

Practical work N°1 :
CONDUCTIMETRIC DOSAGE OF VINEGAR.

**Objectives:**

- Determine the concentration of acetic acid (CH_3COOH) in a sample of commercial vinegar using conductimetric titration.
- Interpret variations in conductance (G) during acid-base titration.

Materials and products used:

- Commercial vinegar (sample for analysis)
- Titrant solution: sodium hydroxide (NaOH 0.1 mol/L)
- Conductivity meter
- Beaker (250 mL)
- Stirrer and magnetic bar
- Graduated burette
- Volumetric pipette (10 mL)
- Distilled water
- Volumetric flask

When you try you will
succeed

Experimental protocol:**1. Sample preparation :**

- Take 10 mL of vinegar with a volumetric pipette and put it to a beaker.
- Add approximately 90 mL of distilled water to dilute the sample in the beaker (to facilitate conductivity measurement).
- Insert magnetic bar into beaker and position on magnetic stirrer.
- Adjust the stirring to obtain a homogeneous solution.
- Immerse the conductivity meter probe in the solution, making sure it doesn't touch the sides of the beaker.

2. Conductimetric titration :

- Add 0.1 mol/L NaOH solution to the graduated burette.
- Before adding NaOH , note the initial conductance.
- Add the NaOH solution in small portions (e.g. 0.5 mL at a time) while stirring.
- In the table below, record the conductance values after each addition of V_{NaOH} .

V_{NaOH}									
$G(\mu\text{S})$									

- Plot of conductance (in μS) versus volume of NaOH addition (in mL).

QUESTIONS :

- 1- Complete the following chemical reaction:



- 2- Calculate the molar concentration of acetic acid according to the following equation:

$$C_{\text{vinaigre}} = C_{\text{NaOH}} \times V_{\text{NaOH}} / V_{\text{vinaigre}}$$

Where :

- C_{vinegar} is the concentration of acetic acid in the vinegar sample.
- C_{NaOH} is the concentration of the NaOH solution.
- V_{NaOH} is the volume of NaOH added at the equivalence point.
- V_{vinegar} is the volume of vinegar sampled (10 mL).

- 3- Why is it necessary to dilute the vinegar before carrying out the conductimetric titration?
- 4- Explain why conductance decreases at the start of the titration, then increases after the equivalence point?
- 5- What is the role of the magnetic stirrer in this experiment?
- 6- From the curve obtained, how can you determine the point of equivalence point ?
- 7- Compare the concentration of acetic acid you found with the value given on the vinegar label. If there is a difference, how do you explain it?
- 8- What other factors can influence the results obtained in conductivity titration?
- 9- Determine the mass concentration of acetic acid?

NOTE:

- Acetic acid is the main acid in vinegar, giving it its pungent taste. Its concentration in commercial vinegar generally varies between 4 and 8%.
- The conductivity of a solution is affected by the presence and mobility of ions. In this experiment, the neutralisation of H^+ ions by OH^- ions changes the concentration of ions in the solution and thus affects the conductivity.