

Edexcel AS Chemistry Paper 6243.02(3B)

Edexcel GCE Student Conference 2006

Paper 6243.02(3B)

- 1 hour.
- 4-6 questions.
- Testing your knowledge and understanding of laboratory chemistry.
- Page 30 of specification lists content.
- 50 marks.
- Mark combined with coursework or practical test to give Unit 3 mark on 120.

Types of Questions on 3B

- Test for ions, gases.
- Tests for organic functional groups.
- Volumetric analysis (titrations) including mole calculations.
- Temperature changes including ΔH calculations.
- Organic techniques including yield calculations.
- Planning exercise.

Test for ions and gases

- Know how to test for CO_3^{2-} , HCO_3^- , SO_4^{2-} , SO_3^{2-} , halide ions, NO_3^- , NH_4^+ .
- Know flame test colours for Li, Na, K, Ca, Sr, Ba compounds.
- Know tests for gases H_2 , O_2 , CO_2 , NH_3 , Cl_2 , NO_2 , SO_2 .
- See tables and Question 1.

Organic Functional Groups

- Know the tests from Topic 2.2 b.
- Alkenes + $\text{Br}_2(\text{aq})$; orange to colourless.
- PCl_5 for OH group(alcohols in AS); steamy fumes.
- Identify halogen in halogenoalkanes by $\text{NaOH}(\text{aq})$ + heat followed by $\text{HNO}_3(\text{aq})$ + $\text{AgNO}_3(\text{aq})$; White, cream or yellow ppte.
- Warm alcohols with acidified $\text{K}_2\text{Cr}_2\text{O}_7$. Orange to green with 1° , 2° not 3° .
- See table and Question 2.

Volumetric Analysis

- Describe making up solution in volumetric flask.
- Describe carrying out titration including rinsing out pipette and burette, drop-by-drop to end point, colour change of indicator, concordant titres.
- Methyl orange- red(acid)-orange-yellow(alkali)
Phenolphthalein-colourless(acid)-pink-red(alkali).
- Choose titres for mean.

Volumetric Analysis

- Use:

$$\text{moles} = \frac{\text{volume(titre)}}{1000} \times \text{concentration}$$

- Use mole ratio from equation.
- Calculate concentration in mol dm⁻³.
- Use:

$$\text{moles} = \text{mass} \div \text{molar mass}$$

- Comment on errors:

$$\% \text{ error} = \frac{\text{uncertainty in each reading}}{\text{reading}} \times 100$$

- See Question 3.

Temperature changes, ΔH

- Extrapolate increase/decrease in temp on graph and read ΔT . Allows for cooling.
- Comment on errors; suggest improvements.
eg lid on plastic cup, more readings, use pipette to measure volumes, more stirring.
- If a fuel(alcohol) burning there may be incomplete combustion or loss of fuel by evaporation.

Calculating ΔH

- Calculate moles of reagent **NOT** in excess.
- Calculate heat released or absorbed:

$$\text{Heat} = \frac{4.18 \times \text{mass solution} \times \Delta T}{1000} \text{ kJ}$$

- Calculate:

$$\Delta H = \frac{\text{heat}}{\text{moles}} \text{ kJmol}^{-1}$$

- Temp rise means exothermic reaction $\therefore -\Delta H$
Temp fall means endothermic reaction $\therefore +\Delta H$
- 2 sf normally enough for ΔH .
- See Question 4.

Organic techniques

- Recognise distillation and heating under reflux. Explain why each is carried out.
- Draw diagrams of both techniques.
- Explain safety precautions. eg use of a water bath not a direct Bunsen flame.
- Spot mistakes; water in and out correctly; no sealed apparatus.
- Explain purification techniques-use of separating funnel, drying agent, collecting distillate over narrow temperature range.

% yield calculations

- Know which reagent is in excess.
- Calculate moles of other reagent using:

$$\text{moles} = \text{mass} \div \text{molar mass}$$

- Use

$$\text{density} = \text{mass} \div \text{volume}$$

- Use equation to predict maximum moles of product.
- Convert moles product into mass.
- Use:

$$\% \text{ yield} = \frac{\text{actual yield}}{\text{max yield}} \times 100$$

Reasons for low yield

- May be side reactions.
- Reaction may be incomplete.
- An equilibrium mixture may be formed.
- See Question 5.

Planning

- May be one question worth 6/7 marks.
- Read question carefully-may be similar, but not identical, to an experiment you have carried out.
- Will be based on chemistry that is in the AS specification.
- Don't invent numerical results but may have to show how you would calculate answer.
- Think about your plan before you start-it is testing your ability to apply your knowledge.