

10.2 Functional Group Chemistry

Question Paper

Course	DPIB Chemistry
Section	10. Organic Chemistry
Topic	10.2 Functional Group Chemistry
Difficulty	Easy

Time allowed: 20
Score: /14
Percentage: /100

Question 1

Which of these organic compounds would undergo free radical substitution?

- 1 ethane
- 2 fluoroethane
- 3 ethene
- 4 ethanal

A 1 only **B** 1 and 2 **C** 1, 2 and 3 **D** All

[1 mark]

Question 2

Which of these compounds would act as a nucleophile?

- A** C_2H_6
- B** H^+
- C** OH^-
- D** Al

[1 mark]

Question 3

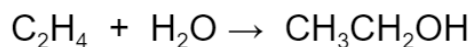
Which equation represents a correct propagation step in the free radical substitution reaction between ethane and chlorine?

- A** $C_2H_6 + Cl\cdot \rightarrow C_2H_5Cl + H\cdot$
- B** $C_2H_5\cdot + Cl_2 \rightarrow C_2H_5Cl + Cl\cdot$
- C** $C_2H_6 + H\cdot \rightarrow C_2H_5\cdot + HCl$
- D** $C_2H_5\cdot + Cl\cdot \rightarrow C_2H_5Cl$

[1 mark]

Question 4

Ethene reacts with steam in the presence of sulfuric acid.



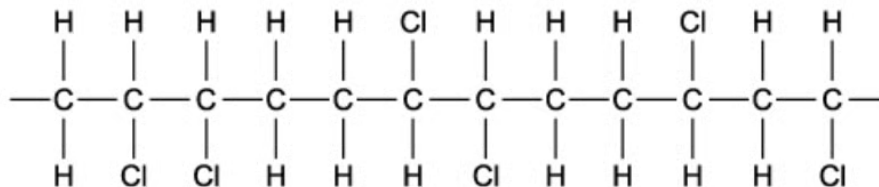
What type of reaction is this?

- A** acid / base
- B** addition
- C** hydrolysis
- D** substitution

[1 mark]

Question 5

A molecule of a polymer contained the sequence shown.



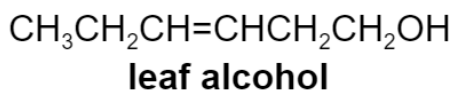
Which monomer could produce this polymer by addition polymerisation?

- A** $\text{CHCl}=\text{CHCl}$
- B** $\text{CH}_2=\text{CHCl}$
- C** $\text{CH}_3\text{CCl}=\text{CHCl}$
- D** $\text{CH}_3\text{CCl}=\text{CH}_2$

[1 mark]

Question 6

The compound 'leaf alcohol' is partly responsible for the smell of new-mown grass.



What product will be formed when 'leaf alcohol' is oxidised using an excess of hot, acidified $\text{K}_2\text{Cr}_2\text{O}_7(\text{aq})$?

- A** $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}_2\text{CO}_2\text{H}$
- B** $\text{CH}_3\text{CH}_2\text{COCOCH}_2\text{CO}_2\text{H}$
- C** $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_2\text{CO}_2\text{H}$
- D** $\text{CH}_3\text{CH}_2\text{CO}_2\text{H}$ and $\text{HO}_2\text{CCH}_2\text{CO}_2\text{H}$

[1 mark]

Question 7

Which of the alcohols shown below will decolourise acidified potassium manganate(VII)?

- I. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- II. $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$
- III. $(\text{CH}_3)_3\text{CCH}_2\text{OH}$

- A** I and II only
- B** I and III only
- C** II and III only
- D** I, II and III

[1 mark]

Question 8

Ultraviolet light initiates the following reaction.



What happens to chlorine in this photochemical reaction?

- A** heterolytic fission to give an electrophile
- B** homolytic fission to give an electrophile
- C** heterolytic fission to give a positive and negative ion
- D** homolytic fission to give free radicals

[1 mark]

Question 9

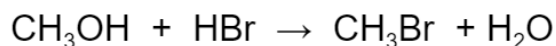
Which reaction is an example of nucleophilic substitution?

- A** $\text{C}_6\text{H}_6 + \text{Br}_2 \rightarrow \text{C}_6\text{H}_5\text{Br} + \text{HBr}$
- B** $\text{CH}_2=\text{CH}_2 + \text{HBr} \rightarrow \text{CH}_3\text{CH}_2\text{Br}$
- C** $\text{C}_3\text{H}_7\text{Br} + \text{H}_2\text{O} \rightarrow \text{C}_3\text{H}_7\text{OH} + \text{HBr}$
- D** $\text{C}_2\text{H}_6 + \text{Br}_2 \rightarrow \text{C}_2\text{H}_5\text{Br} + \text{HBr}$

[1 mark]

Question 10

Bromomethane, CH_3Br , is used as a fumigant to destroy insect pests in grain that is to be stored. It can be made by reacting methanol with hydrogen bromide.



What type of reaction is this?

- A** condensation
- B** electrophilic substitution
- C** free radical substitution
- D** nucleophilic substitution

[1 mark]

Question 11

What reagents and conditions are needed to convert but-2-ene into butane?

- A** Concentrated sulfuric acid, steam, 300°C
- B** Hydrogen gas, Ni catalyst, 150°C
- C** Acidified potassium dichromate, heating under reflux
- D** Hydrogen bromide, room temperature

[1 mark]

Question 12

Which of the following products are possible from the incomplete combustion of alkanes?

- I. C
- II. CO
- III. H₂

- A** I and II only
- B** I and III only
- C** II and III only
- D** I, II and III

[1 mark]

Question 13

What can be produced when an aqueous solution of butan-2-ol is oxidised under suitable conditions?

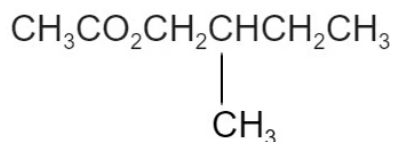
- 1 butanone
- 2 butanoic acid
- 3 butanal

A 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 1 only

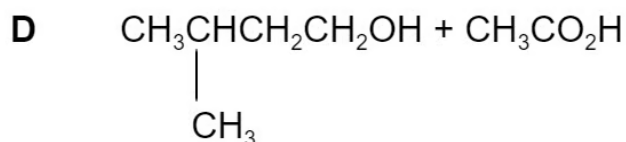
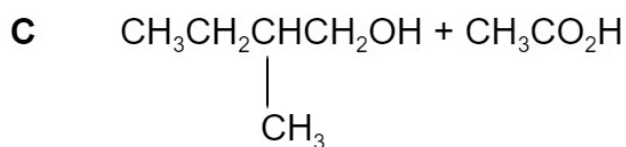
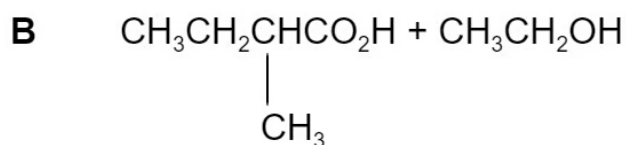
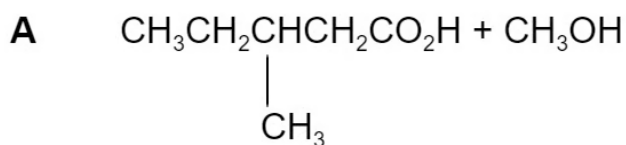
[1 mark]

Question 14

The ester in the diagram below has an odour of banana.



Which pair of reactants can be used to produce this ester under suitable conditions?



[1 mark]