moles of NaOH were needed to neutralize the HCl solution? *Show your work!*

|  |  |  |
| --- | --- | --- |
| HCl-A | HCl-B | HCl-C |

4. How many moles of HCl were present in the HCl solution? *Show your work!*

|  |  |  |
| --- | --- | --- |
| HCl-A | HCl-B | HCl-C |

5. What is the molarity of the 10-mL of unknown HCl solution? *Show your work!*

|  |  |  |
| --- | --- | --- |
| HCl-A | HCl-B | HCl-C |

6. Fill in the table on the front of the page with the answers to questions 2 – 5.