34. Nitrogen compounds

34.1 Primary and secondary amines

Paper 4

Question Paper

1 **(a)** State the relative basicities of phenylamine, $C_6H_5NH_2$, benzylamine, $C_6H_5CH_2NH_2$, and ammonia, NH_3, in aqueous solution. Explain your answer.

..... > ..... > .....
most basic least basic

.....

.....

.....

.....

.....
[3]

2 **(a)** State the reactants and conditions for two different types of reactions that both produce diethylamine, $CH_3CH_2NHCH_2CH_3$.

reaction one .....

.....

reaction two .....

.....
[4]

3 Procaine is used as an anaesthetic in medicine. It can be synthesised from methylbenzene in five steps as shown in Fig. 7.1.

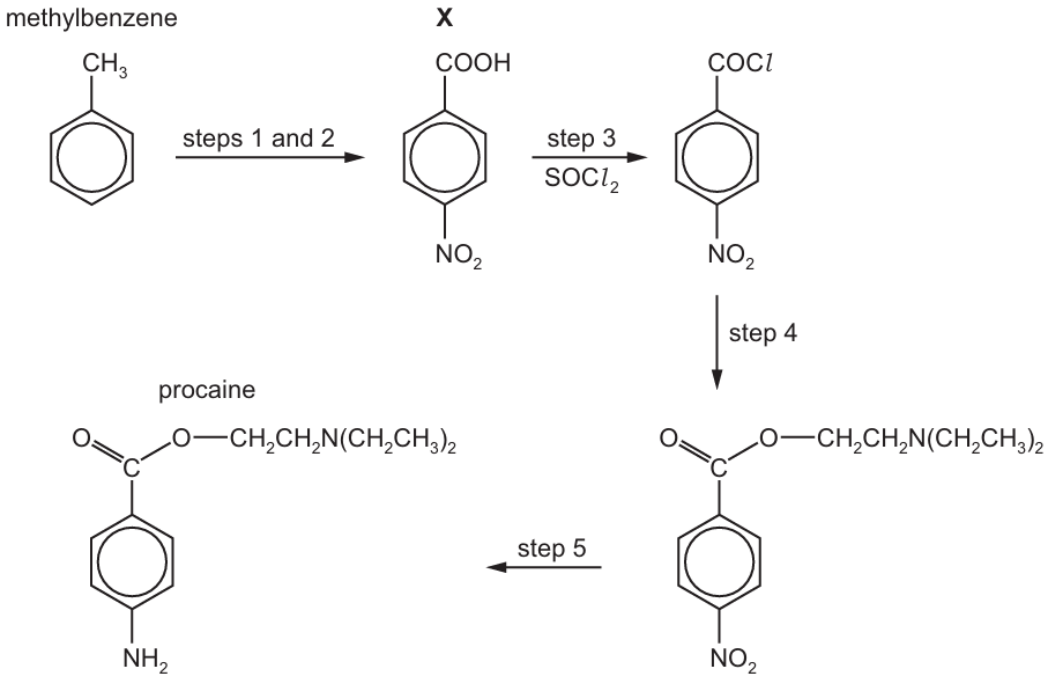


Fig. 7.1

(c) State why procaine can act as a base.

.....

..... [1]

4 The structure of cyclohexylamine is shown in Fig. 9.1.

cyclohexylamine

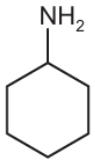


Fig. 9.1

(a) Compare the relative basicities of ammonia, cyclohexylamine and phenylamine.
Explain your reasoning.

..... > ..... > .....
most basic least basic

.....

.....

.....

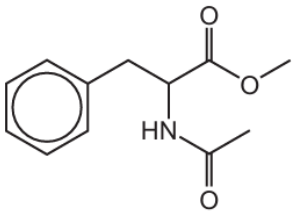
.....

.....

[3]

5 **(b)** **P** can be used to make compound **Q** in a single step reaction.

Q



(i) Give the structural formula of the compound that is added to **P** to make **Q** and give the formula of the other product of this reaction.

compound added to **P** .....

other product .....

[1]

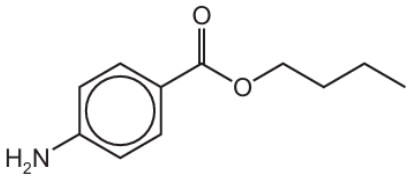
6 Phenylamine, $C_6H_5NH_2$, and ethylamine, $C_2H_5NH_2$, can be distinguished by adding aqueous bromine.

(b) Suggest what is seen when aqueous bromine is added to ethylamine.

..... [1]

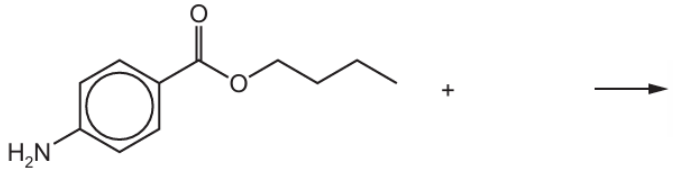
7 The structure of butamben is shown.

butamben



(a) Butamben can act as a base.

(i) Complete the equation for a reaction in which butamben acts as a base.



[1]