Practice Question Set For A-Level
**Subject : Chemistry**
**Paper-2 Topic: Aromatic Chemistry**

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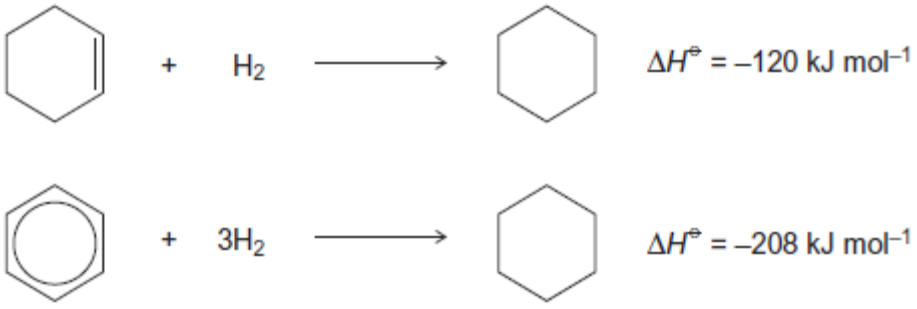
**Name of the Student**:_____
**Max. Marks : 25 Marks** **Time : 25 Minutes**

Q1.

Equations for the hydrogenation of cyclohexene and of benzene, together with the enthalpies of hydrogenation, are shown.




(a) (i) Use these data to show that benzene is 152 kJ mol$^{-1}$ more stable than the hypothetical compound cyclohexa−1,3,5−triene.

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**(1)**

(ii) State, in terms of its bonding, why benzene is more stable than cyclohexa−1,3,5−triene.

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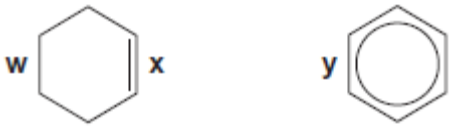
**(1)**

(b) Three carbon−carbon bonds are labelled on the structures shown.
These bonds are of different lengths.




Write the letters **w**, **x** and **y** in order of **increasing** bond length.

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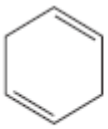
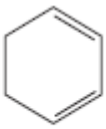
**(1)**

(c) The structures of two cyclic dienes are shown.



cyclohexa-1,4-diene



cyclohexa-1,3-diene

(i) Use the enthalpy of hydrogenation data given opposite to calculate a value for the enthalpy of hydrogenation of cyclohexa−1,4−diene.

**(1)**

(ii) Predict a value for the enthalpy of hydrogenation of cyclohexa−1,3−diene.

**(1)**

(iii) Explain your answers to part (i) and part (ii) in terms of the bonding in these two dienes.

**(3)**

**(Total 8 marks)**

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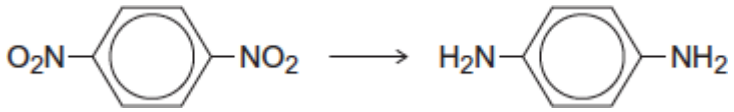
Q2.

Each of the following conversions involves reduction of the starting material.

(a) Consider the following conversion.



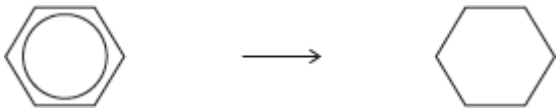

Identify a reducing agent for this conversion.

Write a balanced equation for the reaction using molecular formulae for the nitrogen-containing compounds and [H] for the reducing agent.

Draw the repeating unit of the polymer formed by the product of this reaction with benzene-1,4-dicarboxylic acid.

**(5)**

(b) Consider the following conversion.



Identify a reducing agent for this conversion.

State the empirical formula of the product.

State the bond angle between the carbon atoms in the starting material and the bond angle between the carbon atoms in the product.

**(4)**

(c) The reducing agent in the following conversion is $NaBH_4$

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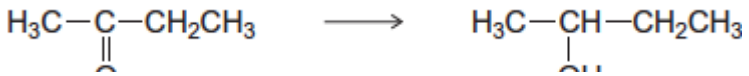

(i) Name and outline a mechanism for the reaction.

Name of mechanism _____

Mechanism

**(5)**

(ii) By considering the mechanism of this reaction, explain why the product formed is optically inactive.

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**(3)**

**(Total 17 marks)**

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