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

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Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

This question is about amines.

(a) An incomplete equation for Step **1** in the reaction between bromoethane and an amine is shown.



Complete the equation.

In Step **2** of this reaction, the product of Step **1** forms a secondary amine.

Name the secondary amine formed.

Amine name _____

(2)

(b) $CH_3CHBrCH_2CH_3$ reacts with NH_3

Draw the skeletal formula of the major organic product formed when

- an excess of NH_3 is used
- an excess of $CH_3CHBrCH_2CH_3$ is used.

Product with excess NH_3

Product with excess $CH_3CHBrCH_2CH_3$

(2)

(c) **Figure 1** shows a two-step synthesis to make amine **G**.

Figure 1

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$\xrightarrow{\text{Step 1}}$ $(CH_3)_2CHCN + Br^-$

$(CH_3)_2CHCN + 2\,H_2 \xrightarrow{\text{Step 2}}$

Complete **Figure 1** by drawing the mechanism for Step **1** and the displayed formula of amine **G**.

(3)

(d) **Figure 2** shows two amines, **P** and **Q**.

Figure 2



Amine **P**

Amine **Q**

Explain why **P** is a stronger base than **Q**.

_____

_____

_____

_____

(2)

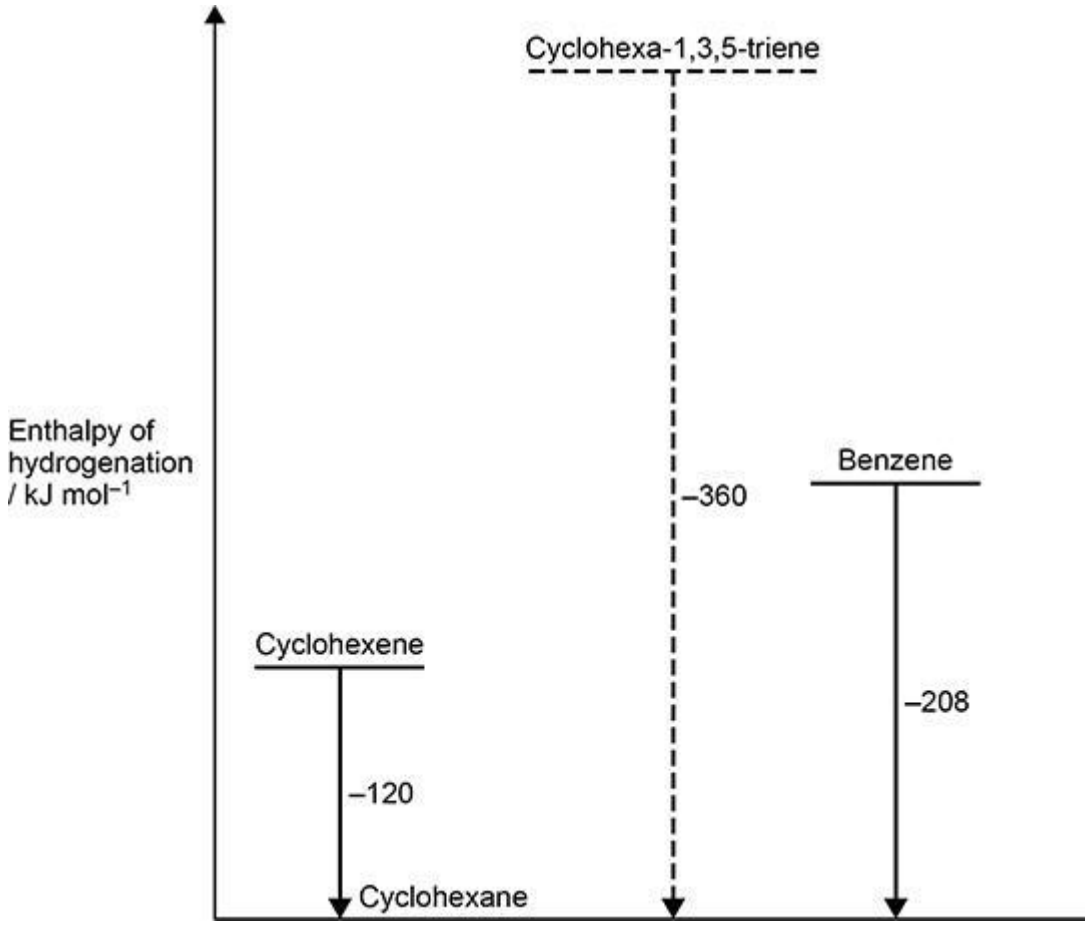
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Q2.

The figure below shows enthalpy of hydrogenation data for cyclohexene and benzene.

It also shows predicted data for the theoretical molecule cyclohexa-1,3,5-triene.



(a) Compare benzene and the theoretical molecule cyclohexa-1,3,5-triene in terms of:

- stability
- shape
- carbon–carbon bond lengths.

For each of these properties, suggest reasons for any differences.

Use data from the figure above in your answer.

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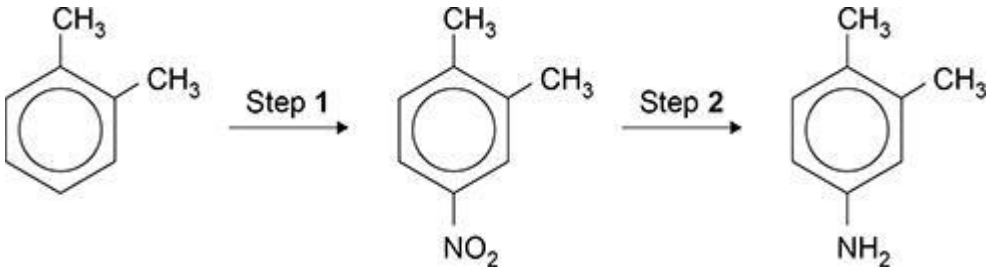
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(5)

Two steps in the synthesis of an aromatic amine are shown.



(b) State the **two** reagents needed for Step **1**.

Give an equation to show the formation of the reactive intermediate from these two reagents.

Reagents _____

_____

Equation

_____

(2)

(c) Outline a mechanism for Step **1**.

(3)

(d) State the reagent(s) needed for Step **2**.

_____

(1)

(e) State a possible use for the amine formed in Step **2**.

_____

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(1)

(Total 12 marks)

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