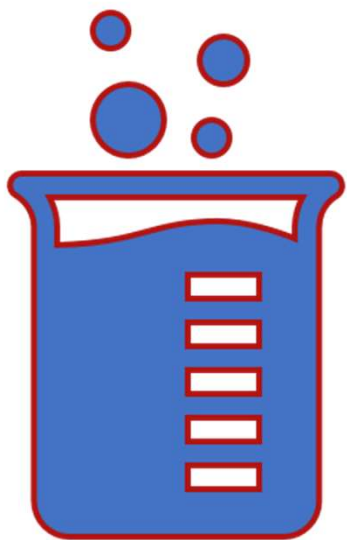


## IDEA PRESENTATION

CHY 1701  
(Engineering Chemistry)

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## OBJECTIVE:

TO DETERMINE THE CONCENTRATION OF ACETIC ACID IN VINEGAR BY REDOX TITRATION

# CONTENTS:

Introduction

Importance

Required Apparatus & Reagents

Principle

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Conclusion

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## ► Introduction:

Vinegars are the one of the most regularly used ingredients in our kitchen. Vinegar is essentially a solution of acetic acid ( $\text{HC}_2\text{H}_3\text{O}_2$ ) in water. The concentration of acetic acid in vinegar may be expressed as a molarity (in mol/L):

Table vinegar typically contains between 4 and 8 % v/v acetic acid (ethanoic acid). It is therefore possible to determine the concentration of acetic acid in vinegar by titrating the vinegar with a strong base such as aqueous sodium hydroxide solution.

## ► IMPORTANCE:

It is important to know the acetic acid concentration of vinegar because it denotes the overall quality of the product. Higher acidic concentration implies that the vinegar is unhealthy for consumption while lower concentration implies that the vinegar is of lower quality.

Hence, an optimal concentration of 4-8 % v/v is to be obtained out of a healthy consumer grade vinegar solution.

In this experiment, we discuss a method to measure the concentration of acetic acid in the vinegar by the titration against known concentration of base (NaOH) and suitable indicator.

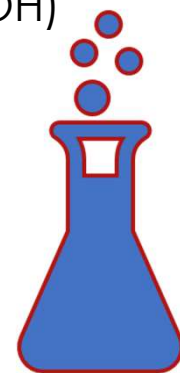
# Chemicals and Apparatus Required:

## Apparatus:

1. Burette (50ml)
2. Pipette(5 or 10 ml)
3. Titration Flask
4. Wash bottle with distilled water
5. Burette Stand
6. Funnel

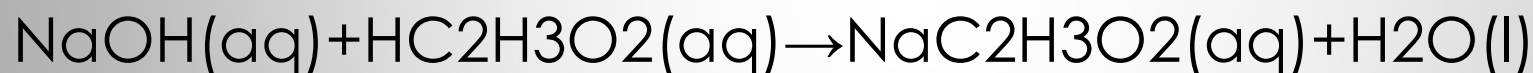
## Reagents:

1. Standardized Alkali (0.1 M NaOH)
2. Bench Vinegar
3. Phenolphthalein



# Principles:

NaOH (base) can be titrated against Acetic Acid in presence of phenolphthalein as indicator in lab in order to calculate the unknown concentration of the acid.

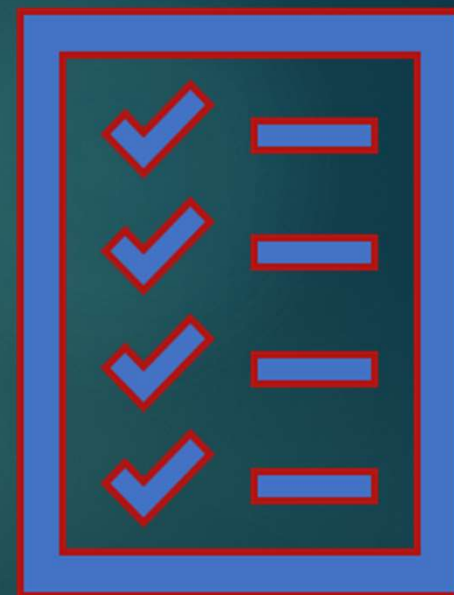


(pink colour denotes the completion of the titration)



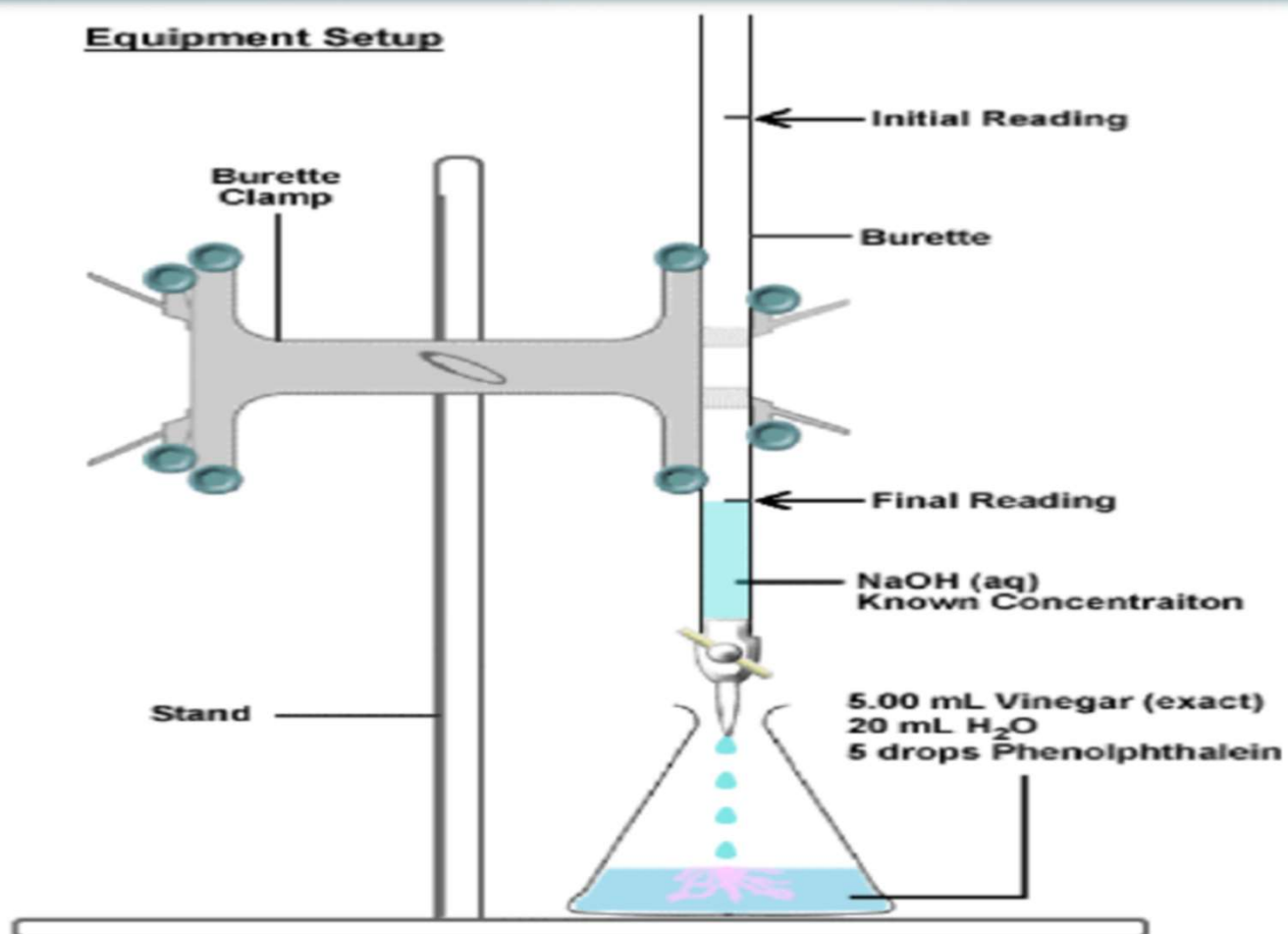
## PROCEDURES:

1. Take a clean burette and flask and rinse it few times with distilled water for couple of times.
2. Pipette out fixed volume of Acidic solution of Vinegar and put in titration flask .
3. Fill the burette up to a point and start titration by following the standard procedures to keep mark of the amount of NaOH used.
4. Repeat the experiment till multiple concurrent readings are obtained.
5. Use the observed data to calculate the value of the concentration of acid as stated in principle.





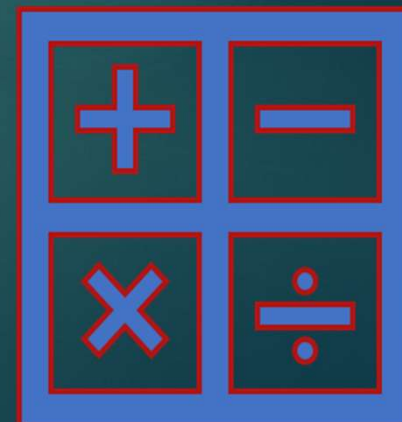
### Equipment Setup



# *CALCULATIONS:*

Readings and observation Table:

	Trial 1	Trial 2
Initial Buret Reading		
Final Buret Reading		
Volume of NaOH (aq) used		
Molarity of NaOH (aq) used		
Volume of Vinegar used		



## Equations used:

1.  $M_1v_1 = M_2v_2$  (Molarity equation during titration)
2. Moles of Acetic Acid = Molarity \* Volume of Vinegar solution used
3. Mass of Acetic Acid in solution = Moles of Acetic Acid \* Molar mass of acid
4.  $\%(W/v)\text{concentration} = \frac{\text{Mass of acetic acid}}{\text{volume of Vinegar Solution}} * 100$
5.  $\%(w/w)\text{concentration} = \%( \frac{w}{v} ) * \text{density of solution}$

## CONCLUSION:

In this way, the concentration of acetic acid in the vinegar can be easily estimated by redox titration.

## *INFERENCES:*

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