1 Which of the following is a tertiary alcohol?

☒ **A** 3-methylbutan-2-ol

☒ **B** 2-methylbutan-2-ol

☒ **C** 2-methylbutan-1-ol

☒ **D** 2,2-dimethylpropan-1-ol

(Total for Question = 1 mark)

2 When sodium is added to ethanol, which of the following observations would be made?

☒ **A** Colour change of orange to green

☒ **B** Effervescence

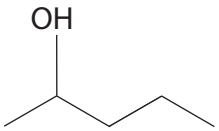
☒ **C** Yellow flame

☒ **D** No change

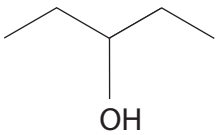
(Total for Question = 1 mark)

3 Which of the following isomeric alcohols, with molecular formula $C_5H_{12}O$, can be oxidized to a carboxylic acid with five carbon atoms?

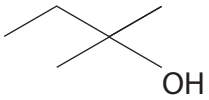
☒ **A**



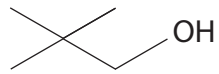
☒ **B**



☒ **C**

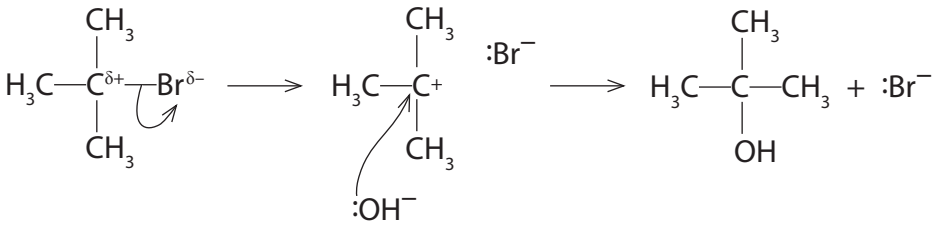


☒ **D**



(Total for Question = 1 mark)

4 A reaction mechanism is shown below.



The hydroxide ion is acting as

☒ **A** an electrophile.

☒ **B** a catalyst.

☒ **C** a free radical.

☒ **D** a nucleophile.

(Total for Question = 1 mark)

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

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

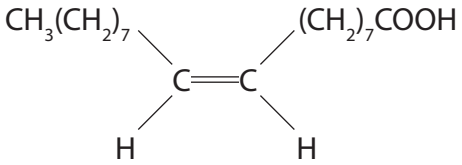
☒ **B** Phosphorus(V) chloride

☒ **C** Dilute sulfuric acid

☒ **D** Bromine water

(Total for Question = 1 mark)

6 The formula for oleic acid, which is present in fingerprints, is shown below.



(a) The systematic name for oleic acid is

(1)

☒ **A** *E*-octadec-9-enoic acid.

☒ **B** *Z*-octadec-9-enoic acid.

☒ **C** *E*-octadec-8-enoic acid.

☒ **D** *Z*-octadec-8-enoic acid.

(b) Which intermolecular forces are present between oleic acid molecules?

(1)

☒ **A** Hydrogen bonds only.

☒ **B** Hydrogen bonds and permanent dipole-dipole forces only.

☒ **C** Hydrogen bonds, permanent dipole-dipole forces and London forces.

☒ **D** Hydrogen bonds and London forces only.

(c) Which of the following species is most likely to cause a peak at *m/e* = 45 in the mass spectrum of oleic acid?

(1)

☒ **A** CH_2CH_2OH

☒ **B** $CH_2CH_2OH^+$

☒ **C** COOH

☒ **D** $COOH^+$

(d) What would you expect to see if oleic acid is tested separately with bromine water and with phosphorus(V) chloride, PCl_5?

(1)

	Bromine water	Phosphorus(V) chloride, PCl_5
☒ **A**	Decolorises	Steamy fumes
☒ **B**	No colour change	No visible change
☒ **C**	Decolorises	No visible change
☒ **D**	No colour change	Steamy fumes

(Total for Question = 4 marks)

7 Which of the following could be used to oxidize ethanol to ethanoic acid?

- ☒ **A** Concentrated H_2SO_4
- ☒ **B** $H^+/Cr_2O_7^{2-}$
- ☒ **C** H^+/Cr^{3+}
- ☒ **D** Concentrated NaOH solution

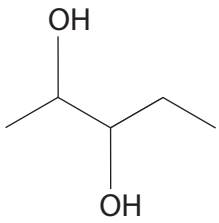
(Total for Question = 1 mark)

8 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)

9 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)

10 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?

		Propan-1-ol	Propan-2-ol
☒	**A**	propanal	propanone
☒	**B**	propanoic acid	propanone
☒	**C**	propanal	propanoic acid
☒	**D**	propanone	propanal

(Total for Question 1 mark)

11 The best method of converting ethanol, C_2H_5OH, into iodoethane, C_2H_5I, 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)

12 Which of these compounds would **not** react when heated with a mixture of potassium dichromate(VI) and sulfuric acid?

☒ **A** CH_3OH

☒ **B** $CH_3(CH_2)_2OH$

☒ **C** $(CH_3)_2CHOH$

☒ **D** $(CH_3)_3COH$

(Total for Question = 1 mark)

13 Which of the following is a **secondary** alcohol?

☒ **A** 2-methylpentan-3-ol

☒ **B** 2-methylpropan-2-ol

☒ **C** 2,2-dimethylpropan-1-ol

☒ **D** ethane-1,2-diol

(Total for Question = 1 mark)

14 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)

15 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)

16 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.

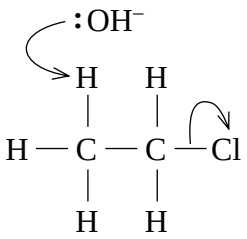
☒ **C** an oxidizing agent.

☒ **D** a reducing agent.

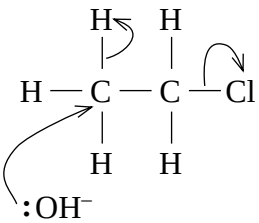
(b) Which of the following shows the correct electron-pair movements in this reaction?

(1)

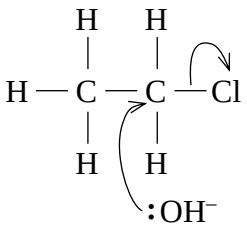
☒ **A**



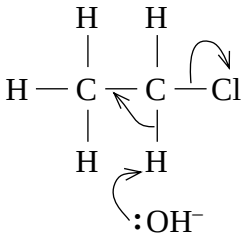
☒ **B**



☒ **C**



☒ **D**



(Total for Question = 2 marks)