

Name of the Student: _____

Max. Marks : 19 Marks

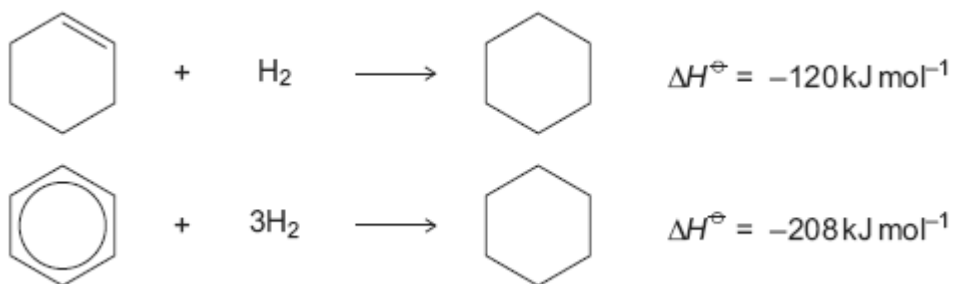
Time : 19 Minutes

Q1.

The hydrocarbons benzene and cyclohexene are both unsaturated compounds.

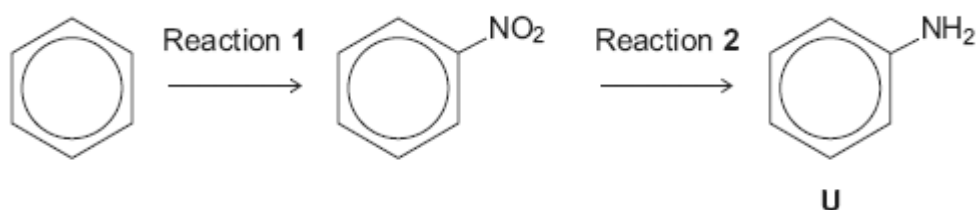
Benzene normally undergoes substitution reactions, but cyclohexene normally undergoes addition reactions.

- (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.



(4)

- (b) Benzene can be converted into amine **U** by the two-step synthesis shown below.



The mechanism of Reaction **1** involves attack by an electrophile.

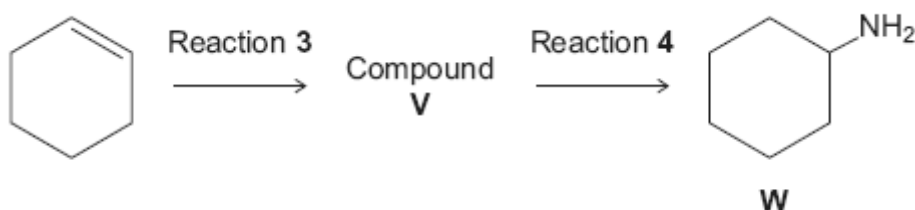
Give the reagents used to produce the electrophile needed in Reaction **1**.

Write an equation showing the formation of this electrophile.

Outline a mechanism for the reaction of this electrophile with benzene.

(6)

- (c) Cyclohexene can be converted into amine **W** by the two-step synthesis shown below.



Suggest an identity for compound **V**.

For Reaction **3**, give the reagent used and name the mechanism.

For Reaction **4**, give the reagent and condition used and name the mechanism.

Equations and mechanisms with curly arrows are **not** required.

(6)

- (d) Explain why amine **U** is a weaker base than amine **W**.

(3)

(Total 19 marks)