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## **IB Chemistry: SL**

### **10.2 Functional Group Chemistry**



# **CHEMISTRY**

# **SL**

## 10.2 Functional Group Chemistry

### Question Paper

Course	DP IB Chemistry
Section	10. Organic Chemistry
Topic	10.2 Functional Group Chemistry
Difficulty	Hard

EXAM PAPERS PRACTICE

Time allowed: 20

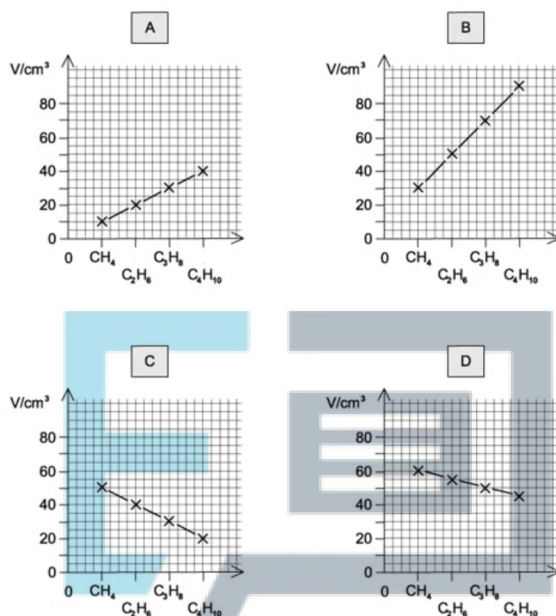
Score: /10

Percentage: /100

## Question 1

Samples of  $10\text{cm}^3$  of each of the first four members of the alkane series are separately mixed with  $70\text{cm}^3$  of oxygen. Each is then burned and the total volume,  $V$ , of residual gas measured again at room temperature and pressure.

Which graph represents the results that would be obtained?

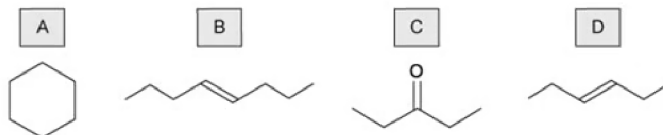


[1 mark]

## Question 2

*A periodic table is needed for this question*

Which compound has an  $M_r$  of 84.18 and will react with  $\text{HBr}$  to give a product with an  $M_r$  of 165.09?



[1 mark]

### Question 3

An organic compound **Y** with molecular formula  $C_5H_{12}O$ , is oxidised to compound **Z** with molecular formula  $C_5H_{10}O_2$

What could be the structural formula of **Y**?

- 1  $CH_3(CH_2)_4OH$
- 2  $CH_3CH_2CH(CH_2OH)CH_3$
- 3  $CH_3C(CH_3)_2CH_2OH$

- A. 1, 2 and 3  
B. 1 and 3 only  
C. 2 and 3 only  
D. 3 only

[1 mark]

### Question 4

*A periodic table is needed to answer this question*

A number of alcohols with the formula  $C_4H_{10}O$  are separately oxidised. Using 7.41 g of the alcohols a 50% yield of organic product is achieved.

What mass of product could be obtained?

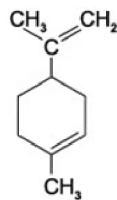
- 1 4.41 g of butanoic acid
- 2 4.41 g of 2-methylpropanoic acid
- 3 3.61 g of butanone

- A. 1, 2 and 3  
B. 1 and 2 only  
C. 2 and 3 only  
D. 1 only

[1 mark]

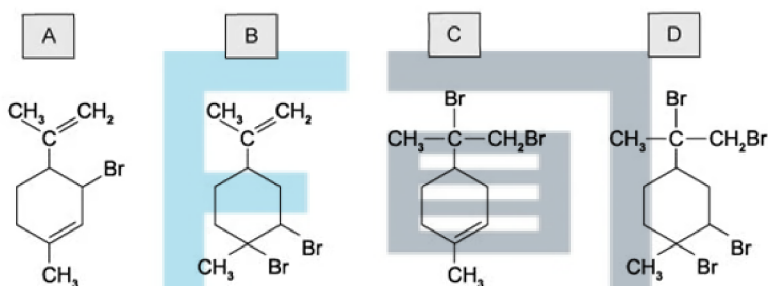
## Question 5

Limonene is an oil formed in the peel of citrus fruits.



Limonene

Which product is formed when an excess of bromine, Br<sub>2</sub>(l), reacts with limonene at room temperature in the dark?



[1 mark]

## Question 6

Compound **K**, C<sub>5</sub>H<sub>12</sub>O, is oxidised by acidified sodium dichromate(VI) to compound **L**.

Compound **L** reacts with butan-2-ol in the presence of a little concentrated sulfuric acid to give liquid **M**.

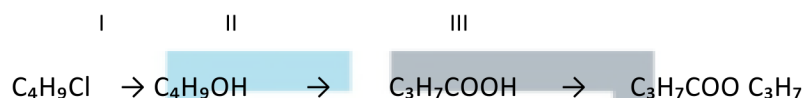
What could be the formula of liquid **M**?

- A.  $(\text{CH}_3)_2\text{CHCH}_2\text{CO}_2\text{C}(\text{CH}_3)_3$
- B.  $\text{CH}_3(\text{CH}_2)_3\text{CO}_2(\text{CH}_2)_3\text{CH}_3$
- C.  $\text{CH}_3(\text{CH}_2)_3\text{CO}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$
- D.  $\text{CH}_3(\text{CH}_2)_2\text{CO}_2\text{CH}_2\text{CH}_2(\text{CH}_3)_2$

[1 mark]

## Question 7

Shown below is a reaction sequence starting with 1-chlorobutane.



What is the correct classification of the types of reactions shown?

	I	II	III
A	substitution	oxidation	substitution
B	addition	substitution	condensation
C	oxidation	substitution	condensation
D	substitution	oxidation	condensation

[1 mark]

## Question 8

Which compound is produced in the reaction between pent-2-ene and steam?

- A.  $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_2\text{OH}$
- B.  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
- C.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- D.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$

[1 mark]

### Question 9

When compound **T** reacts with its own oxidation product, a sweet-smelling liquid is produced.

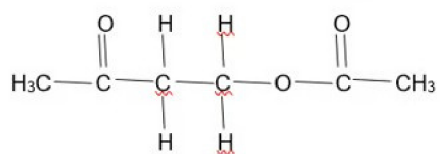
What is the identity of compound **T**?

- A. butanal
- B. butanone
- C. butan-1-ol
- D. butanoic acid

[1 mark]

### Question 10

In the presence of an  $\text{H}^+$  catalyst, compound **X** reacts with ethanoic acid to produce the compound below.



What is the molecular formula of compound **X**?

- A.  $\text{C}_4\text{H}_8\text{O}$
- B.  $\text{C}_4\text{H}_8\text{O}_2$
- C.  $\text{C}_2\text{H}_6\text{O}_2$
- D.  $\text{C}_2\text{H}_6\text{O}_3$

[1 mark]