21. Organic synthesis

Starter Quiz · 课前小测

A-Level Chemistry Name: _____ Score: _____

1. A compound that decolourises bromine water contains:

   ☐ a C=C double bond (an alkene)

   ☐ an –OH group

   ☐ a –COOH group

   ☐ a halogen

2. The best way to plan a multi-step synthesis is to:

   ☐ work backwards from the target, one reaction at a time

   ☐ guess random reactions

   ☐ only work forwards from the start

   ☐ skip the reagents

3. An orange precipitate with 2,4-DNPH indicates:

   ☐ an aldehyde or ketone

   ☐ an alkene

   ☐ an alcohol

   ☐ a carboxylic acid

4. If your route needs to add a carbon atom, the key step is:

   ☐ reaction with KCN

   ☐ oxidation with dichromate

   ☐ reduction with $NaBH_4$

   ☐ esterification

5. According to the reaction map, an alkene + steam (H_3PO_4) gives:

   ☐ an alcohol

   ☐ a nitrile

   ☐ an ester

   ☐ a carboxylic acid

6. A reaction map links functional groups by the reactions that interconvert them.

   ☐ True ☐ False

7. A good synthetic route uses few steps and gives a high overall yield.

   ☐ True ☐ False

8. When analysing each step of a given route, you should state:

   ☐ the type of reaction and the reagent used

   ☐ only the product name

   ☐ only the colour change

   ☐ nothing

9. Which step lengthens the carbon chain by one?

   ☐ reaction of a halogenoalkane with KCN

   ☐ oxidation of an alcohol

   ☐ reduction of a carbonyl

   ☐ esterification

10. Why is the yield of a simple amine from a halogenoalkane low?

    ☐ the amine reacts further, giving a mixture of more-substituted amines

    ☐ no amine forms at all

    ☐ the halogenoalkane is unreactive

    ☐ the amine evaporates

A-Level Chemistry

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. **True**

   Used to plan and identify reactions.

7. **True**

   Fewer steps means less loss of product.

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.