Amines

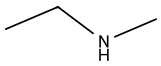
OCR A H432 · A level

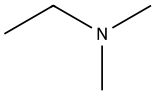
Answer on your own paper. Show your working where needed.

1. Classify the amines shown

Classify A, B and C as primary, secondary or tertiary amines. State what you counted.

A 

B 

C 

2. Form a salt

Write an equation for propylamine, $CH_3CH_2CH_2NH_2$, reacting with dilute hydrochloric acid. Explain the role of the nitrogen lone pair.

3. Control the products of substitution

Bromoethane reacts with excess ethanolic ammonia. Write a balanced equation for forming the primary amine and explain why excess ammonia helps.

4. A reaction of butanenitrile

Butanenitrile, $CH_3CH_2CH_2C{\equiv}N$, is treated with hydrogen over nickel. Draw the organic product and give a balanced equation using H_2. Track the nitrile carbon in the product.

5. The reduction mixture

Nitrobenzene is heated with tin and concentrated hydrochloric acid. Give an equation using [H] for the overall conversion to the free amine. Explain why adding sodium hydroxide is necessary to obtain it.

6. Make a secondary amine

Choose a haloalkane and a primary amine to make N-methylpropan-1-amine. Give the solvent and write the product’s condensed structure.

7. Check a functional-group claim

A student calls $CH_3C(=O)NHCH_2CH_3$ a secondary amine. Name the compound, explain your classification using the bond to nitrogen and give two reactants that could make it by acylation.

8. Choose a route to a tertiary amine

N-Methylethanamine reacts with bromoethane. Name the new amine, write its condensed formula and classify it. Identify the atom that forms the new bond.

9. Extra challenge · Plan a route and check the salt

Make N-ethylbutan-1-amine from 1-bromopropane in three steps. Bromoethane is available. State the reagents, solvent where relevant and structures for each step.

Then add dilute HCl to the target. Draw the organic ion that forms.

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