Chapter 4 Amines

Print out and complete this worksheet to generate a summary for Chapter 4.

Nomenclature

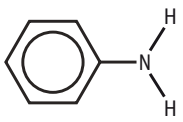
1 Name each of the following compounds:

a $CH_3CH_2NH_2$

b $CH_3CH_2CH_2NH_2$

c $(CH_3)_3CNH_2$

d



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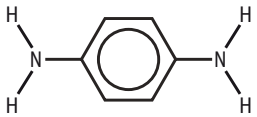

2 An amine can behave as a base or a nucleophile.

a Define an acid.

b Define a base.

c Define a nucleophile.

d An amine can react with HCl to form a salt. With the aid of a diagram, show how the amine behaves as a base. State what type of bond is formed.

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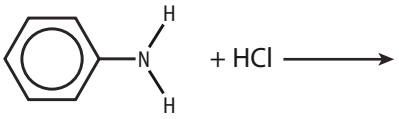
3 Complete the following equations:

a $CH_3CH_2NH_2 + HCl \longrightarrow$

b $CH_3CH_2CH_2NH_2 + HCl \longrightarrow$

c $(CH_3)_3CNH_2 + HCl \longrightarrow$

d



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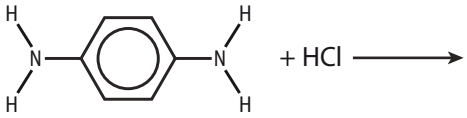

4 a Draw the displayed formula of methylamine. State the H–C–H bond angle and the C–N–H bond angle. Give your reasoning for each bond angle.

b Draw the displayed formula of the salt formed when methylamine reacts with HCl. State the H–C–H bond angle and the C–N–H bond angle. Give your reasoning for each bond angle.

Preparation of amines

5 a An aliphatic amine can be prepared from a halogenoalkane. State the reagents, the conditions and the type of reaction and write a balanced equation for the preparation of ethylamine.

Reagents:

Conditions:

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Type of reaction:

.....

Equation:

.....

b An aromatic amine is prepared by the reduction of a nitrobenzene using tin and concentrated HCl. Re-read the chapter on arenes and then answer the following question:

Starting with methylbenzene, $C_6H_5CH_3$, explain the two-stage preparation of 4-aminomethylbenzene, $(NH_2)C_6H_4CH_3$.

Stage 1:

Reagents:

.....

Conditions:

.....

Type of reaction:

.....

Equation:

.....

Mechanism:

Stage 2:

Reagents:

.....

Conditions:

.....

Type of reaction:

.....

Equation:

.....

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Synthesis of azo dyes

6 a Explain how benzenediazonium chloride can be formed from phenylamine, $C_6H_5NH_2$.

Reagents:

.....

Conditions:

.....

Equation:

b Explain how the diazonium compound formed in part **a** can converted into an azo dye.

Reagents:

.....

Conditions:

.....

Equation:

Observations:

.....

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c Different coloured dyes can be obtained by reacting different diazonium compounds with different phenols. Study the azo dyes in the table below and, in each case, work out the structures of the phenol and diazonium compound used.

Diazonium ion	Phenol	Azo dye