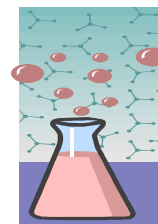


A Titration of Two Strong Acids With Sodium Hydroxide



According to Bronsted and Lowry **an acid is a proton donor and a base is a proton acceptor**. A proton is simply a hydrogen ion (H^+). A strong acid is defined as an acid, which completely dissociates in water, whereas, a weak acid is an acid which only partially dissociates in water. The same statements are true of a strong base and a weak base. Today you will perform a titration, using two strong acids, hydrochloric acid and sulfuric acid, and a strong base, sodium hydroxide.

The reaction between an acid and a base is called a neutralization reaction. In a neutralization reaction, an acid and a base react to form a salt and water. A titration is a process in which an acid is carefully added to a known volume of a base, by using a buret and recording the total volume of acid required to just change the color of an acid-base indicator, or in which a base is carefully added to a known volume of an acid by using a buret and recording the total volume of base required to just change the color of an acid-base indicator. **(By recording the initial and final volume in the buret, you can determine the total volume of acid or base used to completely react with a known volume of a base or an acid).**

Today you will use the acid base indicator, **phenolphthalein**. Phenolphthalein is commonly used when doing a strong acid-strong base titration. Phenolphthalein is **colorless in an acid and pink in a base**.

Procedure:

1. Label two clean Erlenmeyer flasks as A and B using a wax marker
2. Carefully measure exactly 15.0 ml of 1.00 M HCl into flask A
3. Set flask aside
4. Carefully measure exactly 15.0 ml of 1.00 M H_2SO_4 into flask B
5. Add 2 drops of phenolphthalein to each flask
6. Fill the buret with 1.00 M NaOH (**Make sure that you do not fill it above the zero mark on the buret.**)
7. Record the initial reading on the buret
8. Place flask A under the buret and carefully add the NaOH from the buret to the acid in the flask until a **very faint pink color remains** after swirling the flask.
9. Record the final volume in the buret.
10. Repeat steps 7 through 9 for the sulfuric acid (**There is no need to refill the buret but make sure that you do not run the NaOH below the 50 ml mark on the buret.**)

Now it is time to use some "brain power".

Answer the following questions on your tablet or in your lab notebook. Make sure to include all necessary data from the lab as well.

1. Write a balanced equation for both of the neutralization reactions.
2. How are these reactions the same? How do they differ?
3. In both reactions, you measured out 15.0 ml of an acid with a concentration of 1.00 M. How many moles of acid does this represent? **SHOW YOUR WORK.**
4. How many milliliters of 1.00 M NaOH were needed to neutralize the hydrochloric acid? How many ml of 1.00 M NaOH were needed to neutralize the sulfuric acid? (Use your data)
5. Using your answers to question 4 determine how many moles of NaOH you used to neutralize each of the acids. **SHOW YOUR WORK**
6. Explain why you used different volumes (moles) of NaOH for the two acids. Why wouldn't it be the same if both acids are 1.00 M?
7. If you measured out 30.0 ml of .500 M phosphoric acid (H_3PO_4) -how many ml of .250 M NaOH would you need to neutralize the acid?
SHOW YOUR WORK (Hint-start with a balanced reaction).
8. Write a brief paragraph outlining what you learned in this lab activity. Discuss topics such as molarity, balanced equations, and stoichiometric relationships.