PRACTICAL ORGANIC CHEMISTRY II

EXPERIMENT NO. (4)

Saponification

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2023

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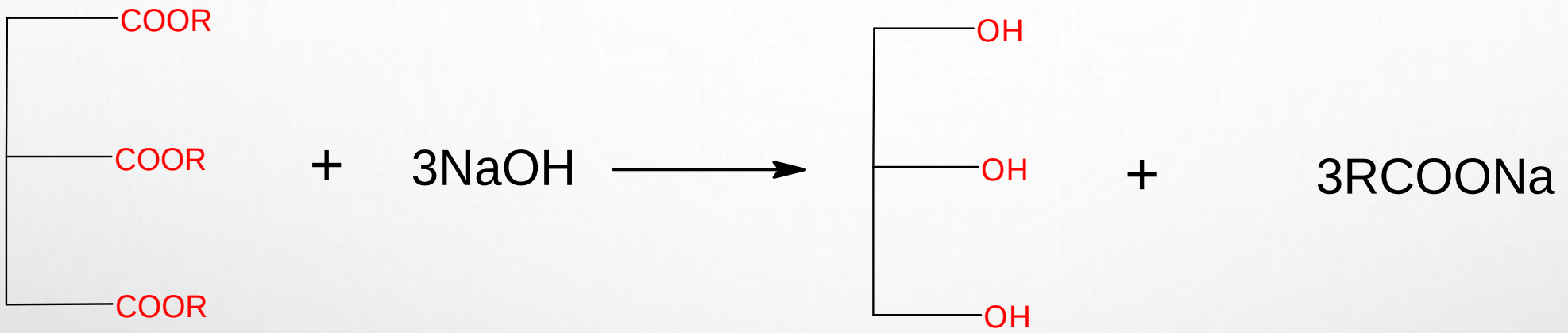
SAPONIFICATION

alkaline hydrolysis of fat or oil to give glycerol and alkali metal salt of long chin fatty acid.

soaps, are sodium or potassium salts of long chain fatty acids.

fats, known as triglycerides are esters of three fatty acid chains and the alcohol glycerol.

sponification is the hydrolysis of an ester with NaoH or KoH to give alcohol and sodium or potassium salt of the acid.



Triglyceride

glycerol

Soap(fatty acid salts)

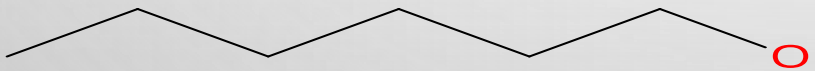
Fatty acids may be saturated or unsaturated.

Saturated (stearic acid $C_{17}H_{35}COOH$, Palmitic acid $C_{15}H_{31}COOH$).

Unsaturated (Oleic acid $C_{17}H_{33}COOH$).

Soap molecules has two parts :

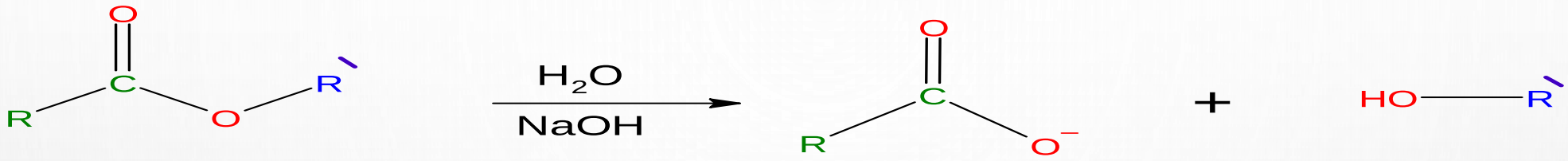
Polar group ($-COO^-Na^+$) and a nonpolar group (R-hydrocarbon part).



Polar head hydrophilic

Hydrophobic un polar tail

General reaction



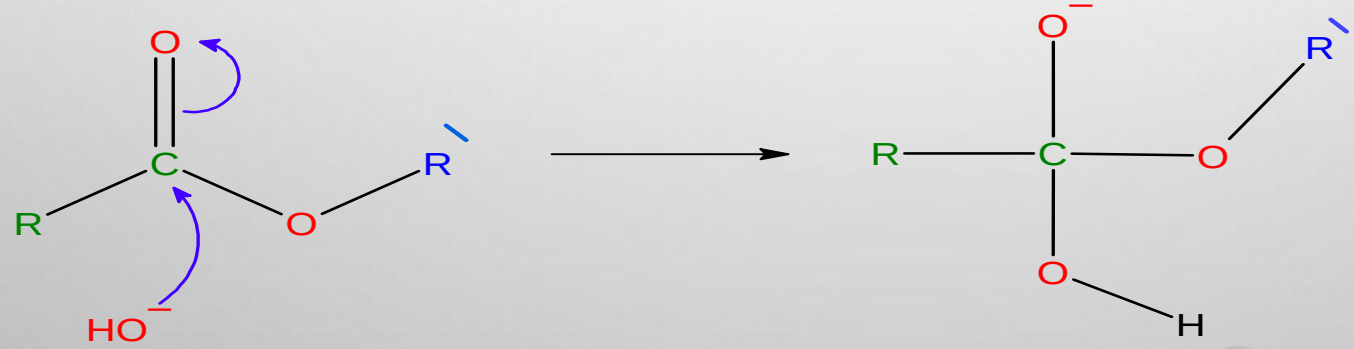
Ester

Carboxylate anion

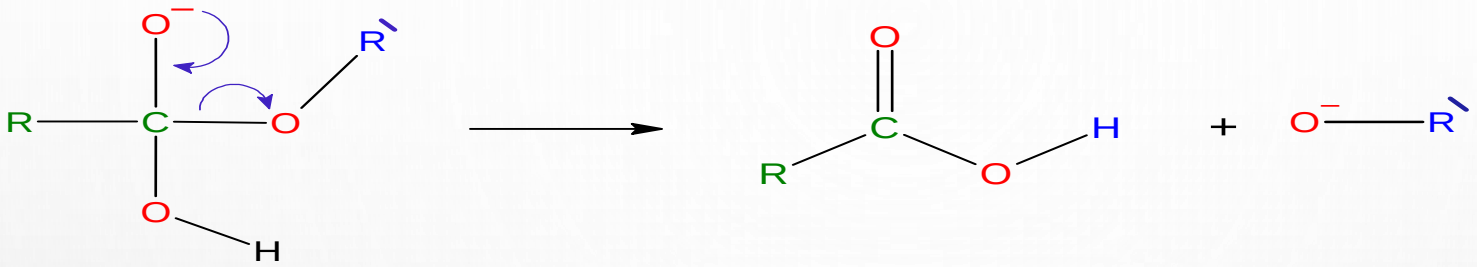
Alcohol

Mechanism

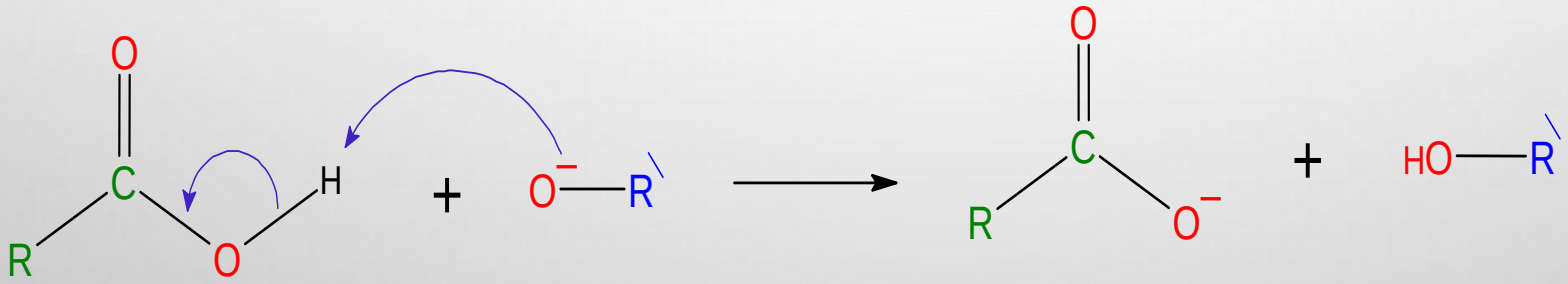
1- Nucleophilic attack by hydroxide



2- Leaving group removel



3) Deprotonation



Procedure

1- Dissolve (2.5 gm) of (NaOH) in (5 ml) of distilled water and (10 ml) of Ethanol (95 %).

2- Add the alkaline solution to (5 gm) of fat in (150 ml) beaker.

3- Cover the beaker with a watch class and heat the mixture on the water bath for about (30 min).

4- Stir frequently and keep the volume of solution fairly constant by adding small amount of (50 % ethanol).

5- The reaction is compete when the oil or melted fat has dissolved and gives a clear homogeneous solution about (30 min).

6- Dilute your soap solution by adding (15 ml) of water and then pour into a brine made by dissolving (30 gm) of (NaCL) in (100 ml) of water.

7- Stir the mixture thoroughly and collect the precipitate soap on the Biichner funnel.

8- Wash the soap with (10 ml) of cooled distilled water.