Organic Pharmaceutical Chemistry

3rd Stage 1st Semester

Lab No: 3

Assay of citric acid

Prepared by:

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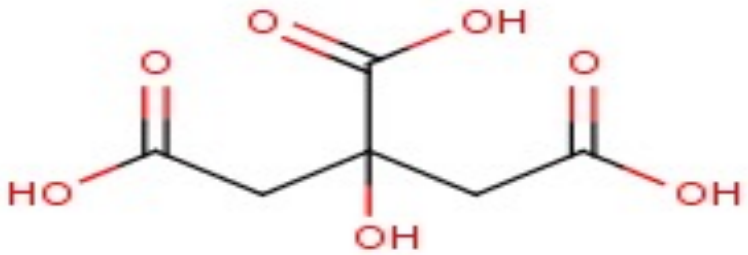
Introduction:

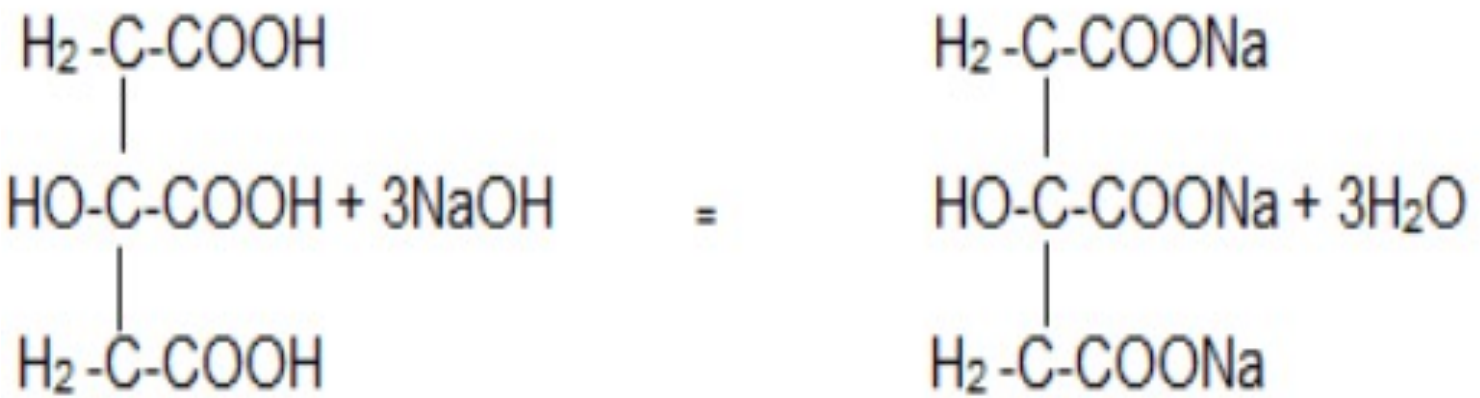
- Citric acid ($C_6H_8O_7$, **m.wt**.=192.123) is a white crystalline powder (or colorless crystals).
- It is very soluble in water and freely soluble in alcohol.
- It is a tri-basic acid, so its solutions are strongly acidic.
- It is available as the anhydrous form or monohydrate form. ***Assay of citric acid is based on the anhydrous form***.



Structure of citric acid

Chemical principle:

- Since citric acid has strong acid properties, it is titrated against a standard basic solution like 1N NaOH solution in an acid- base reaction.



Reaction between citric acid and sodium hydroxide solution

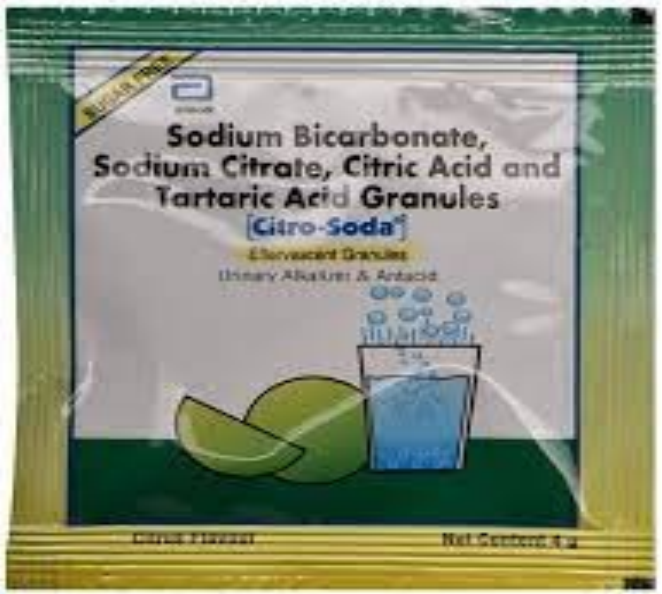
Uses of citric acid:

Uses in medicine and pharmacy:

- Citric acid is used widely in effervescent salts, for their effervescence on CO_2 produced from the reaction between citric acid and sodium bicarbonate

- Citric acid is also used to dissolve renal stones.

- Sodium citrate used in blood transfusion and bacteriology for the prevention of blood clotting.



Uses of citric acid:

Uses in the food industry:

- Used as acidulant in the manufacture of jellies, jams, sweet and soft drinks
- It is used for artificial flavoring in various foods
- Sodium citrate is employed in processed cheese manufacture

Uses of citric acid:

Uses in the cosmetic industry:

- It is used in astringent lotions such as aftershave lotion because of its low PH

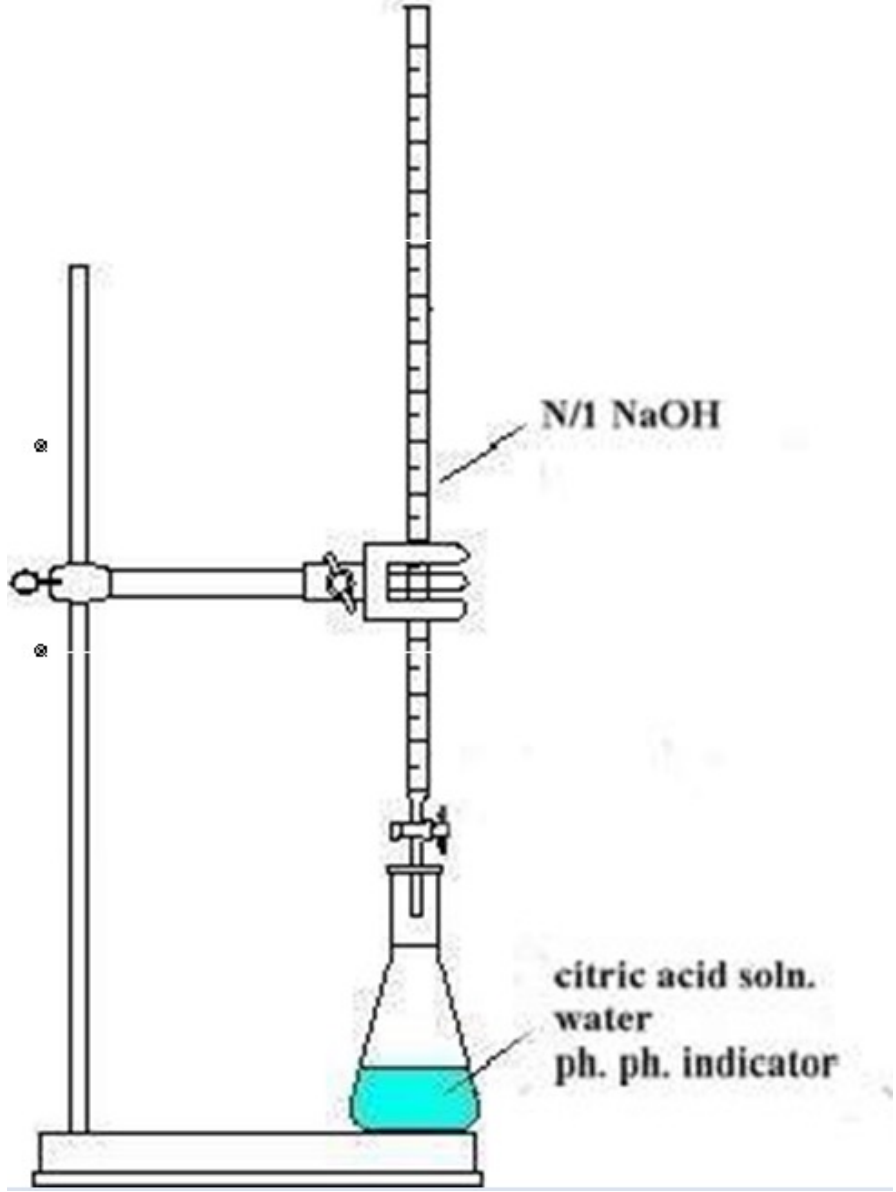
- Citric acid is used in hair rinses and hair and wig setting fluids.

Procedure:

- Weigh accurately (12.5g) of citric acid and dissolve it in (1L)of distilled water.

- and then take (3ml) of citric acid and titrate with (0.25N)sodium hydroxide solution using 2 drops of phenolphthalein solution as the indicator.

- Titrate until you get a pink color.



Calculation:

1. Calculate the quantity of citric acid present in our sample:

- ✓ When the base neutralizes the acid (at the endpoint), the number of equivalents of acid = the number of equivalents of base , therefore we can calculate the normality of citric acid from the following equation :-

(N1 * V1)Citric acid = (N2 * V2) NaOH

Where:

N1 :the normality of citric acid solution **(unknown)**

V1 :the volume of citric acid solution used **(in our lab : 3ml)**

N2 :the normality of NaOH solution **(in our lab: 0.25)**

V2 : volume of NaOH solution **(the volume from coming out of the burette)**

Calculation:

- ✓ Then, calculate the weight of citric acid from the following equation:

$$\mathrm{N} = \frac{wt}{eq.wt} \times \frac{1000}{v}$$

Note:

Eq.wt of citric acid = 64.4g *(why?)*

Calculation:

2. Calculate the percentage (w/w) of our citric acid sample:

✓

12.5g	1000ml
x	3ml

note: x sample weight

$$\% = \frac{wt\ of\ citric\ acid}{sample\ wt} * 100$$

Thank You For Listening