10.2 Functional Group Chemistry

Question Paper

Course	DP IB 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 $C_2H_6 + Cl^{\bullet} \rightarrow C_2H_5Cl + H^{\bullet}$

B $C_2H_5^{\bullet} + Cl_2 \rightarrow C_2H_5Cl + Cl^{\bullet}$

C $C_2H_6 + H^{\bullet} \rightarrow C_2H_5^{\bullet} + HCl$

D $C_2H_5^{\bullet} + Cl^{\bullet} \rightarrow C_2H_5Cl$

[1 mark]

Question 4

Ethene reacts with steam in the presence of sulfuric acid.

$$C_2H_4 + H_2O \rightarrow CH_3CH_2OH$$

What type of reaction is this?

A acid / base

B addition

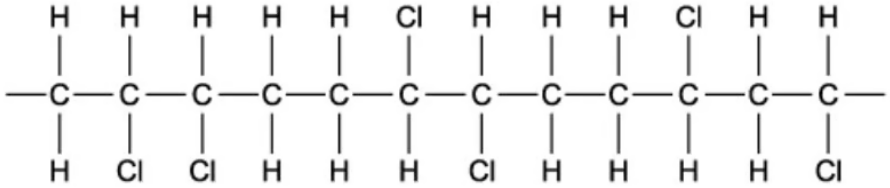
C hydrolysis

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 $CHCl=CHCl$

B $CH_2=CHCl$

C $CH_3CCl=CHCl$

D $CH_3CCl=CH_2$

[1 mark]

Question 6

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

$CH_3CH_2CH=CHCH_2CH_2OH$
leaf alcohol

What product will be formed when 'leaf alcohol' is oxidised using an excess of hot, acidified $K_2Cr_2O_7(aq)$?

A $CH_3CH_2CH(OH)CH(OH)CH_2CO_2H$

B $CH_3CH_2COCOCH_2CO_2H$

C $CH_3CH_2CH=CHCH_2CO_2H$

D $CH_3CH_2CO_2H$ and $HO_2CCH_2CO_2H$

[1 mark]

Question 7

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

I. $CH_3CH_2CH_2CH_2OH$

II. $CH_3CH(OH)CH_2CH_3$

III. $(CH_3)_3CCH_2OH$

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.

alkane + chlorine → chloroalkane + hydrogen chloride

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 $C_6H_6 + Br_2 \rightarrow C_6H_5Br + HBr$

B $CH_2=CH_2 + HBr \rightarrow CH_3CH_2Br$

C $C_3H_7Br + H_2O \rightarrow C_3H_7OH + HBr$

D $C_2H_6 + Br_2 \rightarrow C_2H_5Br + HBr$

[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.

$$CH_3OH + HBr \rightarrow CH_3Br + H_2O$$

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. H_2

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

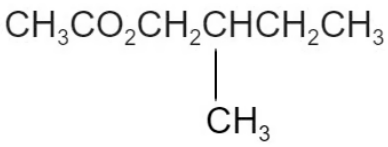
3 butanal

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

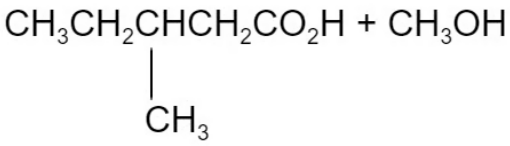
[1 mark]

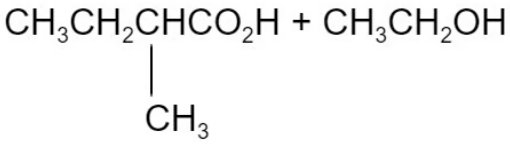
Question 14

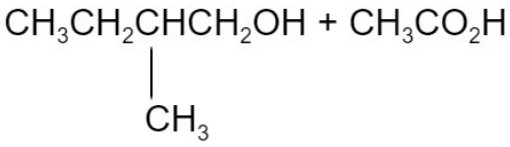
The ester in the diagram below has an odour of banana.

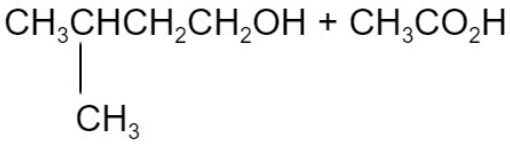


Which pair of reactants can be used to produce this ester under suitable conditions?

A 

B 

C 

D 

[1 mark]