

# 10.2 Functional Group Chemistry

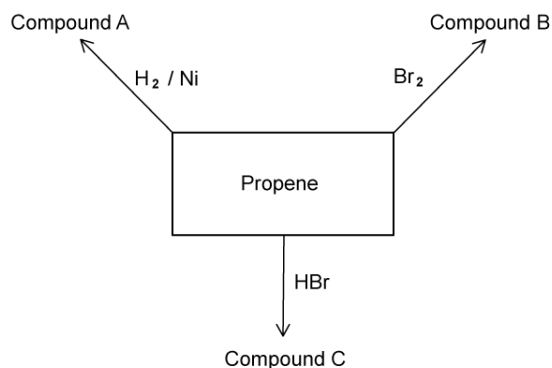
## Question Paper

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

**Time allowed:** 50  
**Score:** /38  
**Percentage:** /100

### Question 1a

a)  
A reaction scheme for propene is shown below.



State the condensed structural formula of propene.

[1 mark]

### Question 1b

b)  
State the IUPAC names for compounds A, B and C shown in the reaction scheme in part (a)

[3 marks]

### Question 1c

c)  
Propene will also react to form an alcohol. State the reagents and conditions required for the formation of an alcohol from propene.

[3 marks]

**Question 1d**

d)

State the colour change when compound B is formed from propene.

**[1 mark]****Question 1e**

e)

Propene can form polypropene. Draw the repeating unit that will be formed via the addition polymerisation of propene.

**[2 marks]****Question 2a**

a)

There are three steps to the free radical substitution mechanism. When ethane and chlorine react in the presence of UV light, chloroethane is produced. Write the equation for the initiation step.

**[1 mark]****Question 2b**

b)

Write two equations for the propagation steps for the reaction outlined in part (a).

**[2 marks]**

### Question 2c

c)  
Write the equation using structural formulae for the termination reaction between two  $\text{CH}_3\text{CH}_2^\bullet$  free radicals.

[1 mark]

### Question 2d

d)  
State the type of bond breaking that occurs in the initiation reaction to produce free radicals.

[1 mark]

### Question 3a

a)  
State the balanced symbol equations for the complete combustion of propane and propanol.

[4 marks]

### Question 3b

b)  
The following reaction profile shown produces propanoic acid after three steps.



State the reagents and conditions that can be used for steps 2 and 3.

[3 marks]

**Question 3c**

c)

Using your answer to part (b) to state the colour change for step 2.

**[1 mark]****Question 3d**

d)

Explain why 2-methylpropan-2-ol will not form a carboxylic acid.

**[2 marks]****Question 4a**

a)

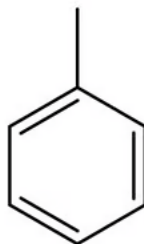
Benzene undergoes substitution reactions. State the equation for the reaction of benzene with nitric acid to produce nitrobenzene and water.

**[2 marks]**

### Question 4b

b)

The structure of methylbenzene is shown below.



Draw the structures of the two isomers of chloromethylbenzene formed from the reaction of methyl benzene and  $\text{Cl}_2$  in the presence of  $\text{AlCl}_3$ .

[2 marks]

### Question 4c

c)

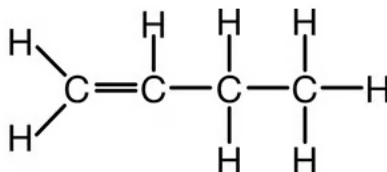
State the type of reaction that benzene will typically undergo.

[1 mark]

### Question 5a

a)

The structure of but-1-ene is shown below.



Draw and state the name of the secondary halogenoalkane formed when but-1-ene reacts with  $\text{HCl}$ .

[2 marks]

### Question 5b

b)

Explain why halogenoalkanes are more reactive than alkanes.

[2 marks]

### Question 5c

c)

State the reagents and conditions required for the formation of propan-1-ol from 1-bromopropane.

[3 marks]

### Question 5d

d)

The type of reaction outlined in part (c) is *nucleophilic substitution*. State the meaning of the term *nucleophile*.

[1 mark]