Ethanol Chemistry Questions with Solutions

Q-1: The general formula for alcohol is $C_nH_{2n+1}OH$. What is the value of 'n' for ethanol?

a) 1
b) 3
c) 2
d) 5

Answer: c) 2

Explanation: 'n' signifies the number of carbon atoms present in the compound. The prefix "eth" stands for the number 2. This implies that 'n' is equal to 2 for ethanol.

Q-2: When ethanol reacts with active metals, what is formed?

a) Metal oxide
b) Metal Alkoxide
c) Metal hydroxide
d) Metal carbonate

Answer: b) Metal Alkoxide

Explanation: The following is the reaction between metal sodium and ethanol:

$2CH_3CH_2OH + 2Na \rightarrow 2CH_3CH_2O^-Na^+ + H_2$
The ultimate product of the process is hydrogen gas and sodium ethoxide (metal alkoxide).

Q-3: In ethanol, which of the following functional group is present?

a) -O-
b) -OH
c) -COOH
d) -CHO

Answer: b) R-OH

Explanation: A functional group is a collection of atoms or bonds that characterise the chemical properties of the hydrocarbon to which they are linked.

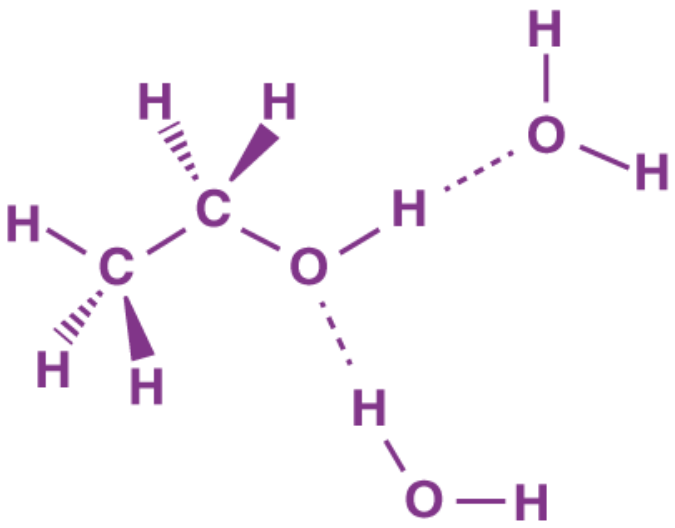
The following is a list of some common functional groups and their representations:

Functional group Name	Representation
Aldehyde	-CHO
Alcohol	-OH
Carboxylic acid	-COOH
Ester	-COO-
Ether	-O-
Amine	$-NH_2$
Ketone	-CO-

Because ethanol belongs to the alcohol class, it has the functional group -OH.

Q-4: What causes ethanol to be so water-soluble?

Answer: Alcohols can establish hydrogen bonds with water molecules as shown, which explains their solubility in water. As the size of the alkyl (hydrophobic) group gets larger, solubility decreases.



Q-5: For the burning of ethanol, the balanced chemical equation is

$C_2H_5OH(l) + 3O_2 \rightarrow 2CO_2(g) + 3H_2O(g)$

How many moles of oxygen react with 6 moles of ethanol?

Answer:
According to the given equation,

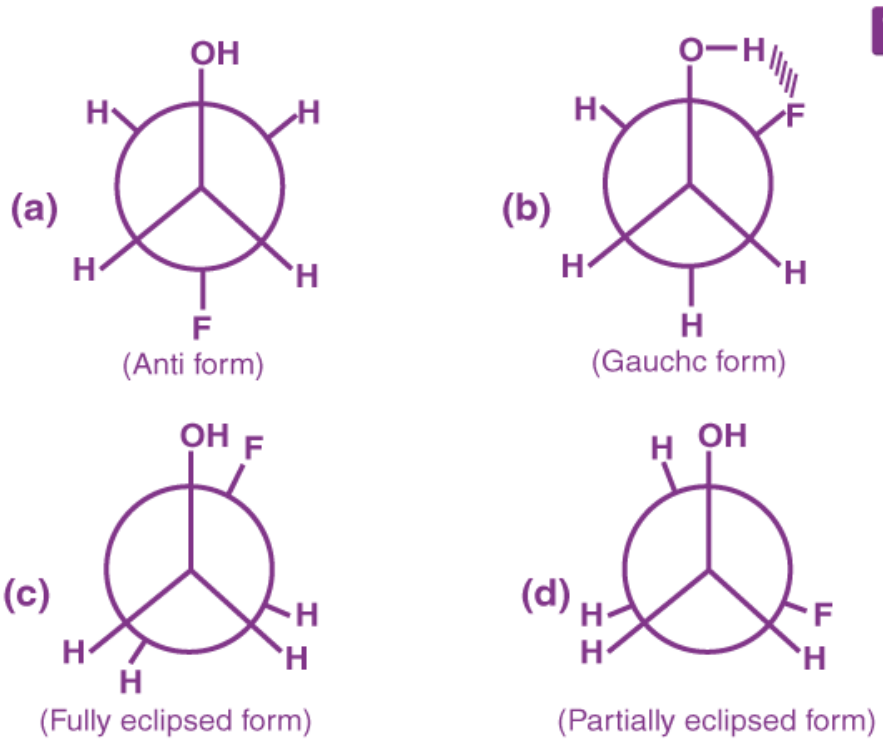
Number of moles of oxygen required by 1 mol of ethanol = 3 moles
Thus, Number of moles of oxygen required by 6 moles of ethanol = (3×6) moles = 18 moles

Q-6: The most stable conformer of 2-fluoro ethanol is

a) Partially eclipsed
b) Fully eclipsed
c) Gauche
d) Anti

Answer: c) Gauche

Explanation: Different conformers of 2-fluoro ethanol are shown below:



Gauche form is more stable due to the formation of H-bonding as shown.

Q-7: An isomer of ethanol is

a) Acetone
b) Methanol
c) Diethyl ether
d) 1-methoxymethane

Answer: d) 1-methoxymethane

Explanation: Isomers are molecules that have the same molecular formula but distinct atomic configurations.

Below table shows the structure of compounds given with their molecular formula:

Chemical Compound	Structural formula	Molecular formula
Acetone	CH_3COCH_3	C_3H_6O
Methanol	CH_3OH	CH_4O
Diethyl ether	$CH_3CH_2OCH_2CH_3$	$C_4H_{10}O$
1-methoxymethane	CH_3OCH_3	C_2H_6O

Because the molecular formula of ethanol is C_2H_6O, its isomer is 1-methoxy methane.
Q-8: In order to get ethanol from formaldehyde, which grignard reagent is used?

a) Ethyl magnesium bromide
b) Methyl magnesium bromide
c) Ethyl magnesium chloride
d) Propyl magnesium bromide

Answer: b) Methyl magnesium bromide

Explanation: Alcohols are produced by the reaction of Grignard reagents with aldehydes and ketones .The first step of the reaction is the nucleophilic addition of Grignard reagent to the carbonyl group to form an adduct. Hydrolysis of the adduct yields an alcohol.

The reaction between methyl magnesium bromide and formaldehyde(HCHO) is shown below:

$HCHO + CH_3MgBr \rightarrow CH_3CH_2OMgX \xrightarrow{H_2O} CH_3CH_2OH + Mg(OH)Br$

Note: Grignard reagents are used to increase the carbon atoms in the hydrocarbon chain. Use that grignard reagent which consists of only one C-atom.

Q-9: Ethanol is denatured in several ways. Denaturing alcohol serves what purpose?

Answer: Denatured alcohol is ethanol that has been treated with additives to make it toxic, bad-tasting, foul-smelling, or unpleasant in order to discourage recreational use.

Its primary goal is to render it unfit for human consumption.

Q-10: Methylated spirits is a mixture of

a) 98% ethanol +2% methanol
b) 95% ethanol + 5% methanol
c) 95% methanol + 5% methanol
d) 98% methanol +2% ethanol

Answer: b) 95% ethanol + 5% methanol

Q-11: Which of the following microbe is involved in the alcoholic fermentation?

a) Clostridium butylicum , a bacterium
b) Lactobacillus , a bacterium
c) Saccharomyces cerevisiae , a fungus
d) Aspergillus niger , a fungus

Answer: c) Saccharomyces cerevisiae,a fungus

Explanation: The anaerobic conversion of fructose and glucose (sugars) to ethanol and carbon dioxide is known as alcoholic fermentation. Yeasts ,a few bacteria (Zymomonas mobilis) and fungus (Saccharomyces cerevisiae) are involved in the process.

Q-12: After fermentation, ethanol is recovered by

a) Centrifugation
b) Distillation
c) Separating funnel

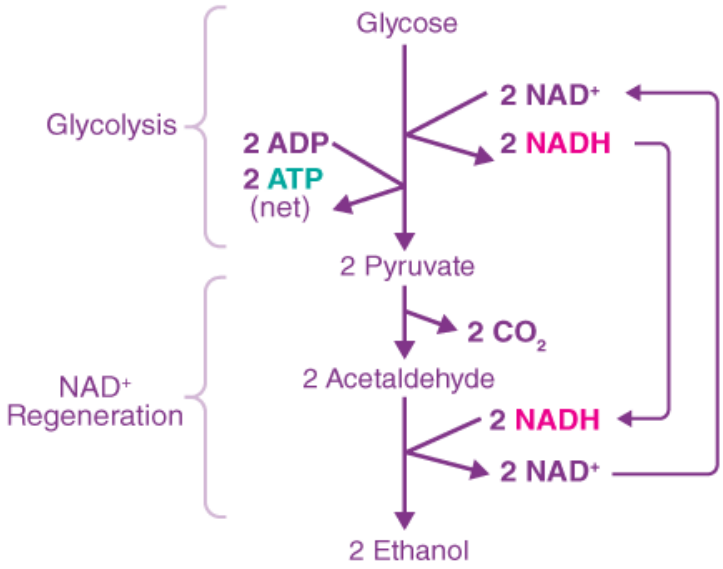
d) Filtration

Answer: b) Distillation

Q-13: How is ethanol prepared from alcoholic fermentation? Give the diagrammatic representation.

Answer: The process of alcoholic fermentation uses two main processes: glycolysis and fermentation.

1. Glycolysis is the breakdown of glucose into two pyruvate molecules.
2. Fermentation converts pyruvate molecules into two carbon dioxide molecules and two ethanol molecules.Saccharomyces cerevisiae primarily directs the pyruvate for the production of ethanol to regenerate NAD^+ consumed by the process of glycolysis.



Q-14: How can you convert But-2-ene to ethanol?

Answer: The conversion can be takes place as shown below:

$$CH_3 - CH = CH - CH_3 \xrightarrow[Zn/H_2O]{O_3} 2CH_3CHO$$

$$CH_3CHO \overset{LiAlH_4}{\rightarrow} CH_3CH_2OH$$

Q-15: Ethanol is

a) Primary alcohol
b) Secondary alcohol
c) Tertiary alcohol
d) Quaternary alcohol

Answer: a) Primary alcohol

Practise Questions on Ethanol

Q-1: The temperature required for acid catalysed dehydration of ethanol is

a) 413 K
b) 443 K
c) 423 K
d) 433 K

Answer: b) 443 K

Explanation: Alkene is produced by heating ethanol to 443 K in the presence of excess conc. sulphuric acid.

The following reaction occurs:

$CH_3CH_2OH \xrightarrow{conc\ H_2SO_4} CH_2{=}CH_2 + H_2O$

Q-2: Which option accurately predicts the vapour pressure difference between dimethyl ether and ethanol at room temperature?

a) Dimethyl ether will have lower vapour pressure because it does not form a H-bond.
b) Dimethyl ether will have higher vapour pressure because it does not form H-bond
c) Dimethyl ether will have lower vapour pressure because it is larger and has more intermolecular forces.
d) Dimethyl ether will have the same lower vapour pressure because it has the same intermolecular forces as ethanol.

Answer: b)

Explanation: Fewer molecules have the kinetic energy to escape at a given temperature if the substances have strong intermolecular interactions and thus results in lower vapour pressure.

Dimethyl ether cannot produce H-bonding (strong forces), although ethanol does. As a result, the vapour pressure of dimethyl ether will be more.

Q-3: What is octane number? Is ethanol's octane number higher than gasoline?

Answer: An octane rating, sometimes known as an octane number, is a standard measure of a fuel's capacity to sustain compression without detonating in an internal combustion engine. The greater the octane rating, the more compression the fuel can tolerate before it explodes.

Ethanol has a higher octane number than gasoline, which allows for better blending and enhanced power and performance.

Q-4: What are the various purposes of ethanol?

Answer:

1) Many cosmetics and beauty products contain ethanol as a component.It works as an astringent to assist clean skin and as a lotion preservative.
2) Ethanol is a frequent ingredient in many hand sanitizers because it is excellent at killing microorganisms such as bacteria, fungus, and viruses.
3) Ethanol is a good solvent for paints, lacquers, and varnishes because it combines easily with water and many organic compounds.
4) Ethanol is frequently used as an antidote in situations of ethylene glycol or methyl alcohol poisoning.
5) Many alcoholic drinks that are drunk orally for recreational purposes contain ethanol as the main ingredient. It works as a psychoactive medication in humans, lowering anxiety and inducing euphoria.

Q-5: The other name of ethyl alcohol is

a) Wheat alcohol
b) Flour alcohol
c) Grain alcohol
d) None of the above

Answer: c) Grain alcohol