

## CBSE Class 12 Chemistry Chapter 11 Alcohols, Phenols, and Ethers Worksheet with Answer– Set 5

**Q1.** Iodoform can be used in medicine as an

- (a) Anaesthetic
- (b) Analgesic
- (c) Antiseptic
- (d) None of the above

**Answer:**

(c) Iodoform can be used in medicine as an antiseptic.

**Q2.** Which of the following compound gives a positive iodoform test?

- (a) Formaldehyde
- (b) Acetaldehyde
- (c) Methanol
- (d) None of the above

**Answer:**

(b) Acetaldehyde gives a positive iodoform test.

**Q3.** Alkyl halide gives alcohol on hydrolysis with

- (a) Aqueous sodium hydroxide
- (b) Alcoholic sodium hydroxide
- (c) Both (a) and (b)
- (d) None of the above

**Answer:**

(a) Alkyl halide gives alcohol on hydrolysis with aqueous sodium hydroxide.

**Q4.** The reaction of ethanol and methyl magnesium bromide gives

- (a) Methane
- (b) Ethane
- (c) Propane
- (d) None of the above

**Answer:**

(a) The reaction of ethanol and methyl magnesium bromide gives methane.

**Q5.** What is the molecular formula of chloral hydrate?

- (a)  $\text{CCl}_3 \text{CH} (\text{OH})_2$
- (b)  $\text{CCl}_3 \text{CH}_2 \text{OH}$
- (c)  $\text{CCl}_3 \text{CH}_2 \text{COOH}$
- (d)  $\text{CCl}_3 \text{CH}_2 \text{CCl}_2 \text{OH}$

**Answer:**

(a) The molecular formula of chloral hydrate is  $\text{CCl}_3 \text{CH} (\text{OH})_2$ .

**Q6.** Arrange the following sets of compounds in order of their increasing boiling points. Pentanol, butanol, butan-2-ol, ethanol, propanol, and methanol

**Answer:**

We can arrange the compounds mentioned above as follows.

Methanol < ethanol < propanol < butan-2-ol < butanol < pentanol.

**Q7.** Arrange the following sets of compounds in order of their increasing boiling points. Pentanol, n-butane, pentanal, ethoxyethane.

**Answer:**

We can arrange the compounds mentioned above as follows.

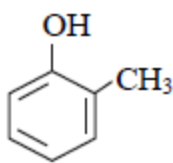
n-Butane < ethoxyethane < pentanal < pentanol.

**Q8.** Give the structures and IUPAC names of monohydric phenols of molecular formula  $\text{C}_7\text{H}_8\text{O}$ .

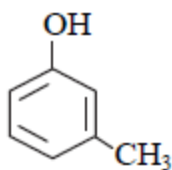
**Answer:**

Three isomers of monohydric phenols with molecular formula  $\text{C}_7\text{H}_8\text{O}$  are possible.

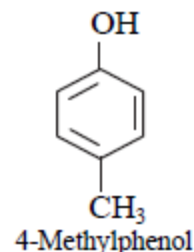
They are as follows:



2-Methylphenol



3-Methylphenol

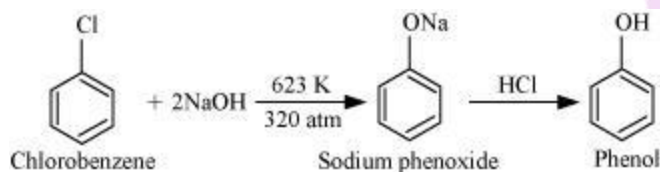


4-Methylphenol

**Q9.** Convert chloro benzene to phenol.

**Answer:**

Fusion of chlorobenzene with NaOH at 623 K and 320 atmospheric pressure produces sodium phenoxide, which on acidification yields phenol.



**Q10.** Explain why aniline does not undergo Friedel- Crafts reaction.

**Answer:**

Aniline does not undergo Friedel- Crafts reaction because  $\text{AlCl}_3$ , being electron-deficient, acts as a Lewis base. and attacks on the lone pair of nitrogen present in aniline to form an insoluble complex which precipitates out, and the reaction does not proceed.

**Q11.** Why is phenol more acidic than alcohol?

**Answer:**

Phenol is more acidic than alcohol because phenol on losing  $\text{H}^+$  ion forms phenoxide ion, and alcohol on losing  $\text{H}^+$  ion forms alkoxide ion. Phenoxide ion is more stable than alkoxide ion as phenoxide ion is resonance stabilised. Hence, phenol is more acidic than alcohol.

**Q12.** Why are ethers used as a solvent?

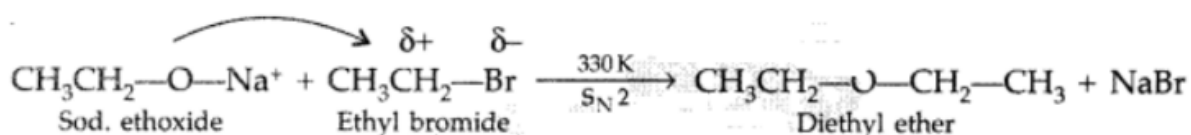
**Answer:**

Ethers are compounds in which the oxygen atom is linked with two alkyl groups. They have a general formula of (R-O-R') and are typically used as a solvent. They are relatively inert, do not react with the solute particles, and generally are used as solvents.

**Q13.** Explain Williamson's synthesis reaction.

**Answer:**

Williamson's synthesis is a nucleophilic displacement reaction involving the displacement of a halide ion by an alkoxide ion via an  $S_N^2$  reaction mechanism.



**Q14.** Why is the C=O bond of alcohol larger than the C=O bond of alcohol?

**Answer:**

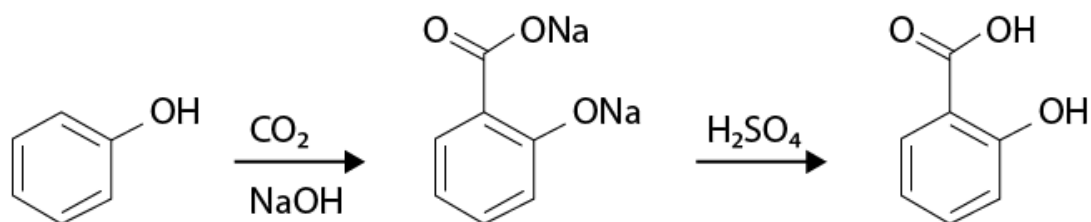
The C=O bond of phenol is much shorter than the C=O bond of alcohol because, in phenol, there is delocalisation of electrons, due to which it acquires partial double bond character, while in alcohol, there is a single bond.

As the double bond is shorter than the single bond, the C=O bond of phenol is shorter than the C=O bond of alcohol.

**Q15.** What is Kolbe's reaction?

**Answer:**

When phenol is treated with sodium hydroxide, sodium phenoxide is produced. When treated with carbon dioxide, this sodium phenoxide, followed by acidification, undergoes electrophilic substitution to give ortho-hydroxybenzoic acid as the main product. This reaction is known as Kolbe's reaction.

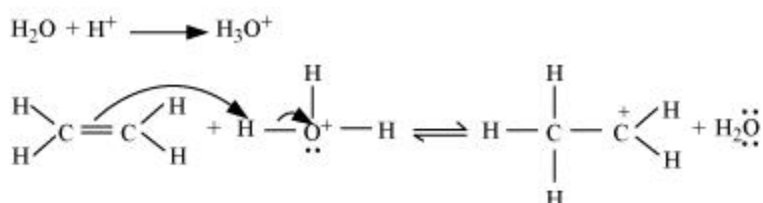


**Q16.** Write the mechanism of hydration of ethene to ethanol.

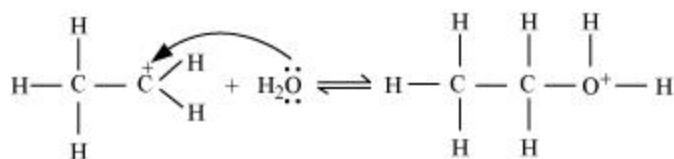
**Answer:**

The mechanism of hydration of ethene to form ethanol involves three steps.

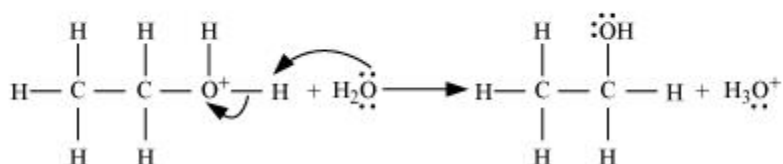
**Step 1:** Protonation of ethene to form carbocation by an electrophilic attack of  $\text{H}_3\text{O}^+$ .



**Step 2:** Nucleophilic attack of water.



**Step 3:** Deprotonation to ethanol.



**Q17.** Why does propanol have a higher boiling point than butane?

**Answer:**

Propanol has a higher boiling point than butane because in propanol, there is an intermolecular hydrogen bonding and Van der Waal's forces.

In butane, a weak van der Waal's force of attraction is the only force between the molecules. Therefore, propanol has a high boiling point (391 K) than butane (309 K).

**Q18.** Why are alcohols more soluble in water than hydrocarbons of comparable molecular masses?

**Answer:**

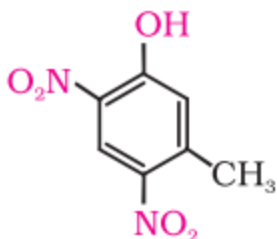
Alcohols can form hydrogen bonds with water and break the existing hydrogen bonds between water molecules. Therefore they are soluble in water. At the same time, hydrocarbons cannot form hydrogen bonds with water and hence are insoluble in water.

**Q19.** Write the structures of the major products from the following reactions.

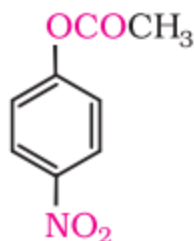
- (a) Dinitration of 3-methyl phenol
- (b) Mononitration of phenyl methanoate.

**Answer:**

(a) The structure of the major products from the dinitration of 3-methyl phenol is mentioned below.



(b) The structure of the major products from the mononitration of phenyl methanoate is mentioned below.



**Q20.** Give the structures and IUPAC names of the products from the following reactions:

- Catalytic reduction of butanal.
- Hydration of propene in the presence of dilute sulphuric acid.
- The reaction of propanone with methylmagnesium bromide, followed by hydrolysis.

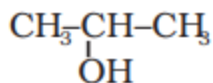
**Answer:**

(a) The IUPAC name of the compound formed by the catalytic reduction of butanal is butanol.

Structure of Butanol: CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH.

(b) The IUPAC name of the compound formed by the hydration of propene in the presence of dilute sulphuric acid is propan-2-ol.

Structure of propan-2-ol: CH<sub>3</sub>CH<sub>2</sub>(OH)CH<sub>3</sub>.



(c) The IUPAC name of the compound formed by the reaction of propanone with methylmagnesium bromide, followed by hydrolysis is 2-Methyl propan-2-ol.

