

Q1. Which alcohol could **not** be produced by the reduction of an aldehyde or a ketone?

- A 2-methylbutan-1-ol
- B 2-methylbutan-2-ol
- C 3-methylbutan-1-ol
- D 3-methylbutan-2-ol

(Total 1 mark)

Q2. Which one of the following reactions will produce an organic compound that has optical isomers?

- A dehydration of butan-2-ol by heating with concentrated sulphuric acid
- B reduction of pentan-3-one by warming with NaBH_4
- C addition of Br_2 to 3-bromopropene
- D reduction of 2,3-dimethylpent-2-ene with H_2 in the presence of a nickel catalyst

(Total 1 mark)

Q3. In which one of the following mixtures does a redox reaction occur?

- A ethanal and Tollens' reagent
- B ethanoyl chloride and ethanol
- C ethanal and hydrogen cyanide
- D ethanoic acid and sodium hydroxide

(Total 1 mark)

Q4. Propanone can be reduced to form an alcohol. A functional group isomer of the alcohol formed is

- A $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- B $\text{CH}_3\text{CH}_2\text{CHO}$
- C $\text{CH}_3\text{OCH}_2\text{CH}_3$
- D CH_3COCH_3

(Total 1 mark)

Q5. Which one of the following is **not** a correct general formula for the non-cyclic compounds listed?

- A alcohols $\text{C}_n\text{H}_{2n+2}\text{O}$
- B aldehydes $\text{C}_n\text{H}_{2n+1}\text{O}$
- C esters $\text{C}_n\text{H}_{2n}\text{O}_2$
- C primary amines $\text{C}_n\text{H}_{2n+3}\text{N}$

(Total 1 mark)

Q6. Which one of the following would **not** reduce an acidified aqueous solution of potassium dichromate(VI)?

- A CH_3COOH
- B Zn
- C CH_3CHO
- D $\text{Fe}^{2+}(\text{aq})$

(Total 1 mark)

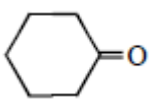
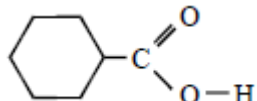
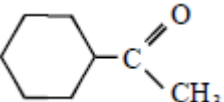
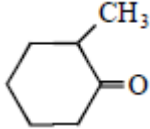
Q7. Which one of the following statements about but-2-enal, $\text{CH}_3\text{CH}=\text{CHCHO}$, is **not** true?

- A It has stereoisomers.
- B It shows a strong absorption in the infra-red at about 1700 cm^{-1} .
- C It will turn an acidified solution of potassium dichromate(VI) green.
- D It can be dehydrated by concentrated sulphuric acid.

(Total 1 mark)

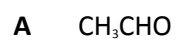
Q8. The compound lithium tetrahydridoaluminate(III), LiAlH_4 , is a useful reducing agent. It behaves in a similar fashion to NaBH_4 . Carbonyl compounds and carboxylic acids are reduced to alcohols. However, LiAlH_4 also reduces water in a violent reaction so that it must be used in an organic solvent.

Which one of the following can be reduced by LiAlH_4 to a primary alcohol?

- A  A cyclohexane ring with a carbonyl group (=O) attached to one of the carbons.
- B  A cyclohexane ring with a carboxylic acid group (-COOH) attached to one of the carbons.
- C  A cyclohexane ring with a carbonyl group (=O) and a methyl group (-CH₃) attached to adjacent carbons.
- D  A cyclohexane ring with a carbonyl group (=O) and a methyl group (-CH₃) attached to adjacent carbons, with the methyl group positioned above the ring and the carbonyl group to the right.

(Total 1 mark)

Q9. Which one of the following can act as an oxidising agent but not as a reducing agent?

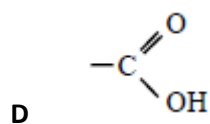
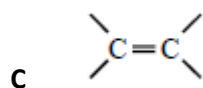
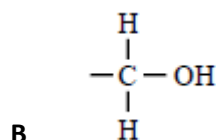
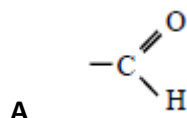


(Total 1 mark)

Q10. Certain chemical tests were performed on the pain-relief drug ibuprofen. The results of these tests are given in the table below.

| Test | Result |
|---|-----------------|
| Aqueous sodium carbonate | Effervescence |
| Bromine water | Remained orange |
| Acidified potassium dichromate(VI) and heat | Remained orange |
| Fehling's solution and heat | Remained blue |

Which one of the following functional groups do these results suggest that ibuprofen contains?



(Total 1 mark)

Q11. On reduction, a racemate can be formed by

- A $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$
- B $\text{CH}_3\text{CH}_2\text{CH}_2\text{COCH}_3$
- C $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3$
- D $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CHO}$

(Total 1 mark)

Q12. How many structural isomers, which are aldehydes, have the molecular formula $\text{C}_5\text{H}_{10}\text{O}$?

- A 2
- B 3
- C 4
- D 5

(Total 1 mark)

Q13. Which one of the following will undergo nucleophilic addition?

- A hex-3-ene
- B hexan-3-one
- C 3-bromohexane
- D hexan-3-ol

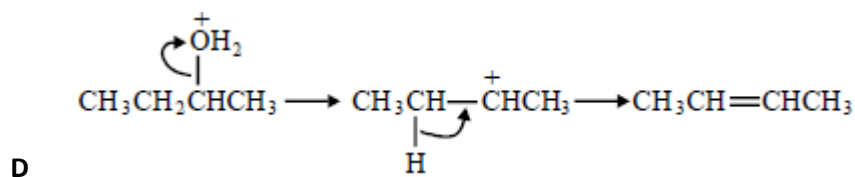
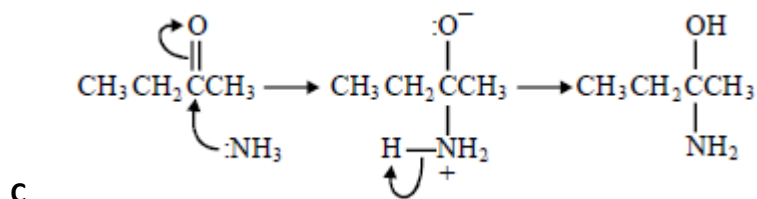
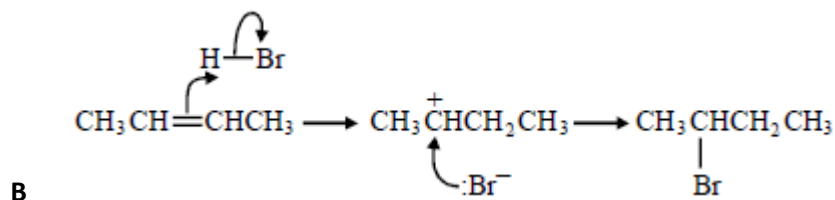
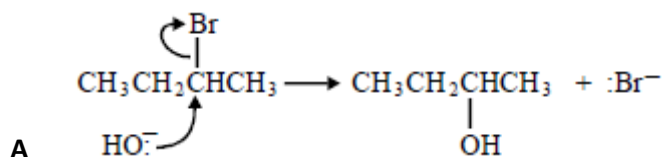
(Total 1 mark)

Q14. Which one of the following isomers is not oxidised under mild reaction conditions?

- A $(\text{CH}_3)_2\text{CHCH}(\text{OH})\text{COCH}_3$
- B $(\text{CH}_3)_2\text{C}(\text{OH})\text{CH}_2\text{COCH}_3$
- C $(\text{CH}_3)_2\text{CHCH}(\text{OH})\text{CH}_2\text{CHO}$
- D $(\text{CH}_3)_2\text{C}(\text{OH})\text{CH}_2\text{CH}_2\text{CHO}$

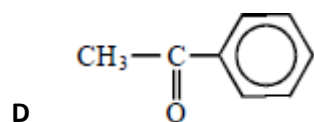
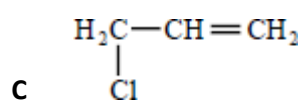
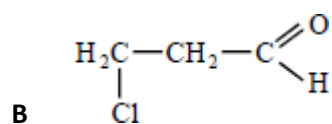
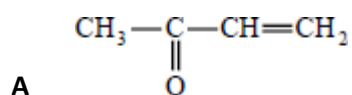
(Total 1 mark)

Q15. In which of the following is a curly arrow used incorrectly?



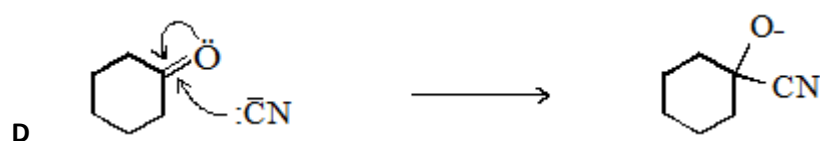
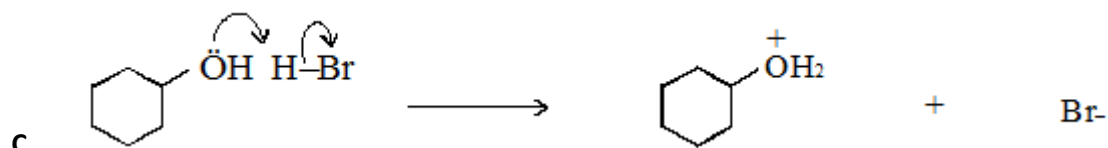
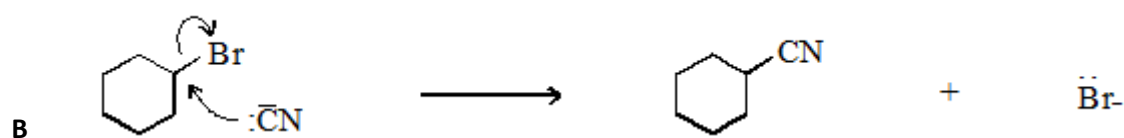
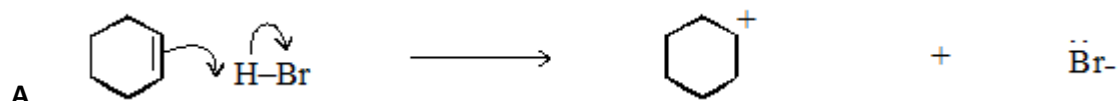
(Total 1 mark)

Q16. Which one of the following can react both by nucleophilic addition and by nucleophilic substitution?



(Total 1 mark)

Q17. In which one of the following are the curly arrows **not** used correctly?



(Total 1 mark)

Q18.CH₂O is the empirical formula of

- A methanol
- B methyl methanoate
- C ethane-1,2-diol
- D butanal

(Total 1 mark)

Q19.Which one of the following does **not** represent an oxidation?

- A propene → propane
- B propan-1-ol → propanal
- C propan-1-ol → propanoic acid
- D propanal → propanoic acid

(Total 1 mark)

Q20.Which one of the following is **not** a suitable method for the preparation of ethanol?

- A oxidation of ethane
- B hydration of ethene
- C reduction of ethanal
- D hydrolysis of bromoethane

(Total 1 mark)

Q21. Which one of the following reactions involves nucleophilic addition?

- A** $\text{CH}_3\text{CH}=\text{CH}_2 + \text{HBr} \rightarrow \text{CH}_3\text{CHBrCH}_3$
- B** $\text{CH}_3\text{CH}_2\text{CH}_3 + \text{Cl}_2 \rightarrow \text{CH}_3\text{CHClCH}_3 + \text{HCl}$
- C** $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{NaOH} \rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{OH} + \text{NaBr}$
- D** $\text{CH}_3\text{CH}_2\text{CHO} + \text{HCN} \rightarrow \text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CN}$

(Total 1 mark)

Q22. Which one of the following conversions does **not** represent a reduction?

- A** propene \rightarrow propane
- B** propanal \rightarrow propan-1-ol
- C** propanal \rightarrow propanoic acid
- D** propanone \rightarrow propane

(Total 1 mark)