

ALCOHOLS PHENOLS & ETHERS ^{1.}

CHEMISTRY, CLASS-XII, UNIT-11

LECTURE-5, BY:-DR. RINKY, 24/09/2020

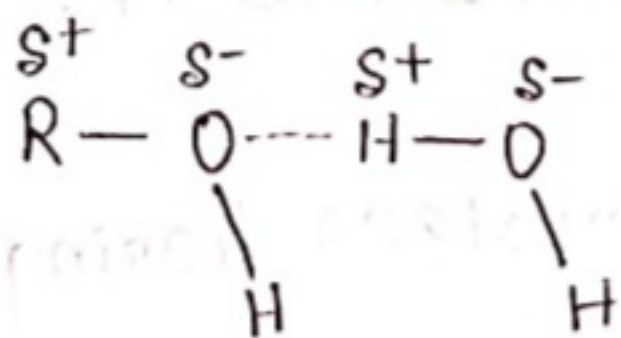
TOPIC :- PROPERTIES OF ALCOHOLS

PHYSICAL PROPERTIES

- * Lower alcohols are colourless having sweet smell and burning taste, Higher alcohols are colourless, odourless waxy solids.
- * The boiling points of alcohols increase with increase in the number of carbon atoms (increase in van der Waals forces). The boiling points decrease with increase of branching in carbon chain (because of decrease in van der Waals forces with decrease in surface area).
- * Boiling points of alcohols are higher than hydrocarbons, alkyl halides, ethers, aldehydes, ketones of comparable molecular mass. This is due to extensive H-bonding among the alcohol molecules.

Q Alcohols are comparatively more soluble in water than hydrocarbons of comparable molecular masses. Explain.

Ans. Alcohols can form H-bonds with water and can also break the H-bonds already existing between water molecules. Therefore, they are soluble in water.



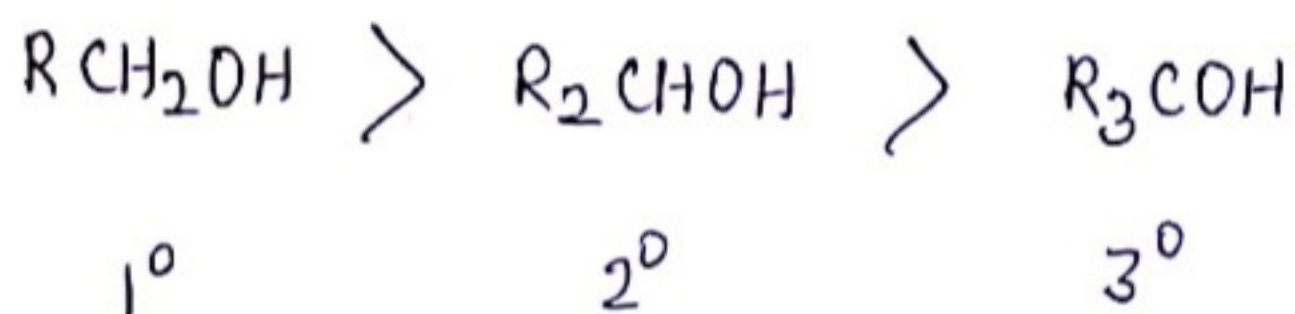
On the other hand, hydrocarbons can neither form H-bonds with water nor can break the H-bonds already existing between water molecules and hence are insoluble in water.

CHEMICAL PROPERTIES

* Alcohols are versatile compounds. They react both as nucleophiles as well as electrophiles. They also undergo oxidation reactions, dehydrogenation reaction and dehydration reaction. These reactions are discussed below: --

1. Alcohols as nucleophiles :- The bond between O-H is

broken when alcohols react as nucleophiles. The order of reactivity of alcohols in these reactions is



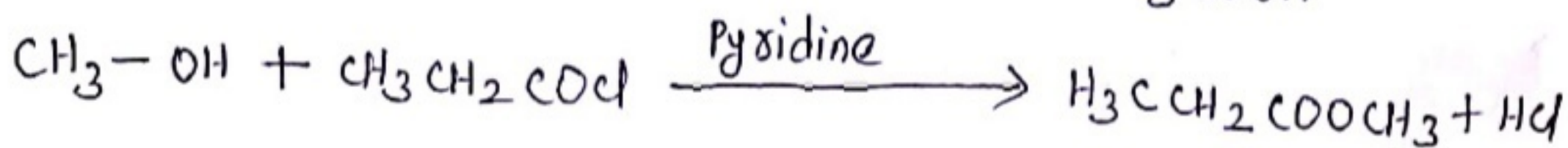
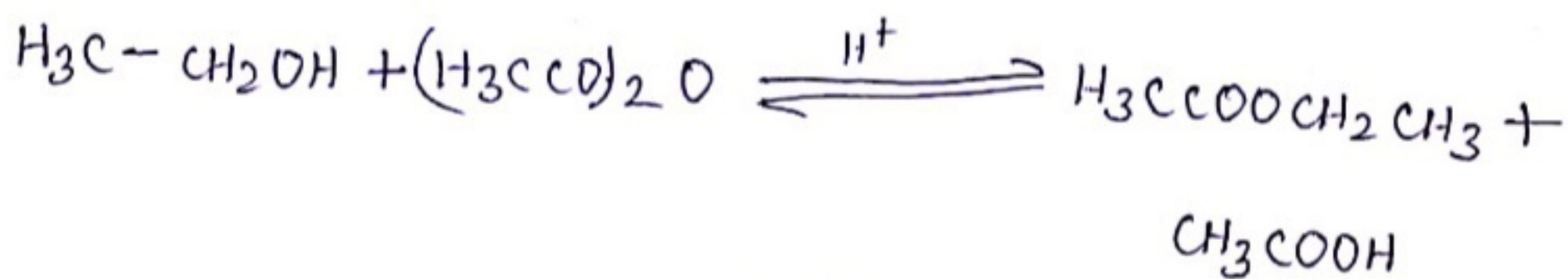
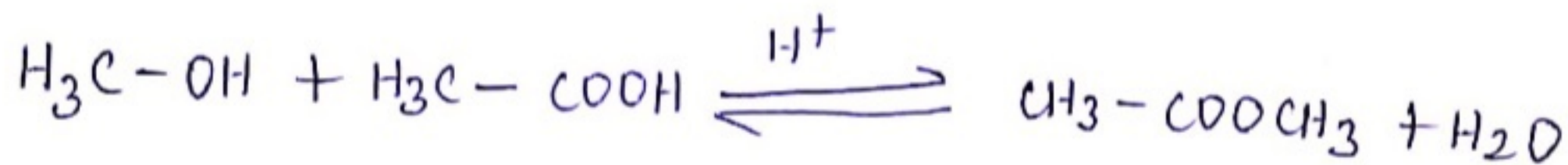
a. Reaction with metals (Acidity of alcohols)

Alcohol react with active metals such as sodium potassium and aluminium to yield corresponding alkoxides and hydrogen gas.



b. esterification

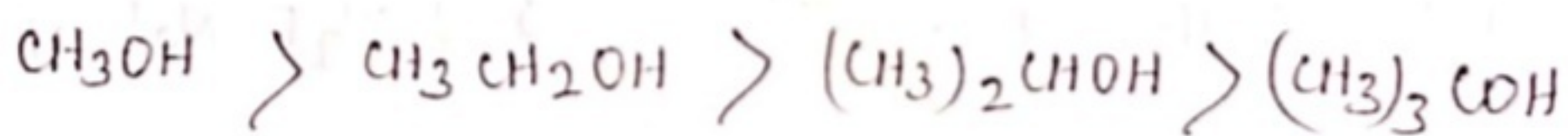
Alcohols react with carboxylic acid, acid chlorides and acid anhydrides to form esters.



* The reaction with carboxylic acid and acid anhydride is carried out in the presence of a small amount of concentrated sulphuric acid. The reaction is reversible, and therefore, water is removed as soon as it is formed.

The reaction with acid chloride is carried out in the presence of a base (Pyridine) so as to neutralise HCl which is formed during the reaction. It shifts the equilibrium to the right-hand side.

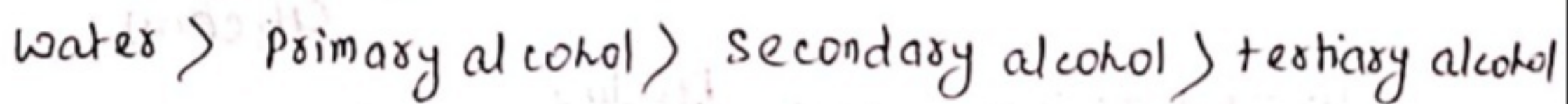
The rate of esterification of alcohol decreases in the following order



Acidic Nature of Alcohols

* Alcohols behave as acids because of the presence of polar O-H group. However, they are weakly acidic because of the electron releasing nature of alkyl group present in them.

* The decreasing order of acidic strength is as follows: -



* Except methanol, all alcohols are weaker acids than water.

To be continued in next lecture....