

A-Level Chemistry

Name: _____ Score: _____

1. A compound that decolourises bromine water contains:
 - ☐ a halogen
 - ☐ a C=C double bond (an alkene)
 - ☐ an –OH group
 - ☐ a –COOH group
2. The best way to plan a multi-step synthesis is to:
 - ☐ skip the reagents
 - ☐ only work forwards from the start
 - ☐ guess random reactions
 - ☐ work backwards from the target, one reaction at a time
3. An orange precipitate with 2,4-DNPH indicates:
 - ☐ an alkene
 - ☐ an aldehyde or ketone
 - ☐ an alcohol
 - ☐ a carboxylic acid
4. If your route needs to add a carbon atom, the key step is:
 - ☐ esterification
 - ☐ oxidation with dichromate
 - ☐ reduction with NaBH₄
 - ☐ reaction with KCN
5. According to the reaction map, an alkene + steam (H₃PO₄) gives:
 - ☐ a carboxylic acid
 - ☐ a nitrile
 - ☐ an alcohol
 - ☐ an ester
6. A good synthetic route uses as many steps as possible to give a high overall yield.
 - ☐ True ☐ False

7. A reaction map links functional groups by the reactions that interconvert them.
- ☐ True ☐ False
8. When analysing each step of a given route, you should state:
- ☐ only the product name
- ☐ nothing
- ☐ only the colour change
- ☐ the type of reaction and the reagent used
9. Which step lengthens the carbon chain by one?
- ☐ oxidation of an alcohol
- ☐ esterification
- ☐ reduction of a carbonyl
- ☐ reaction of a halogenoalkane with KCN
10. Why is the yield of a simple amine from a halogenoalkane low?
- ☐ the amine evaporates
- ☐ the amine reacts further, giving a mixture of more-substituted amines
- ☐ the halogenoalkane is unreactive
- ☐ no amine forms at all

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1. **a C=C double bond (an alkene)**

Decolourising bromine water is the test for a C=C double bond.

2. **work backwards from the target, one reaction at a time**

Working backwards from the target finds which reaction makes it, and from what, step by step.

3. **an aldehyde or ketone**

2,4-DNPH detects the carbonyl group (aldehyde or ketone).

4. **reaction with KCN**

KCN is the only AS reaction that lengthens the carbon chain.

5. **an alcohol**

Electrophilic addition of water across the C=C gives an alcohol.

6. **False**

False. Each step loses some product, so a good route uses few steps; the overall yield is the product of the yields of every step.

7. **True**

Used to plan and identify reactions.

8. **the type of reaction and the reagent used**

Identify the reaction type (oxidation, substitution, etc.) and the reagent/conditions for each step.

9. **reaction of a halogenoalkane with KCN**

KCN adds a CN group (a carbon) – the only AS reaction that lengthens the chain.

10. **the amine reacts further, giving a mixture of more-substituted amines**

The amine is itself a nucleophile, so it reacts again – a by-product mixture lowers the yield.