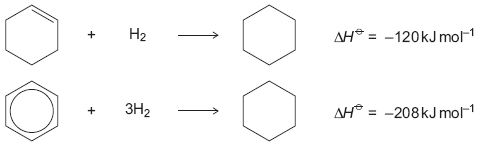
**Benzene Exam Question**

**Q1.**          The hydrocarbons benzene and cyclohexene are both unsaturated compounds.  
Benzene normally undergoes substitution reactions, but cyclohexene normally  
undergoes addition reactions.

(a)     The molecule cyclohexatriene does not exist and is described as hypothetical.  
Use the following data to state and explain the stability of benzene compared with the hypothetical cyclohexatriene.



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**(4)**

**M1.**          (a)     **M1** Benzene is more stable than cyclohexatriene

*more stable than cyclohexatriene must be stated or implied*

*If benzene more stable than cyclohexene, then penalise M1 but mark on*

*If benzene less stable: can score M2 only*

**1**

**M2** Expected ΔH~~ο~~ hydrogenation of C6H6 is 3(–120)

 = –360 kJ mol-1

*Allow in words e.g. expected ΔH~~ο~~ hydrog is three times the ΔH~~ο~~ hydrog of cyclohexene*

**1**

**M3** Actual ΔH~~ο~~ hydrogenation of benzene is

152 kJ mol-1 (less exothermic)

or 152 kJ mol-1 different from expected

*Ignore energy needed*

**1**

**M4** Because of delocalisation or electrons spread out or resonance

**1**