PHARMACEUTICAL ORGANIC CHEMISTRY-II- BP301T

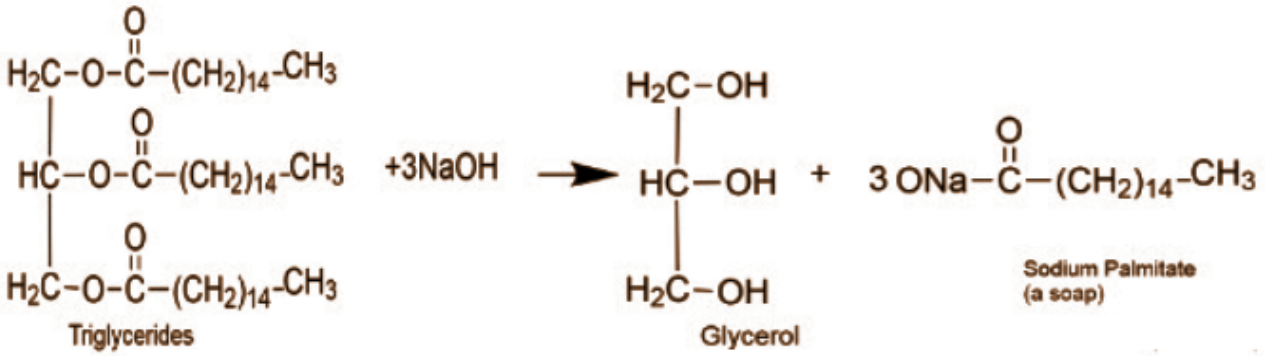
UNIT: 3 Fats and Oils

CLASS:2

TOPIC: Chemical reactions of fats and oils

Chemical reactions of fats and oils:

1) **Hydrolysis:**



Triglycerides are reacting with 3 molecules of sodium hydroxide to form glycerol.

2) **By Water:**

(1) $C_3H_5(OCOR)_3 + H_2O \longleftrightarrow C_3H_5(OH).(OCOR)_2 + RCOOH$

triglyceride water diglyceride fatty acid

(2) $C_3H_5(OH).(OCOR)_2 + H_2O \longleftrightarrow C_3H_8(OH)_2.(OCOR) + RCOOH$

diglyceride water monoglyceride fatty acid

(3) $C_3H_5(OH)_2.(OCOR) + H_2O \longleftrightarrow C_3H_5(OH)_3 + RCOOH$

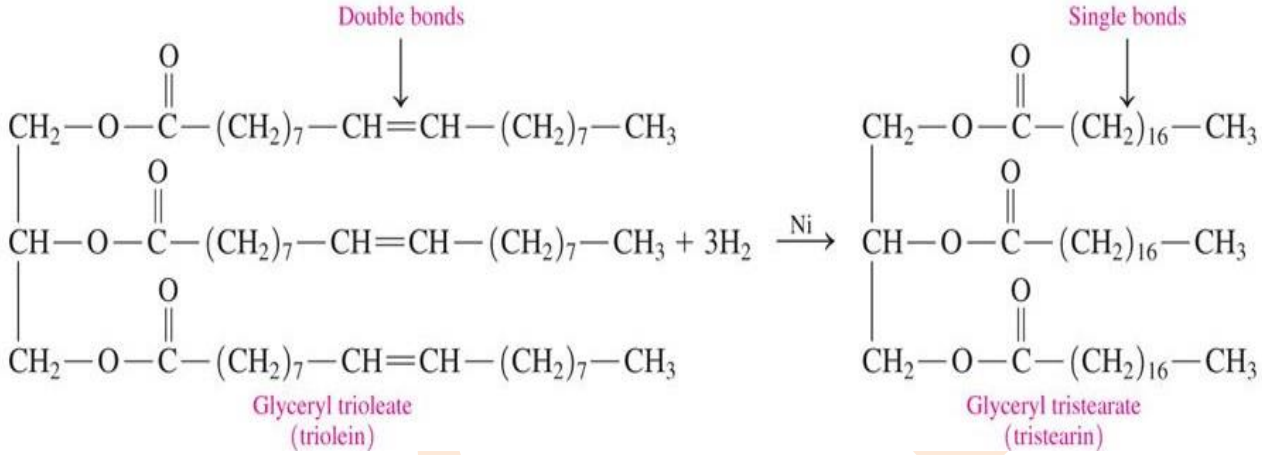
monoglyceride water glycerol fatty acid

Tri glyceride is reacting with water molecule to form di glyceride.

Di glyceride is reacting with water molecule to form mono glyceride.

Mono glyceride is reacting with water molecule to form di glycerol.

3) **Hydrogenolysis:**



Glyceryl trioleate (Triolein) is react with 6 molecules of hydrogen to form Glyceryl tri stearate (Tristearin)

Rancidification:

On long storage and in contact with air, moisture and sun light, oil and fat undergo decomposition and start smelling unpleasant. This process is known as rancidification.

Oxidation of unsaturated acids:

In presence of light, moisture small amount of unsaturated acid present in fat (or) oil get oxidized by air to form peroxides which further break down into aldehydes having unpleasant smell and taste.

Saturated fatty acid do not get rancid this problem can be checked by adding small quantity of phenol substances which act as antioxidants.

Enzymatic Hydrolysis:

Due to the presence of micro organisms fat get hydrolyzed by enzymes to produce fatty acid having sour taste and unpleasant odor.

Ex: Butter gets rancid due to production of butyric acid in these manners.

Beta Oxidation of saturated fatty acids:

Fats having saturated fatty acid undergo ketone rancidity. Saturated acid undergoes beta oxidation to form keto acid which gives carbon dioxide to form ketone having pungent unpleasant odor.

$CH_3 (CH_2)_6COOH$ --------> $CH_3 (CH_2)_4CH_2COOH$ ---------> $CH_3 (CH_2)_4COCH_3$

Caprylic acid beta keto caprolic acid N-methyl N- acyl ketone

Drying oils:

Some glycerol's of unsaturated acids having two or more double bonds absorb oxygen from air and get polymerized to form a hard transparent coating which is used in making paints and oil cloth this phenomenon is known as drying oils.

Ex: Linseed oil, Perilla oil

Non drying oils:

These oils on exposed to light and long storage get rancid. Oils get decompose in to glycerol and fatty acid.

The unsaturated acid gets oxidized in to aldehydes and acid with less carbon atoms in the molecule.

The saturated acid gets decompose by enzymes to form the ketones.

Ex: Olive oil, Almond oil.

Semi drying oils:

These oils have high level of linoleic acid and low level of linolenic acid as compared to non drying oils.

Ex: Sunflower oil, Cotton seed oil.

Drying oils are used as medium for paints, varnishes, lacquers, paints are suspension of some pigments are the organic coloring matter in linseed oil to which some turpentine oil has been added as a thinner.

These paints when applied on wooden surface they quickly dry up forming a tough organic film which protects the surface.