**4.1.1 Exercise 1 - Benzene**

1) Draw the structures of:

a) cyclohexane

b) cyclohexene

c) cyclohex-1,3,5-triene (Kekulé model of benzene)

2) **Structure of Benzene**

a) Describe the structure and bonding in benzene.

b) Explain why this structure has a different shape from the Kekulé model.

3) **Reactivity of Benzene**

1. Explain how the π-electron density in benzene compares with the π-electron density in cyclohexene.
2. Hence explain why benzene reacts with bromine more readily than cyclohexane but less readily than cyclohexene.
3. The enthalpy of hydrogenation of cyclohexene is -120 kJmol-1.

Predict the enthalpy of hydrogenation of cyclohex-1,2,3-triene.

The enthalpy of hydrogenation of benzene is -207 kJmol-1. What does this tell you about the benzene ring?

1. Explain why, despite being unsaturated, benzene does not readily undergo addition reactions.

4) **Summary of evidence for the structure of benzene**

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| Property | Benzene | Cyclohex-1,3,5-triene  (Kekulé structure) |
| Shape |  |  |
| Enthalpy of hydrogenation |  |  |
| Reactivity with electrophiles |  |  |
| Type of reaction |  |  |