



**Q.56** \*\*Ethanol is prepared on industrial scale world over, by the process of fermentation. Fermentation is a biological process which occurs in the presence of certain enzymes secreted by microorganisms such as yeast. Which of the following statement is incorrect for essential conditions for fermentation?

- A) Optimum temperature (25 to 30°C)                                          C) Proper aeration  
B) In the presence of a preservative                                                                  D) Dilution of solution

**Answer Explanation: (B) It is incorrect statement**

The correct statement is as follow:

- Fermentation is carried out in the absence of any preservative.

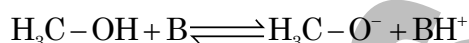
**Q.57** \*\*Which of the following statements about alcohol is/are correct?

- A) It can act as an acid only                                                                  C) Both A and B  
B) It can act as a base only                                                                          D) Neither A nor B

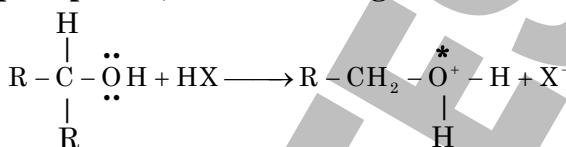
**Answer Explanation: (C)**

**Solution:**

- If an alcohol donates a proton to some other species B, it is acting as an acid such:



- If an alcohol accepts a proton, then it is acting as a base.



**MORE DETAIL:**

Alcohol shows amphoteric behavior:

- When it acts as an acid, the alcohol cleaves at the O – H bond.



- When it acts as a base, it can subsequently cleave at the R – O bond.



**NOTE:** In fact,  $K_a$  of ethanol is  $10^{-18} \text{ mol dm}^{-3}$  whereas the value for water is  $10^{-16} \text{ mol dm}^{-3}$ . It shows that alcohol is a weak acid.

**Q.58** \*\*Primary alcohols can be oxidized to aldehydes using either acidified potassium dichromate (VI) or acidified potassium manganate (VII).

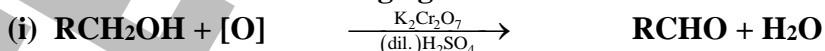
Both these oxidizing agents change colour as they are reduced.

What is the colour of each oxidizing agent before and after it has reacted?

Opt.	Acidified Potassium Dichromate (VI)	Acidified Potassium Manganate (VII)		
A)	Green	Orange	Purple	Colourless
B)	Orange	Green	Colourless	Purple
C)	Orange	Green	Purple	Colourless
D)	Purple	Colourless	Orange	Green

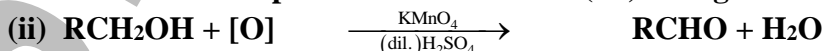
**Answer Explanation: (C)**

- Primary alcohols can be oxidized to aldehydes using either acidified potassium dichromate (VI) or acidified potassium manganate (VII).
- Both these oxidizing agents change colour as they are reduced.
- The colour of each oxidizing agent before and after it has reacted is as follow



Alcohol                                          (Acidified potassium dichromate (VI))                                          Aldehyde

Colour of acidified potassium dichromate (VI) changes from orange to green



Alcohol                                          (Acidified potassium manganate (VII))                                          Aldehyde

Colour of acidified potassium manganate (VII) changes from purple to colourless

**Q.59** \*\*Consider the following statements for the classification of alcohols:

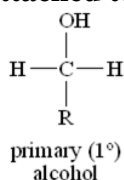
- I. A primary alcohol has the – OH group at the end of carbon chain
- II. A secondary alcohol has the – OH group in the body of carbon chain
- III. A tertiary alcohol has the – OH group at the branch in the carbon chain
- IV. A neo-alcohol has the – OH group at the 2<sup>nd</sup> last carbon of the chain

Which of the above statement is incorrect.

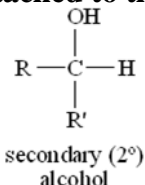
- A) I only
- B) II and III
- C) IV only
- D) I, II, III and IV

**Answer Explanation: (C)**

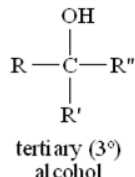
- A primary alcohol has the – OH group at the end of carbon chain (It is a type of monohydric alcohol in which hydroxal group is attached to the primary carbon atom)



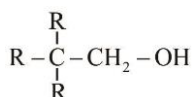
- A secondary alcohol has the – OH group in the body of carbon chain (It is a type of monohydric alcohol in which hydroxal group is attached to the secondary carbon atom)



- A tertiary alcohol has the – OH group at the branch in the carbon chain (It is a type of monohydric alcohol in which hydroxal group is attached to the tertiary carbon atom)



- A neo-alcohol has the – OH group at the 2<sup>nd</sup> last carbon of the chain (It is a type of alcohol in which OH group is attached with primary carbon and neo carbon is attached with four carbon)



**Q.60** Which one of the following statements is incorrect for S<sub>N</sub>1 and S<sub>N</sub>2 mechanism reaction w.r.t alkyl halide?

Opt.	S <sub>N</sub> 1	S <sub>N</sub> 2
A)	A two step mechanism	A one step mechanism
B)	Unimolecular reaction	Bimolecular reaction
C)	Rate of reaction depends on the conc. of alkyl halide only	Rate of reaction depends on the conc. of alkyl halide and nucleophile
D)	Reaction occurs with strong nucleophile	Reaction occurs with weak nucleophile

**Answer Explanation: (D)**

It is incorrect statement. The correct statement is as follow:

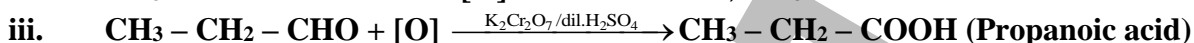
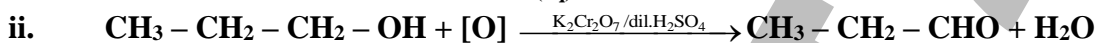
Opt.	S <sub>N</sub> 1	S <sub>N</sub> 2
D)	Reaction occurs with weak nucleophile	Reaction occurs with strong nucleophile

**Q.61** When 1-bromopropane is treated in succession with two reagents, 'X' and 'Y', it produces propanoic acid. What are reagent 'X' and 'Y'?

Options	X	Y
A)	NaOH <sub>(aq)</sub>	H <sup>+</sup> / Cr <sub>2</sub> O <sub>7</sub> <sup>2-</sup> <sub>(aq)</sub>
B)	NaOH <sub>(aq)</sub>	CO <sub>2</sub>
C)	KCN in ethanol	HCl <sub>(aq)</sub>
D)	KCN in ethanol	NaOH <sub>(aq)</sub>

**Answer Explanation: (A)**

When 1-bromopropane is treated in succession with two reagents, 'X' and 'Y', it produces propanoic acid. The reagents 'X' and 'Y' are NaOH<sub>(aq)</sub> and H<sup>+</sup> / Cr<sub>2</sub>O<sub>7</sub><sup>2-</sup><sub>(aq)</sub> respectively. Propanoic acid is produced by the said reagents as shown in the reaction below:



**Q.62** Which of the following tests helps us to distinguish between 1°, 2°, 3° alcohols?

- A) Lucas test only  
B) Dichromate test only  
C) Both A and B  
D) Neither A nor B

**Answer Explanation: (C)**

Lucas test and dichromate test help us to distinguish between 1°, 2°, 3° alcohols as shown below:

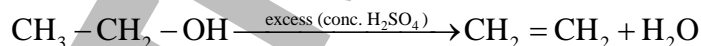
Tests	Primary alcohol (1°)	Secondary alcohol (2°)	Tertiary alcohol (3°)
Lucas Test	1° alcohols form an oily layer only on heating.	2° alcohols form an oily layer in five to ten minutes.	3° alcohols form an oily layer immediately.

**Q.63** When ethanol is treated with excess conc. H<sub>2</sub>SO<sub>4</sub> at 180°C the product obtained is?

- A) Ethene  
B) Ethoxyethane  
C) Ethanal  
D) Ethane

**Answer Explanation: (A)**

When ethanol is treated with excess conc. H<sub>2</sub>SO<sub>4</sub> at 180°C the product obtained is ethene as shown in the reaction.



**Q.64** Which term describes the action of NaOH<sub>(aq)</sub> on a bromoalkane?

- A) Acid base reaction  
B) Electrophilic substitution  
C) Elimination reaction  
D) Nucleophilic substitution reaction

**Answer Explanation: (D)**

The term nucleophilic substitution describes the action of NaOH<sub>(aq)</sub> on a bromoalkane as shown in the reaction:



**Q.65** Which of the following is correct order of stability of carbanion of alkyl halides?

- A) CH<sub>3</sub><sup>-</sup> > CH<sub>3</sub>CH<sub>2</sub><sup>-</sup> > (CH<sub>3</sub>)<sub>2</sub>CH<sup>-</sup> > (CH<sub>3</sub>)<sub>3</sub>C<sup>-</sup>  
B) CH<sub>3</sub>CH<sub>2</sub><sup>-</sup> > CH<sub>3</sub><sup>-</sup> > (CH<sub>3</sub>)<sub>2</sub>CH<sup>-</sup> > (CH<sub>3</sub>)<sub>3</sub>C<sup>-</sup>  
C) CH<sub>3</sub><sup>-</sup> > (CH<sub>3</sub>)<sub>2</sub>CH<sup>-</sup> > CH<sub>3</sub>CH<sub>2</sub><sup>-</sup> > (CH<sub>3</sub>)<sub>3</sub>C<sup>-</sup>  
D) (CH<sub>3</sub>)<sub>2</sub>CH<sup>-</sup> > (CH<sub>3</sub>)<sub>3</sub>C<sup>-</sup> > CH<sub>3</sub><sup>-</sup> > CH<sub>3</sub>CH<sub>2</sub><sup>-</sup>

**Answer Explanation: (D)**

The correct order of stability of carbanion of alkyl halides is as follow:  
CH<sub>3</sub><sup>-</sup> > CH<sub>3</sub>CH<sub>2</sub><sup>-</sup> > (CH<sub>3</sub>)<sub>2</sub>CH<sup>-</sup> > (CH<sub>3</sub>)<sub>3</sub>C<sup>-</sup>

- Smaller is the size of carbanion greater is the stability
- Since, alkyl groups are electron donating they increase charge density of respective carbanion
- As a result stability decreases. i.e. greater is the charge density of carbanion less is the stability.

**Q.66** In the presence of strong base and polar solvent secondary alkyl halide undergo through \_\_\_\_\_ reaction?

- A) E2  
B) E1  
C) S<sub>N</sub>1  
D) S<sub>N</sub>2

**Answer Explanation: (B)**

In the presence of strong base and polar solvent secondary alkyl halide undergo through E1 reaction.

**Q.67** Which one of the following type of reaction is shown by alcohols?

- A) Reaction in which C-O bond breaks only  
B) Reaction in which O-H bond breaks only  
C) Both A and B  
D) Neither A nor B

**Answer Explanation: (C)**

The type of reactions shown by alcohols are:

- Reaction in which C – O bond breaks  
e.g.  $\text{CH}_3 - \text{CH}_2 - \text{OH} + \text{HCl} \xrightarrow{\text{ZnCl}_2} \text{CH}_3 - \text{CH}_2 - \text{Cl} + \text{H}_2\text{O}$

In this reaction C – O bond is broken in ethanol

- Reaction in which O – H bond breaks  
e.g.  $2\text{CH}_3 - \text{CH}_2 - \text{O} - \text{H} + 2\text{Na} \longrightarrow 2\text{C}_2\text{H}_5\text{O}^- \text{Na}^+ + \text{H}_2$

In this reaction O – H bond is broken in ethanol

**Q.68** Teflon (- CF<sub>2</sub> – CF<sub>2</sub>)<sub>n</sub> is a valuable plastic. Which of the following is not use of Teflon?

- A) It is used for making corrosion-proof parts of machinery  
B) It is used for coating the electrical wiring  
C) It is used as a refrigerants  
D) It is used as a non-stick coating for cooking pans

**Answer Explanation: (C)**

It is incorrect statement. The correct statement is that dichlorodifluoromethane (CF<sub>2</sub>Cl<sub>2</sub>) is used as a refrigerant.

**Q.69** When ethanol is warmed with ethanoic acid in the presence of conc. H<sub>2</sub>SO<sub>4</sub>, ethyl ethanoate (an ester) is formed. H<sub>2</sub>SO<sub>4</sub> (conc.) acts as a catalyst in this reaction? 2012

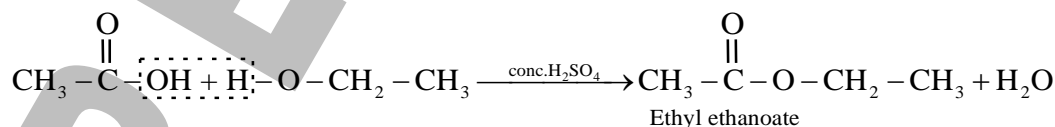


During this reaction:

- A) Alcohol is reduced  
B) O–H bond in ethanoic acid is broken  
C) O–H bond in ethanol is broken  
D) Acid is oxidized

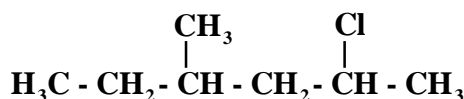
**Answer Explanation: (C)**

During this reaction O – H bond in ethanol is broken as shown in the reaction.



This reaction clearly shows that during this reaction O – H bond in ethanol is broken.

**Q.70** Consider the following structural formula:



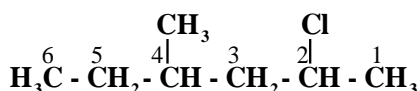
The correct name according to IUPAC is:

- A) 2-Chloro-3-methylhexane  
B) 3-Methyl-4-chlorohexane  
C) 2-Chloro-4-methylhexane  
D) 3-Chloro-2-methylhexane



**Answer Explanation: (C)**

The correct name according to IUPAC of the given structure is 2-Chloro-4-methylhexane.



**Q.71** Mechanism of  $\text{S}_{\text{N}}1$  reaction depends on all of the following factors EXCEPT:

- A) Strength of attacking nucleophile
- B) Nature of solvent
- C) Nature of leaving group
- D) Structure of alkyl halides

**Answer Explanation: (A)**

Mechanism of  $\text{S}_{\text{N}}1$  reaction does not depend on the strength of attacking nucleophile because it is not involved in the first rate determining step (slow step).

**Q.72** Which of the following reactions is not shown by phenol?

- A) Reaction with NaOH
- B) Reaction with  $\text{FeCl}_3$
- C) Reaction with HX
- D) Catalytic reduction

**Answer Explanation: (C)**

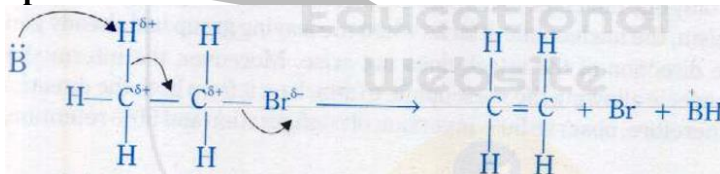
Reaction with HX is not shown by phenol.

**Q.73** Elimination bimolecular reactions involve:

- A) First order kinetics
- B) Second order kinetics
- C) Zero order kinetics
- D) Third order kinetics

**Answer Explanation: (B)**

Elimination bimolecular reactions involve second order kinetics. In  $\text{E}_2$  mechanism (bimolecular elimination reaction), the nucleophile attacks and the leaving group leaves at the same time with a formation of carbon-carbon double bond. The single step  $\text{E}_2$  elimination is shown below:



Rate of reaction shows second order kinetics.

**Q.74** Alkyl halides (Halogenoalkanes) show which of the following types of reaction:

- A) Nucleophilic substitution reaction
- B) Electrophilic substitution reaction
- C) Nucleophilic addition reaction
- D) Oxidation reduction reaction

**Answer Explanation: (A)**

Alkyl halides (Halogenoalkanes) show nucleophilic substitution reaction.

**Q.75** Consider the following reaction



Which product may be formed?

- A)  $\text{C}_2\text{H}_5\text{Cl}$ ,  $\text{POCl}_3$ ,  $\text{HCl}$
- B)  $\text{C}_2\text{H}_5\text{Cl}$ ,  $\text{HCl}$
- C)  $\text{C}_2\text{H}_5\text{Cl}$  only
- D)  $\text{C}_2\text{H}_5\text{Cl}$ ,  $\text{POCl}_3$

**Answer Explanation: (A)**

Following product may be obtained by the above reaction.



**Q.76** Alkyl halides show  $\beta$ -elimination reactions. Which is the incorrect statement about  $\text{E}_1$  elimination mechanism?

- A) It is two step reaction
- B) It is unimolecular
- C) It depends on the strength of nucleophile
- D) Ter-alkyl halides follow  $\text{E}_1$  elimination reaction

**Answer Explanation: (C)**

It is incorrect statement.  $\text{E}_1$  elimination reaction does not depend on



