**Questions**

**Q1.**



The molecule shown above is 3-chloro-3-methylhexane. It reacts with hot, alcoholic potassium hydroxide to produce a number of different alkenes. This reaction can be classified as

   **A**    elimination.

   **B**    oxidation.

   **C**    reduction.

   **D**    substitution.

**(Total for question = 1 mark)**

**Q2.**



The systematic name of the compound with skeletal formula shown above is

   **A**    1,1-dimethylethanol.

   **B**    2,2-dimethylethanol.

   **C**    2-methylpropan-1-ol.

   **D**    2-methylpropan-2-ol.

**(Total for Question = 1 mark)**

**Q3.**Which of the following could be used to oxidize ethanol to ethanoic acid?

   **A**    Concentrated H2SO4

   **B**    

   **C**    H+/Cr3+

   **D**    Concentrated NaOH solution

**(Total for Question = 1 mark)**

**Q4.**

Which of these is a tertiary alcohol?

   **A**     3-methylpentan-2-ol

   **B**     Pentan-2-ol

   **C**     Pentan-3-ol

   **D**     2-methylpentan-2-ol

**(Total for question = 1 mark)**

**Q5.**

Which of the following is a secondary alcohol?

   **A**  butan-1-ol

   **B**  butan-2-ol

   **C**  2-methylpropan-1-ol

   **D**  2-methylpropan-2-ol

**(Total for question = 1 mark)**

**Q6.**The alcohol shown below can be classified as



   **A**    just primary.

   **B**    primary and secondary.

   **C**    just secondary.

   **D**    secondary and tertiary.

**(Total for Question = 1 mark)**

**Q7.**

Which of these compounds is a secondary halogenoalkane?

   **A**     CH3CH(OH)CH3

   **B**     CH3CCl(CH3)CH3

   **C**     CH3CHClCH3

   **D**     CH3CH2CH2Cl

**(Total for question = 1 mark)**

**Q8.**

Hydrogen, H2, is not a completely 'carbon neutral' fuel. Which of the following is an **incorrect** reason for this?

   **A**    Some CO2 is released in the transportation of H2 fuel.

   **B**    CO2 is made when the electricity is generated for the manufacture of H2.

   **C**    A small amount of CO2 is produced on the combustion of H2 fuel.

   **D**    CO2 is released during the construction of the H2 manufacturing plant.

**(Total for question = 1 mark)**

**Q9.**

When a chloroalkane is heated with aqueous sodium hydroxide

   **A**  no reaction occurs with primary, secondary or tertiary chloroalkanes.

   **B**  a reaction occurs with primary and secondary chloroalkanes but not with tertiary chloroalkanes.

   **C**  a reaction occurs with tertiary chloroalkanes but not with primary and secondary chloroalkanes.

   **D**  a reaction occurs with primary, secondary and tertiary chloroalkanes.

**(Total for question = 1 mark)**

**Q10.**

Chloroethane reacts with **aqueous** potassium hydroxide solution, producing ethanol as
 the organic product.

(a)  The hydroxide ion is acting as

**(1)**

   **A**     an electrophile.

   **B**     a nucleophile.

   **C**     an oxidizing agent.

   **D**     a reducing agent.

(b)  Which of the following shows the correct electron-pair movements in this reaction?

**(1)**



**(Total for question = 2 marks)**

**Q11.**Samples of 1-chloropropane and 1-bromopropane are warmed with water containing dissolved silver nitrate in the presence of ethanol. The 1-chloropropane reacts more slowly because

   **A**    the C—Cl bond is more polar than the C—Br bond.

   **B**    the C—Cl bond is stronger than the C—Br bond.

   **C**    1-chloropropane is less soluble than 1-bromopropane.

   **D**    1-chloropropane is a weaker oxidizing agent than 1-bromopropane.

**(Total for Question = 1 mark)**

**Q12.**

The best method of converting ethanol, C2H5OH, into iodoethane, C2H5I, is to

   **A**     heat iodine and ethanol under reflux.

   **B**     react ethanol and potassium iodide in the presence of dilute acid.

   **C**     heat potassium iodide and ethanol with concentrated sulfuric acid.

   **D**     heat red phosphorus, ethanol and iodine under reflux.

**(Total for question = 1 mark)**

**Q13.**

These questions concern the use of infrared (IR) spectra to identify organic compounds. The IR absorption ranges associated with some organic functional groups are given below.

   **A**       O—H stretching in alcohols at 3750 − 3200 cm−1

   **B**       CO stretching in aldehydes at 1740 − 1720 cm−1

   **C**       CO stretching in ketones at 1700 − 1680 cm−1

   **D**       CO stretching in carboxylic acids at 1725 − 1700 cm−1

      (a) When propan−2−ol is refluxed with potassium dichromate(VI) and sulfuric acid, the **product** will show a peak due to

**(1)**

   **A**

   **B**

   **C**

   **D**

      (b) When propan−1−ol is heated with potassium dichromate(VI) and sulfuric acid, the **product**, that is distilled off as it is formed, will show a peak due to

**(1)**

   **A**

   **B**

   **C**

   **D**

**(Total for question = 2 marks)**

**Q14.**

How many molecular ion peaks (parent ion peaks) occur in the mass spectrum of 1,2-dibromoethane, CH2BrCH2Br?

Assume the only isotopes present are 1H, 12C, 79Br and 81Br.

   **A**    1

   **B**    2

   **C**    3

   **D**    4

**(Total for Question = 1 mark)**

**Q15.**

Propan-1-ol and propan-2-ol are separately oxidized under mild conditions by acidified sodium dichromate(VI) and the product immediately distilled off. What is the oxidation product in each case?



**(Total for Question = 1 mark)**

**Q16.**

Which of the following isomeric alcohols, with molecular formula C5H12O, can be oxidized to a carboxylic acid with five carbon atoms?



**(Total for question = 1 mark)**

**Q17.**

Which of the following reagents gives a **positive** result with a tertiary alcohol?

   **A**    Acidified potassium dichromate(VI) solution

   **B**    Phosphorus(V) chloride

   **C**    Dilute sulfuric acid

   **D**    Bromine water

**(Total for question = 1 mark)**

**Q18.**

Consider the following organic liquids:

**A**  ethanal

**B**  ethanol

**C**  tetrachloromethane

**D**  trichloromethane

(a) Each liquid is run from a burette. Which liquid would not be deflected significantly by a charged rod?

**(1)**

   **A**

   **B**

   **C**

   **D**

(b) Which liquid would react with phosphorus(V) chloride to give a gas which fumes in moist air?

**(1)**

   **A**

   **B**

   **C**

   **D**

(c) Which liquid would you expect to have the peak at the greatest mass/charge ratio in its mass spectrum?

**(1)**

   **A**

   **B**

   **C**

   **D**

(d) Which liquid has an infrared spectrum with a broad absorption due to hydrogen bonding?

**(1)**

   **A**

   **B**

   **C**

   **D**

**(Total for question = 4 marks)**

**Q19.**The compound with formula CH3CH(NH2)CH3 can be made by reacting alcoholic ammonia with

   **A**    propane.

   **B**    propene.

   **C**    2-chloropropane.

   **D**    propan-2-ol.

**(Total for Question = 1 mark)**

**Q20.**

      Which of the following formulae does not represent 2,2−dimethylpropan−1−ol?



**(Total for question = 1 mark)**

**Q21.**

The skeletal formulae of some 6-carbon bromoalkanes are shown below.

?

(a)  Which of the above bromoalkanes is **not** a structural isomer of the others?

**(1)**

   **A**

   **B**

   **C**

   **D**

(b)  Which of the above is **not** a secondary bromoalkane?

**(1)**

   **A**

   **B**

   **C**

   **D**

**(Total for question = 2 marks)**

**Q22.**

What is the correct systematic name for the alcohol shown below?



   **A**     hexan-4-ol

   **B**     hexan-2-ol

   **C**     pentan-4-ol

   **D**     pentan-2-ol

**(Total for question = 1 mark)**

**Q23.**

The compound



has the systematic name

   **A**  2-chlorobutane

   **B**  3-chlorobutane

   **C**  1-chloro-1-methylpropanel

   **D**  1-chloro-2-methylbutane

**(Total for question = 1 mark)**

**Q24.**

When chloroethane is heated with a concentrated solution of potassium hydroxide in
**ethanol**, the reaction which occurs is

   **A**     substitution.

   **B**     elimination.

   **C**     hydrolysis.

   **D**     redox.

**(Total for question = 1 mark)**

**Q25.**The term "reflux" is best described as

   **A**    continuous evaporation and condensation.

   **B**    heating to evaporation and separation.

   **C**    heating under reduced pressure and separation.

   **D**    constant boiling.

**(Total for Question = 1 mark)**

**Mark Scheme**

**Q1.**



**Q2.**



**Q3.**



**Q4.**



**Q5.**



**Q6.**



**Q7.**



**Q8.**



**Q9.**



**Q10.**



**Q11.**



**Q12.**



**Q13.**



**Q14.**



**Q15.**



**Q16.**



**Q17.**



**Q18.**



**Q19.**



**Q20.**



**Q21.**



**Q22.**



**Q23.**



**Q24.**



**Q25.**

