Objective: In this lab, you will determine the percentage of KHP in your unknown as well as the percent error of KHP.

Materials:
- Unknown, KHP
- Phenolphthalein Indicator
- 0.1 M NaOH Solution (previously prepared, use exact molarity determined)
- Desiccators
- 250-mL Erlenmeyer Flasks (3 needed)
- Ring Stand
- Burette Clamp
- Hot Plates
- Scoopula
- Distilled Water
- Burette
- Graduated Cylinders
- Weighing Boats
- Balances

Background:

\[
\text{KHP} + \text{OH}^- \rightarrow \text{KHP}^- + \text{H}_2\text{O}
\]

Pre-Lab:
1. In general, what is the Arrhenius acid-base theory?
2. What is the Bronsted-Lowry acid-base theory?
3. A solution is prepared by dissolving 25.8g of magnesium chloride (MgCl}_2\text{) in water to produce 250-mL of solution. Calculate the molarity of the solution.
4. A 1.32g sample of unknown containing KHP as a component was titrated with 22.48 mL of 0.105 M NaOH to a phenolphthalein end-point. What is the weight percent of KHP (grams of KHP/total grams of sample x 100) in the unknown sample?

Part I Procedure:
1. Carefully weigh to the nearest milligram (0.001g) three clean dry weighing boats. Record the mass of each boat.
2. Weigh out three samples of your dried unknown, approximately 1.000g of each, to the nearest 0.001g. Record the mass of each weighing boat and unknown.
3. Transfer your weighed samples into three different labeled 250- mL Erlenmeyer flasks.
4. Dissolve your unknown samples in 50-mL of distilled water each, warming if necessary to dissolve.
5. Add 10-15 drops of phenolphthalein indicator to your solution of unknown KHP sample.
6. Titrate into your unknown KHP solution using the 0.1M NaOH solution you prepared in Lab I.
7. Titrate until a full color change takes place and persists for at least 15 seconds.
8. A very light pink color is desired if the color turns out a very dark pink you have over titrated and your calculations could possibly be incorrect. It is highly recommended that you go back and repeat the titration with a new sample.
9. Record the amount of titrant added to the solution.
10. Repeat steps 5 – 8 for every trial performed.
11. Perform the necessary calculations. Once you have determined the percent of KHP in your unknown compound based on your calculations, show your instructor to receive the actual values so percent error can be calculated.
12. Clean up your lab area. Return all equipment and supplies to the correct areas.
13. You may not leave lab until the instructor signs you out.

Data:

<table>
<thead>
<tr>
<th></th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
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<tbody>
<tr>
<td>Mass of weighing boat (g)</td>
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<tr>
<td>Mass of unknown KHP (g)</td>
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<tr>
<td>Amount of NaOH titrated into solution (mL)</td>
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Results:

<table>
<thead>
<tr>
<th></th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
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<tbody>
<tr>
<td><strong>Solution Calculations</strong></td>
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<tr>
<td>Moles NaOH</td>
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<tr>
<td>Convert moles of NaOH to Moles KHP</td>
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<tr>
<td><strong>Powder Calculations</strong></td>
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<tr>
<td>Moles to mass KHP</td>
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<tr>
<td>Percent by Weight Composition of KHP</td>
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<tr>
<td>Average Percent by Weight Composition of KHP</td>
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<td>Instructor’s Initials</td>
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**Part II Procedure:**
(To be Completed after Part I Graded and Returned)

Average Percent by Weight Composition of KHP

Actual Percent Composition of KHP

Instructor’s Initials

Calculation of Percent Error:

\[
\% \text{ Error} = \frac{\text{Actual} - \text{Theoretical}}{\text{Theoretical}} \times 100
\]

Final Grade on Lab