10.1 Fundamentals of Organic Chemistry

Question Paper

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

Time allowed: 40

Score: /31

Percentage: /100

Question 1a

a)
Define the term hydrocarbon.

[1 mark]

Question 1b

b)
State the general formula for the following hydrocarbon families.

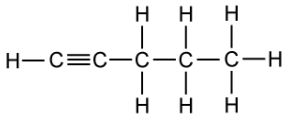
Alkanes ……

Alkenes ……

[2 marks]

Question 1c

c)
State the IUPAC name of the following hydrocarbon.



[1 mark]

Question 1d

d)
A student stated that as the number of carbon atoms increases in an alkane, the boiling point increases. State if the student is correct and justify your answer.

[3 marks]

Question 2a

a)
Propanal and propanone have the same molecular formula, C_3H_6O, but have different structures. Draw the displayed structures of propanal and propanone.

[2 marks]

Question 2b

b)
State the type of isomerism that is exhibited by propanal and propanone.

[1 mark]

Question 2c

c)
Butanone can be reduced to a secondary alcohol by $LiAlH_4$. State the name of this alcohol.

[1 mark]

Question 2d

d)
State the general formula of an alcohol.

[1 mark]

Question 3a

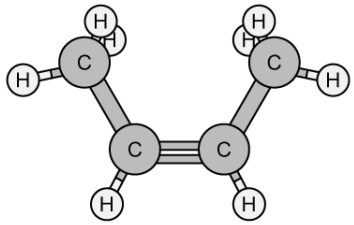
a)
Name the three possible isomers of C_5H_{12}.

[3 marks]

Question 3b

b)

Using IUPAC rules state the name of the molecule shown in the image below.



[1 mark]

Question 3c

c)

Draw the sterochemical drawing of methane.

[1 mark]

Question 4a

a)

State whether the following amines can be classed either primary, secondary or tertiary.

Ethylamine …….

2–aminopropane …….

[2 marks]

Question 4b

b)
2–chloro-2–methylbutane is classed as a tertiary halogenoalkane.

i)
Draw the structure of 2–chloro-2–methylbutane.

ii)
Explain why this is classed as a tertiary haloalkane

[2 marks]

Question 4c

c)
The formulae of four organic compounds are given below. State the IUPAC names of the compounds.

$CH_3CH_2CH_2CH_2CHO$ ……

CH_3CH_2COOH ……

CH_3CH_2OH ……

[3 marks]

Question 4d

d)
State the two compounds from part (c) that will react to form an ester in the presence of concentrated sulfuric acid.

[1 mark]

Question 5a

a)
State the formula for benzene and draw the displayed structure.

[2 marks]

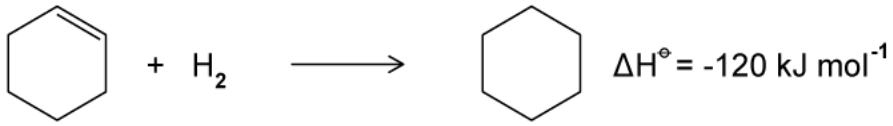
Question 5b

b)
State the bond angle in the planar regular hexagon structure of benzene.

[1 mark]

Question 5c

c)
Cyclohexene is an unsaturated hydrocarbon and can undergo hydrogenation as shown below.



When benzene undergoes the same reaction with three hydrogen molecules the expected enthalpy change of the reaction is lower than expected.

State the expected value of the hydrogenation of benzene.

[1 mark]

Question 5d

d)
Explain why the enthalpy value for the hydrogenation of benzene is lower than expected.

[2 marks]