SYNTHESIS OF SALICYLIC ACID

i) Synthesis: It is a process of formation of new compound with new structure, molecular formula, molecular weight & melting point.

ii) Yield: It is a quantity of product obtained during synthesis.

There are three types of yields:

1. Theoretical yield: It is a quantity of product obtained from the reaction.

2. Practical yield: It is quantity of product obtained after the completion of reaction.

3. Percentage yield:

$$\% \text{ yield} = \frac{\text{Practical yield}}{\text{Theoretical yield}} \times 100$$

iii) Purification : It is a process in which remove the impurities.

iv) Recrystallization: It is a process in which new compound dissolved in the selected solvent [volatile solvent] with heating and cooled slowly & it gives pure compound or crystals.

❖What is reflux in chemistry?

Reflux involves heating the chemical reaction for a specific amount of time, while continually cooling the vapour produced back into liquid form, using a

condenser. The vapours produced above the reaction continually undergo condensation, returning to the flask as a condensate.
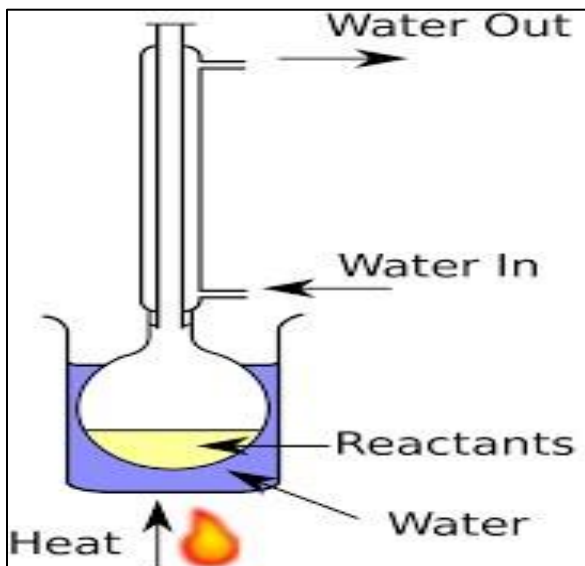

➢ Aim : To carry out synthesis of salicylic acid from methyl salicylate and report its theoretical yield, practical yield and percentage yield.

➢ Requirements:

   a) Chemicals: Sodium hydroxide, methyl salicylate, distilled water, hydrochloric acid.

   b) Apparatus: Reflux condenser, Round bottom flask(RBF),beaker, funnel, Filter paper, pipe etc.

➢ Principle:
Methyl salicylate is an ester upon subjecting it for alkaline hydrolysis with NaOH and water results in formation of sodium salicylate.
The clear solution of sodium salicylate upon acidification with HCl forms white precipitate of salicylic acid.

Methyl salicylate is used as a counter irritant and anti-inflammatory agent whereas salicylic acid is an antifungal agent.

➢ Reaction:

OH
$\bigcirc$—COOCH$_3$

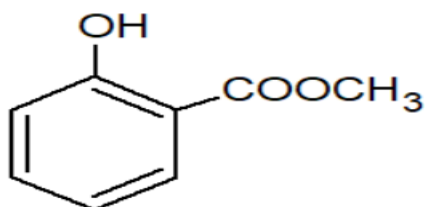Methyl salicylate

NaOH →

HO
$\bigcirc$—COOH

Salicylic acid
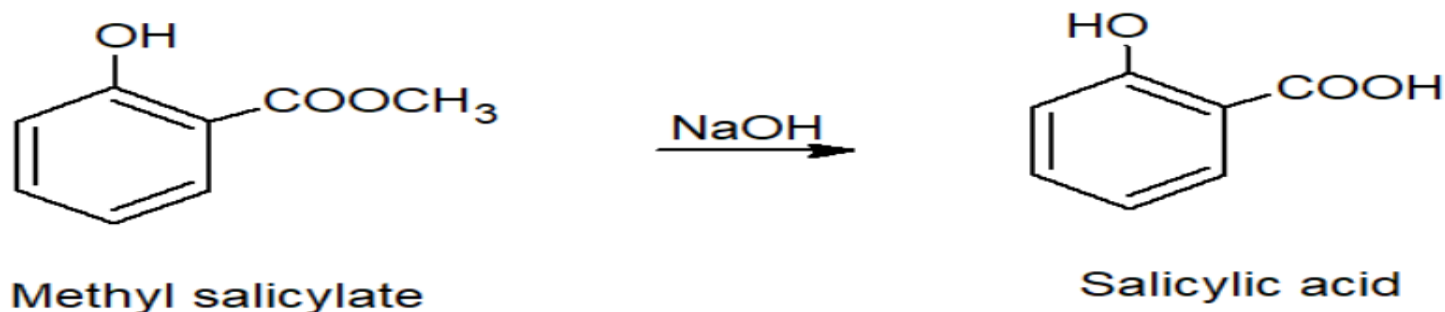
❖ PROCEDURE

1. Take 5 gm of NaOH and add 25 ml of water in RBF.
2. Dissolve the contents and add 2.5 ml of methyl salicylate and few pieces of porcelain to avoid bumping.
3. Attach the reflux condenser for 30 minutes.
4. After refluxing, cool the reaction mixture to room temperature and transfer the content into beaker.
5. Slowly add concentrated HCl drop by drop till the reaction mixture become acidic.
6. Filter the salicylic acid. And calculate its

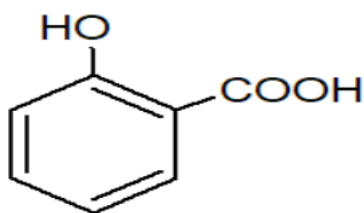theoretical, practical yield and percentage yield.

❖ CALCULATIONS

Methyl salicylate

Molecular Formula: $C_8O_3H_8$
Molecular weight:
1. $C_8 = 8 \times 12 = 96$
2. $O_3 = 3 \times 16 = 48$
3. $H_8 = 1 \times 8 = 8$
$\overline{}$
152 gm

Salicylic acid

Molecular formula: $C_7O_3H_6$

Molecular weight:
1. $C_7 = 7 \times 12 = 84$

2. O3= 3×16=48

3. H6= 6×1=6

$$138$$

1. Theoretical yield

152ml of methylsalicylate = 138 gm of salicyclic acid

2.5 ml of methylsalicylate= x gm of salicyclic acid

$$x= \frac{138×2.5}{152}$$

x=2.2 gm

2. Practical yield: 2 gm

3. Percentage yield= $\frac{\text{Practical yield}}{\text{Theoretical yield}}$ ×100

$$= \frac{2}{2.2} ×100 = 90.9\%$$