

ACID - BASE TITRATION

Pre lab

1. What is the **objective** of this lab activity? _____

2. What **glassware** does your titrant base go into? _____
What **glassware** does your acid of unknown concentration go into? _____
3. What **indicator** will you add to signal the endpoint of your titration? _____
What **color** will indicate the endpoint of your titration? _____
4. Write the **neutralization reaction** used in this titration (between HCl and NaOH):

DATA TABLE

Trial 1		Trial 2		Trial 3	
BASE NaOH	ACID 0.10 M HCl	BASE NaOH	ACID 0.10 M HCl	BASE NaOH	ACID 0.10 M HCl
Exact Volume: 9.94 ml	Final: 28.80 ml	Exact Volume: 10.00 ml	Final: 14.03 ml	Exact Volume: 9.82 ml	Final: 27.18 ml
	Initial: 16.12 ml		Initial: 0.12 ml		Initial: 14.24 ml
	Volume used:		Volume used:		Volume used:

CALCULATIONS

1. Calculate the molarity of the **NaOH (M_b)** using your data.

Trial 1	Trial 2	Trial 3

2. Find the average of the three trials.

Average

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INTRODUCTION

Titration is a technique for determining the **UNKNOWN** concentration (molarity) of a substance by reacting it with another substance of **KNOWN** concentration (the titrant). The titrant is placed in the buret, and the solution of unknown concentration is placed in an Erlenmeyer flask. An indicator that changes color in the appropriate range must be added to the Erlenmeyer flask to show when the titration is complete.

Since acids and bases neutralize each other according to specific molar ratios, this reaction can be used to determine the concentration of an unknown acid or base. In this activity, you will determine the concentration of a hydrochloric acid (HCl) solution by reacting it with a 0.10 M NaOH titrant. You will use phenolphthalein to indicate the endpoint of the titration because it turns from clear to pink at a pH of 8-9. You will try to get a very pale pink color – if your solution turns dark pink or magenta, you have over-titrated and added too much base.

OBJECTIVE

1. Perform an acid-base titration to determine the concentration of an unknown acid.

MATERIALS

buret	ring stand	buret clamp	10 mL graduated cylinder
Erlenmeyer flask	waste beaker	0.10 M NaOH	phenolphthalein
UNKNOWN ACID			

PROCEDURE

1. **Put on your safety goggles.**
2. **Preparation of the buret has been done for you.**
3. Fill the buret with the base if the buret contains less than 20 ml of base.
4. **Check for air bubbles.** If there are air bubbles, place the waste beaker under the buret and open the stopcock. Then tap the buret tip lightly (don't break it) to get rid of any air bubbles.
5. **RECORD** the initial volume (the bottom of the meniscus). (This does not have to be zero).
6. Add between 5 – 10 mL of ? M HCl to a graduated cylinder and **RECORD** the exact volume to the nearest 0.01 mL.
7. Pour the HCl into an Erlenmeyer flask and add 1 drop of phenolphthalein.
8. Use the buret to add base **SLOWLY** to the flask until the indicator just turns A LIGHT PINK COLOR AND THE COLOR REMAINS. This is the end-point or the neutralization point. **RECORD** the final volume of the buret.
9. Dump the contents of the Erlenmeyer into the **WASTE BEAKER**. Rinse out Erlenmeyer with distilled water, and dump water in sink. It is not necessary to dry the flask.
10. Repeat steps 5-9 two more times, for a total of three trials. It is not necessary to fill the buret each time, but **BEFORE BEGINNING ANY TRIAL**, make sure you have enough to complete the titration without running out.
11. Calculate the molarity of the acid for each trial.