

# Oxidising alcohols and testing carbonyl compounds

Chemistry grades 11-12 (A Level · IB · Class 11-12) · Test

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_ Mark: \_\_\_\_ / 20

This 45 minute test is worth 20 points and covers oxidation of alcohols, tests for carbonyls, nucleophilic addition and a yield calculation. Write balanced equations where asked and use the correct names for colours and products.

**Level:** Chemistry grades 11-12 (A Level · IB · Class 11-12) · **Curriculum:** A Level 3.3.5

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

## Question 1 Oxidising butan-2-ol (3 marks)

Butan-2-ol is heated under reflux with acidified potassium dichromate(VI).

- Classify the alcohol. (1 mark)
- Name the organic product. (1 mark)
- State the colour change. (1 mark)

## Question 2 Reflux or distillation (2 marks)

Propan-1-ol is oxidised.

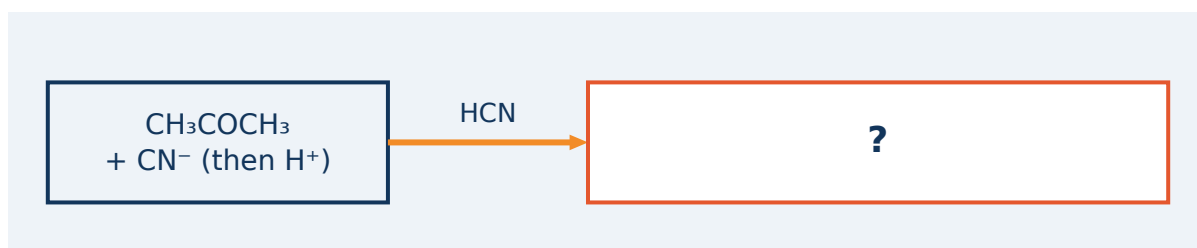
- Name the product formed by distillation and by reflux with excess oxidant. (1 mark)
- Explain why distillation is needed for the first product. (1 mark)

## Question 3 Tollens' reagent (3 marks)

- State what is seen when warm Tollens' reagent is added to ethanal and to propanone. (2 marks)
- State what happens to the silver ions. (1 mark)

## Question 4 Propanone and HCN (3 marks)

Propanone reacts with HCN.



Reaction for the mechanism question: draw the product of propanone with HCN.

- Name the type of mechanism. (1 mark)
- Give the formula and name of the product. (1 mark)
- Explain why the product has no optical activity. (1 mark)

### Question 5 Yield calculation (3 marks)

4.60 g of ethanol ( $M = 46.0 \text{ g/mol}$ ) is oxidised to ethanoic acid ( $M = 60.0 \text{ g/mol}$ ).

- Calculate the theoretical mass of acid. (2 marks)
- Calculate the actual mass if the yield is 80 %. (1 mark)

### Question 6 Racemic product (2 marks)

The addition of HCN to ethanal gives a racemic mixture.

- Explain what a racemic mixture is. (1 mark)
- Explain why it forms here. (1 mark)

### Question 7 Boiling points (2 marks)

Propan-1-ol boils at  $97^\circ\text{C}$  and propanal at  $49^\circ\text{C}$ .

- Name the strongest intermolecular force in propan-1-ol. (1 mark)
- Explain the lower boiling point of propanal. (1 mark)

### Question 8 Identify by tests (2 marks)

A compound of formula  $\text{C}_3\text{H}_6\text{O}$  gives an orange precipitate with 2,4-DNPH and no change with Fehling's solution.

- Name the compound. (1 mark)
- Explain your reasoning. (1 mark)