



## College of Pharmacy-University of Mustansiriyah

5Th. Year- Practical advance pharmaceutical analysis – 2019 -

### Experiment-8

#### Titration of the Sodium salicylate in tablets

#### By pH meter used first and 2<sup>nd</sup> derivatives

#### Outcomes:

After completing this experiment, the student should be able to:

- Calibration of pH meter.
- Calculation of first and 2<sup>nd</sup> derivatives.
- Calculate the  $K_b$  of weak base.

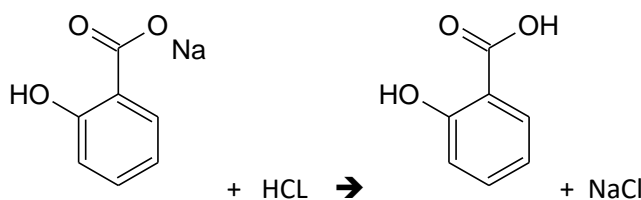
#### Introduction:

Sodium salicylate is used in medicine as an **analgesic** and **antipyretic**. Sodium salicylate also acts as **non-steroidal anti-inflammatory drug**(NSAID), and induces apoptosis in cancer cells and also necrosis. It is also a potential replacement for aspirin for people **sensitive** to it. **Melting point:** 200 °C (392 °F; 473 K), **Chemical formula:**  $C_7H_5NaO_3$ , **Solubility in water:** 25.08 g/100 g (-1.5 °C), **Autoignition temperature:** 250 °C (482 °F).

In considering the titration of a weak base by a strong acid, for example, Sodium Salicylate with hydrochloric acid, the situation would be similar to that described for the titration of a weak acid. The pH at the start of the titration would be about 11, and as the titration proceeds there would be an immediate drop followed by a leveling off resulting from the formation of a buffer system ( $C_7H_5NaO_3$ -  $C_7H_6O_3$ ), which would resist changes in pH upon further addition of acid. At the equivalence point the salt hydrolyzes, producing a slightly ionized base and a completely ionized acid. The solution at the equivalence point is therefore acid. Phenolphthalein is not suitable since it would signal the end point long before the equivalence point is reached. Methyl red is commonly used for such a titration.

The aqueous solution of sodium salicylate (water soluble as it is salt) is titrated with standard HCl, When HCl is added, salicylic acid is precipitate.

At the equivalence point only NaCl is present and the first drop of acid will produce color change of the indicator.



**Materials and Equipment:** pH meter, Buratte, Pipette, beker, Sodium Salicylate, Hydrochloric Acid, Indicator.



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### **Procedure:**

Place a Sodium Salicylate in a beaker, add about 50 mL of distilled water. Add two or three drops of indicator to the flask and titrate with Hydrochloric Acid solution until the endpoint is reached. Make two independent titrations at least.

### **Result calculation:**

As seen in the titration curve, Sodium Salicylate behaves as mono-protic acid when titrated using Phenolphthalein as indicator. This means that the number of moles of HCl in titration is equal to the number of moles of the Sodium Salicylate.

Calculate the mass of acid for two titrations and, finally, calculate the arithmetic average of these two results. Compare the result with the factory value.

**Note:** that since this is a quantitative lab. exercise all measurements to be used in calculations must be recorded to the proper number of significant digits.

Record all the numbers obtained and the name of indicator used, as well as the calculations made.

### **Procedure (pH-metric titration):**

1. Place a tablet of Sodium Salicylate in a beaker, add  $\approx$  50 mL of distilled water.
2. Place the beaker on magnetic stirrer insert the magnet in it, as well as pH-electrode. **Ask the assistant** to control the correctness of the installation and some advices.
3. Measure and note pH; Repeat this adding small portions of the titrant base (few drops each), noting also the actual volume of titrant added (total). Finish titration when pH exceeds 4.

### **Processing the results**

Using a computer data-sheet, plot the titration curve obtained and determine as exactly as possible the volume of titrant corresponding to the inflection point.

### **For more aspiring students:**

The preciseness of determination of the inflection point can be very improved if calculating the second derivative of the titration curve.

Record all the numbers obtained, as well as the calculations made.

Note your observation concerning the comparison of your result with the factory value.