10.1 Fundamentals of Organic Chemistry

Question Paper

Course	DP IB Chemistry
Section	10. Organic Chemistry
Topic	10.1 Fundamentals of Organic Chemistry
Difficulty	Hard

Time allowed: 50

Score: /35

Percentage: /100

Question 1a

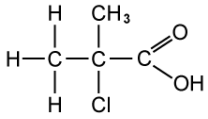
a)
State the general formula for carboxylic acids.

[1]

[1 mark]

Question 1b

b)
State the IUPAC name of the following compound.



[1]

[1 mark]

Question 1c

c)
Explain why the solubility of carboxylic acids decreases as chain length increases.

[2]

[2 marks]

Question 1d

d)
Propan-2-ol will form an ester when reacted with ethanoic acid in the presence of concentrated sulfuric acid.

Draw the displayed formula for the ester formed.

[1]

[1 mark]

Question 2a

a)
State the IUPAC names for the isomers of $C_5H_{12}O$ that are primary alcohols.

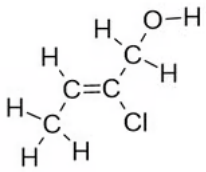
[4]

[4 marks]

Question 2b

b)
State the IUPAC name for the following primary alcohols.

i)



[1]

ii)
$CH_2(Br)CH(CH_3)CH_2OH$

[1]

[2 marks]

Question 2c

c)
Draw the displayed formula for a straight chain isomer of $CH_2(Br)CH(CH_3)CH_2OH$.

[1]

[1 mark]

Question 2d

d)
The empirical formula of the compound in part b) i).

[1]

[1 mark]

Question 3a

a)
Draw a diagram to show the resonance structure in a molecule of benzene.

[2]

[2 marks]

Question 3b

b)
The energy change for hydrogenation of cyclohexene is -120 kJ mol^{-1}. However, when benzene undergoes hydrogenation, the energy change is 152 kJ mol^{-1} less than expected.

Use this data to explain the relative stabilities of benzene and the theoretical cyclohexa-1,3,5-triene molecule.

[3]

[3 marks]

Question 3c

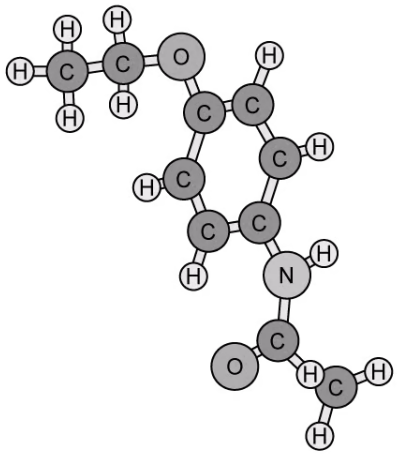
c)
With reference to bonding and hybridisation, describe the structure of benzene.

[4]

[4 marks]

Question 4a

a)
Phenacetin is a pain killer though the use of this was banned as it was found to cause harm to kidney function.



Deduce the molecular formula of phenacetin.

[1]

[1 mark]

Question 4b

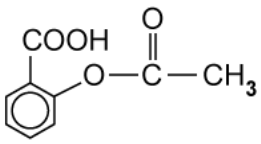
b)
Identify the names of the three functional groups present in phenacetin.

[3]

[3 marks]

Question 4c

c)
Aspirin is a common pain killer and has the following structure.



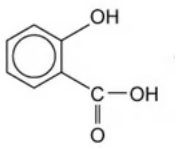
State the empirical formula of aspirin.

[1]

[1 mark]

Question 4d

d)
Aspirin is formed from ethanoic anhydride and compound A. State the IUPAC name of compound **A**.



Compound A

[1]

[1 mark]

Question 5a

a)
Deduce the number of isomers of C_6H_{14}.

[1]

[1 mark]

Question 5b

b)
State the IUPAC name of **two** branched isomers of C_6H_{14}.

[2]

[2 marks]

Question 5c

c)
Draw the displayed formula of a possible isomer of C_6H_{12} that does **not** contain a π bond.

[1]

[1 mark]

Question 5d

d)
State the IUPAC names of two branched isomers of C_5H_{10} that contain a π bond.

[3]

[3 marks]