

CONDUCTOMETRIC TITRATION

Acidum Acetylsalicylicum and Ibuprofenum analysis in drugs.

Introduction

Conductivity method can be used as a simple and convenient technique for determining the concentration of weak acids such as acetylsalicylic acid and ibuprofen in drugs.

During the titration of the following reactions occur (Fig.1-2)

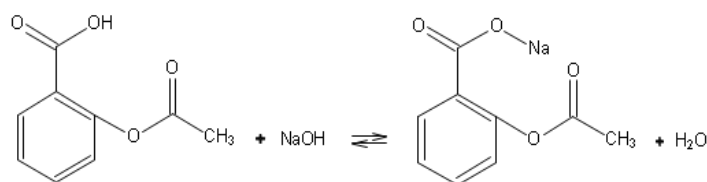


Fig.1. Reaction of *Acidum Acetylsalicylicum* with sodium hydroxide

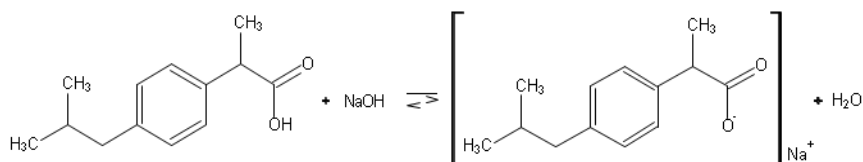


Fig.2. Reaction of *Ibuprofenum* with sodium hydroxide

Initially the conductance is low due to the feeble ionization of acetic acid. On the addition of base, there is decrease in conductance not only due to the replacement of H^+ by Na^+ but also suppresses the dissociation of acid due to common ion acetate. But very soon, the conductance increases on adding NaOH as NaOH neutralizes the un-dissociated acetylsalicylic acid (ibuprofenum) to its sodium salt which is the strong electrolyte. This increase in conductance continues raise up to the equivalence point. The graph near the equivalence point is curved due the hydrolysis of salt. Beyond the equivalence point, conductance increases more rapidly with the addition of NaOH due to the highly conducting OH^- ions resulting in disappearance slightly dissociated acid, in place of which occurs a completely dissociated sodium salt, which has a higher conductivity than the undissociated acid form (Fig.3).

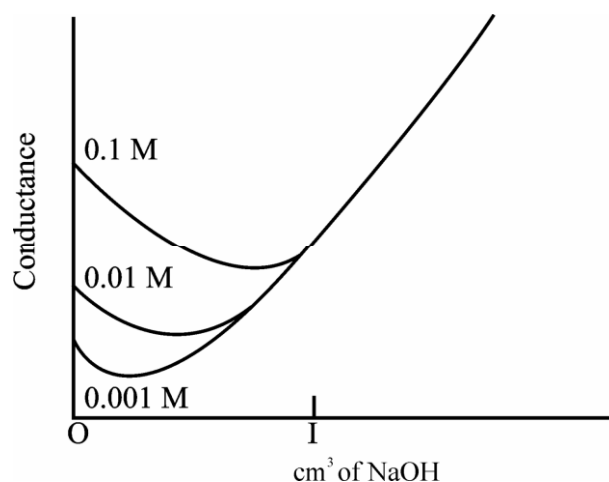


Fig. 3. Conductometric titration of a weak acid (acetylsalicylic acid/ibuprofenum) vs. a strong base (NaOH)

The equivalence point of titration is determined by drawing a tangents to the titration curve (before and after equivalence point, Fig.4).

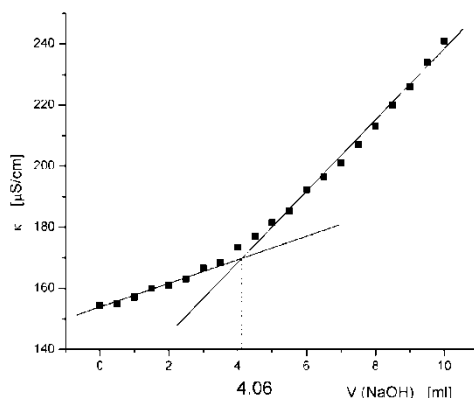


Fig. 4. Determination of equivalence point

Materials and methods

Conductometer	Volumetric flask 250ml
Magnetic stirrer	Beaker 150ml
Single-Channel Pipette 1ml	Tweezers
Volumetric pipettes 100ml	0,1M NaOH
Measuring cylinder 50ml	C ₂ H ₅ OH

Sample preparation – same method for all drugs

Check the weight of the drug tablet on an analytical balance, place the tablet in a volumetric flask (250ml). Add 15ml of distilled water and 30ml of ethanol to volumetric flask and mix it until tablet is dissolved. Fill volumetric flask to the mark, place a stir bar inside and continue mixing for 5 min.

Measurement

Pipette into a beaker 100ml of the solution. Place in a beaker and stir bar and conductivity cell. Each time add 0,5ml of NaOH to summary volume of 15ml, mix the solution for 1min, stop the stirrer before conductivity measurement. Write down the results.

Report

1. Discuss the principle of conductivity measurements (taking into account formulas and units).
2. Plot the dependence of conductivity relative to the added volume of NaOH. Determine the equivalence point from titration curve.
3. Calculate molar concentration, mass of the active agents in drugs, and mass percentage of active agents in tablets.
4. Conclusions.

POTENTIOMETRIC TITRATION

Acidum Acetylsalicylicum and *Ibuprofenum* analysis in drugs.

Introduction

Potentiometric method can be used as a simple and convenient technique for determining the concentration of weak acids such as acetylsalicylic acid and ibuprofen in drugs.

During the titration of Acetylsalicylic acid and Ibuprofen by NaOH the following reactions occur (Fig.1-2)

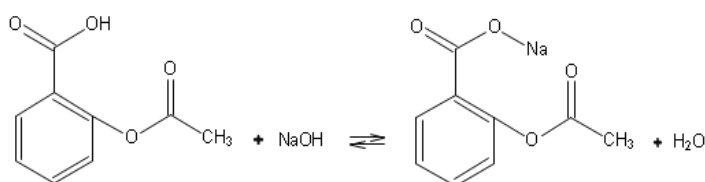


Fig.1. Reaction of *Acidum Acetylsalicylicum* with sodium hydroxide

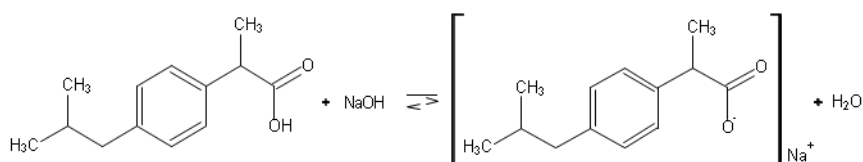


Fig.2. Reaction of *Ibuprofenum* with sodium hydroxide

Materials and methods

Conductometer	Volumetric flasks 50ml, 250ml
Magnetic stirrer	Beakers 50ml, 150ml
Single-Channel Pipette 1ml	Tweezers
Volumetric pipettes 20ml, 100ml	0.1M NaOH, 0.1M HCl
Measuring cylinder 50ml	C ₂ H ₅ OH

Sample preparation – Aspirin, Polopiryna S

Check the weight of the drug tablet on an analytical balance. Place the tablet in a volumetric flask (250ml) and add 15ml of distilled water and 50ml of ethanol and mix it until tablet is dissolved. Fill volumetric flask to the mark, place a stir bar inside and continue mixing for 5 min.

Sample preparation – Ibuprom MAX, Ibum Forte

Check the weight of the drug tablet on an analytical balance. Place the tablet in a volumetric flask (50ml) and add 20ml of ethanol and 5ml 0.1M HCl and mix it until

tablet is dissolved. Fill volumetric flask to the mark, place a stir bar inside and continue mixing for 5 min.

Measurement – Aspirin, Polopiryna S

Pipette 100ml of the solution into a beaker (150ml). Place a stir bar and conductivity cell in a beaker. Titration is carried out by addition of 0.5 ml of NaOH, to a total volume of 15ml. After each addition of NaOH the solution must be mixed for 1 min, then stop the stirrer and measure the electrode potential. Write down the results.

Measurement –Ibuprom Max, Ibum Forte

Pipette 20ml of the solution into a beaker (50ml) and add 2ml of 0.1M NaOH. Place a stir bar and conductivity cell in a beaker. Titration is carried out by addition of 0.5 ml of NaOH, to a total volume of 15ml. After each addition of NaOH, the solution must be mixed for 1 min, then stop the stirrer and measure the electrode potential. Write down the results.

V [ml]	E [mV]	ΔV	ΔE	$\frac{\Delta E}{\Delta V}$

Report

1. Discuss the principle of potentiometric measurements (taking into account formulas and units).
2. Plot the dependence of $E=f(V)$, $\frac{\Delta E}{\Delta V} = f(V)$ Determine the equivalence point from titration curve.
3. Calculate molar concentration, mass of the active agents in drugs, and mass percentage of active agents in tablets.
4. Conclusions.