Alcohol Chemistry Questions with Solutions

Q1. Lucas reagent is the solution of

(a) Anhydrous zinc chloride and concentrated hydrochloric acid
(b) Anhydrous copper chloride and concentrated hydrochloric acid
(c) Anhydrous zinc chloride and dilute hydrochloric acid
(d) Anhydrous copper chloride and dilute hydrochloric acid

Answer: (a), Lucas reagent is the solution of anhydrous zinc chloride and concentrated hydrochloric acid. It is used to differentiate primary, secondary and tertiary alcohols.

Q2. Converting sugar into alcohol is known as

(a) Homogenisation
(b) Fermentation
(c) Pasteurisation
(d) None of the above

Answer: (b), The process of converting sugar into alcohol is known as fermentation.

Q3. Dehydration of alcohol is an example of

(a) Substitution Reaction
(b) Addition Reaction
(c) Elimination Reaction
(d) Redox Reaction

Answer: ©, Dehydration of alcohol is an example of an elimination reaction. Elimination is an organic reaction in which several atoms are removed from a molecule.

Q4. Which of the following alcohol will not give a Lucas reagent test?

(a) N-butanol
(b) Isobutyl alcohol
(c) Tert-butyl alcohol
(d) sec-butyl alcohol

Answer: (a), Isobutyl alcohol does not give a Lucas reagent test. Lucas reagent is a solution of anhydrous zinc chloride and concentrated hydrochloric acid solution. It is used to differentiate primary, secondary and tertiary alcohols.

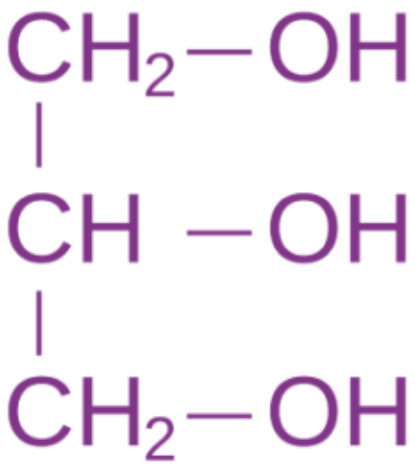
Q5. Which of the following is formed when glycerol is heated with oxalic acid at 503K?

(a) Allyl alcohol
(b) Benzyl alcohol
(c) Phenol

(d) None of the above

Answer: (a), Allyl alcohol is formed when glycerol is heated with oxalic acid at 503K.

Q6. Draw the structure of glycerol and write its IUPAC name?
Answer: Structure of glycerol:



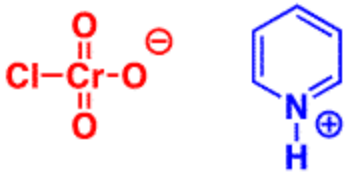
The IUPAC name of glycerol is trihydric alcohol.

Q7. Name a reagent that can be used to convert ethanol to ethanoic acid.
Answer: Strong reagents like acidified $KMnO_4$ and $K_2Cr_2O_7$ can be used to convert ethanol to ethanoic acid.

Q8. Why do alcohol and ether of relative molecular mass have different boiling points?
Answer: The difference in the boiling point of alcohol and ether of relative molecular mass is because ether is less polar and does not have intermolecular hydrogen bonding.

Q9. Why is 2-chloro ethanol more acidic than ethanol?
Answer: 2-chloro ethanol is more acidic than ethanol because chlorine is an electron-withdrawing group. It decreases the electron density over the O-H. Thereby destabilising it. In contrast, ethanol has an electron-donating alkyl group on it, which neutralises the negative charge of oxygen, thereby stabilising it. Thus, 2-chloro ethanol is more acidic than ethanol.

Q10. Name a reagent that can be used to convert ethanol to ethanal.
Answer: Pyridinium chlorochromate (PCC) can be used to convert ethanol to ethanal.



PCC (Pyridinium Chlorochromate)

Q11. Draw the structures of the isomers of alcohols with the molecular formula $C_4H_{10}O$. Which of these will exhibit optical activity?
Answer: There are four isomers of alcohols with the molecular formula $C_4H_{10}O$.

- Butanol
- 2- Methyl propanol
- 2-methyl propan-2-ol
- Butan-2-ol

Out of the four isomers mentioned above, Butan-2-ol will show optical activity and exist in two optically active forms.

Q12. Alcohols are more soluble in water than the hydrocarbons of relative molecular masses. Explain Why?
Answer: Alcohols are more soluble in water than the hydrocarbons of equivalent molecular masses because alcohols form a hydrogen bond with water molecules and break the existing hydrogen bonds of water molecules. Thus, they are soluble in water. In contrast, hydrocarbon can not form hydrogen bonds with water molecules. Thus, they are insoluble in water.

Q13. Give a chemical test used in distinguishing 2-propanol and 2-methyl-2-propanol.
Answer: We can differentiate between 2-propanol and 2-methyl-2-propanol using the iodoform test. 2-Propanol is a secondary alcohol. It reacts with iodine and sodium hydroxide to form a yellow precipitate of iodoform. In contrast, 2-methyl-2 propanol does not respond to this test. Thus, using the iodoform test, we can quickly differentiate between 2-propanol and 2-methyl-2-propanol.

Q14. What is Luca's reagent?
Answer: Luca's reagent is the solution of anhydrous zinc chloride and concentrated hydrochloric acid. It is used to differentiate primary, secondary and tertiary alcohols.

Q15. Differentiate between alcohol and phenol.
Answer:

S. No.	Alcohol	Phenol
1.	It has at least one OH group attached to a carbon atom.	It has at least one OH group linked to aromatic hydrocarbons.
2.	They are less acidic than phenol.	They are more acidic than alcohol.
3.	They are predominantly colourless liquids.	They are primarily colourless solids that exist as a crystal at STP.
4.	They don't turn blue litmus paper red.	They turn blue litmus paper red.
5.	They are primarily used in the ink and pharmaceutical industries.	They are mainly used in medicinal products as antiseptic agents.

Practise Questions on Alcohol

Q1. What is denatured alcohol?
Answer: Denatured alcohol is ethanol with additives to make it poisonous, bad-tasting, foul-smelling, or nauseating to discourage recreational consumption. It is sometimes dyed so that it can be identified visually.
Pyridine and methanol are added to ethanol to denature it.

Q2. Explain various factors accountable for the solubility of alcohols in water.
Answer: Various factors accountable for the solubility of alcohols in water are:

- **Hydrogen bonds:** Because of their ability to create hydrogen bonds with water molecules or intermolecular hydrogen bonding, alcohols are soluble in water.
- **Size of the alkyl or aryl groups:** The solubility of alcohols in water diminishes as the size of the alkyl or aryl groups increases.

Q3. Arrange the following compounds in the decreasing order of acidity: Water, Alcohol, Alkyne.
Answer: Water > Alcohol > Alkyne

Q4. Name the enzymes responsible for preparing ethanol from sucrose by fermentation. Write the reactions involved.
Answer: Invertase and zymase are responsible for preparing ethanol from sucrose by fermentation.

Sucrose is transformed into glucose and fructose by the enzyme invertase, and then glucose and fructose are turned to ethanol in the presence of zymase. The following is the reaction that occurs during this process:

$C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$
$C_6H_{12}O_6 \rightarrow 2\ CH_3CH_2OH$ (Ethanol) $+ 2CO_2$

Q5. How will you convert propan-2-one into tert-butyl alcohol?
Answer: We can convert propan-2-one into tert-butyl alcohol as follows.