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0653/51

May/June 2013

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use a pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.

You may lose marks if you do not show your working or if you do not use appropriate units.

Chemistry practical notes for this paper are printed on page 16.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
Total	

This document consists of **13** printed pages and **3** blank pages.

1 (a) Dish **A** contains two flowers of the same species.

(i) Take one of the flowers from dish **A**, and place it on the white tile.

While being careful to cut towards the tile and away from your fingers, cut the flower lengthways. It is best to do this by starting at the flower stalk and then cutting upwards through the middle of the flower, as shown in Fig. 1.1.

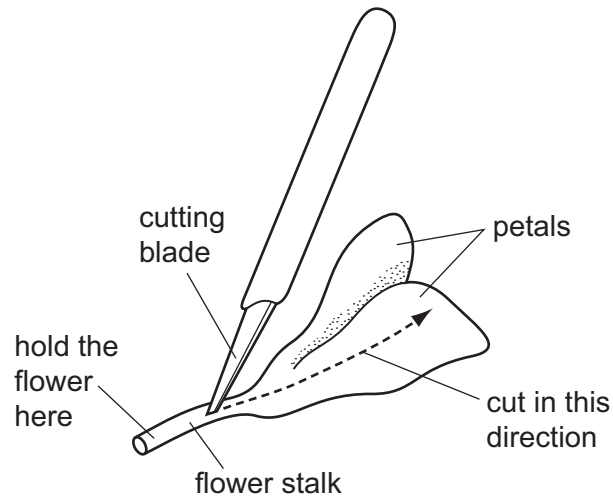


Fig. 1.1

Look at the two halves of the flower, and choose the one that best shows the internal flower parts.

Make a large, clear pencil drawing of this half of the flower, showing the internal flower parts, in the space below.

[2]

(ii) On your drawing, label the stamen and the carpel. Next to each of these labels, state (in brackets) whether the part is male or female. [2]

- (iii) Take the second flower from dish **A**, and place it on the white tile.

Again being careful not to cut towards your fingers, cut the flower horizontally so that your cut follows the path and position as shown in Fig. 1.2.

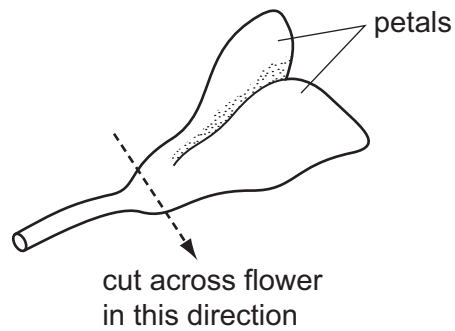


Fig. 1.2

In the space below, make a large, clear pencil drawing of the carpel as it appears in section.

Label any **two** features of the carpel that are visible in your drawing.

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[2]

(b) Dish **B** contains a flower of a different species. You are going to test the petals of this flower for the presence of reducing sugar.

- Remove three of the petals from the flower, being careful to ensure that you have complete petals, including the base.
- Place one of the petals on the white tile, and spread it out flat. Keep this petal for later.
- Place the other two petals into the bottom of a test-tube, and add enough Benedict's solution to cover them.
- Place this test-tube into a hot water bath for five minutes. During this time, continue with part **(b)(i)**.
- After five minutes, use tweezers to remove the petals from the test-tube, and place them on the white tile.
- Spread these petals out on the tile, being careful not to tear them.

(i) In the left-hand column of Table 1.1 make a drawing of the untreated petal that you placed on the white tile, to show the distribution of the colours and markings.

Label the colours. [1]

(ii) Look at the two petals that you treated with Benedict's solution. Choose the petal you think is less damaged, and make a similar drawing of this petal in the right-hand column of Table 1.1.

Label the colours. [1]

Table 1.1

untreated petal	petal treated with Benedict's solution

- (iii) State your conclusion from the results of the Benedict's test you carried out.

conclusion
..... [1]

- (iv) Explain the significance of this in relation to the function of the petals.

significance
.....
..... [1]

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- 2 You are going to find the unknown mass, M , of a fixed load by balancing it against a range of known masses on a metre rule.

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The apparatus is set up on the bench as shown in Fig. 2.1 below.

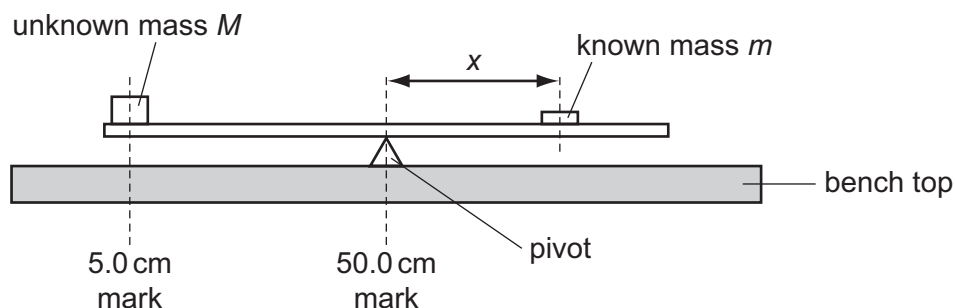


Fig. 2.1

The fixed load of mass M has been secured to the metre rule. Its position is fixed with its centre over the 5.0 cm mark. Do not attempt to move this mass during the experiment.

- (a) (i) Take a mass m of 60 g and place it on the rule. Adjust its position until the rule is just balanced with the pivot directly under the 50.0 cm mark, as shown in the diagram above.

Measure, to the nearest 0.1 cm, the distance x from the centre of the known mass to the 50.0 cm mark on the rule.

Record this distance in Table 2.1.

[1]

Please turn over for Table 2.1.

Table 2.1

mass, m/g	distance, x/cm	$\frac{1}{x}$
60		
70		
80		
100		

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Use

- (ii) Repeat the procedure described in (i), replacing the 60 g mass m with a new mass of 70 g.

Measure and record the new distance x in Table 2.1. [1]

- (iii) Repeat the procedure two more times, using masses m of 80 g and 100 g, each time recording the distance x in Table 2.1. [1]

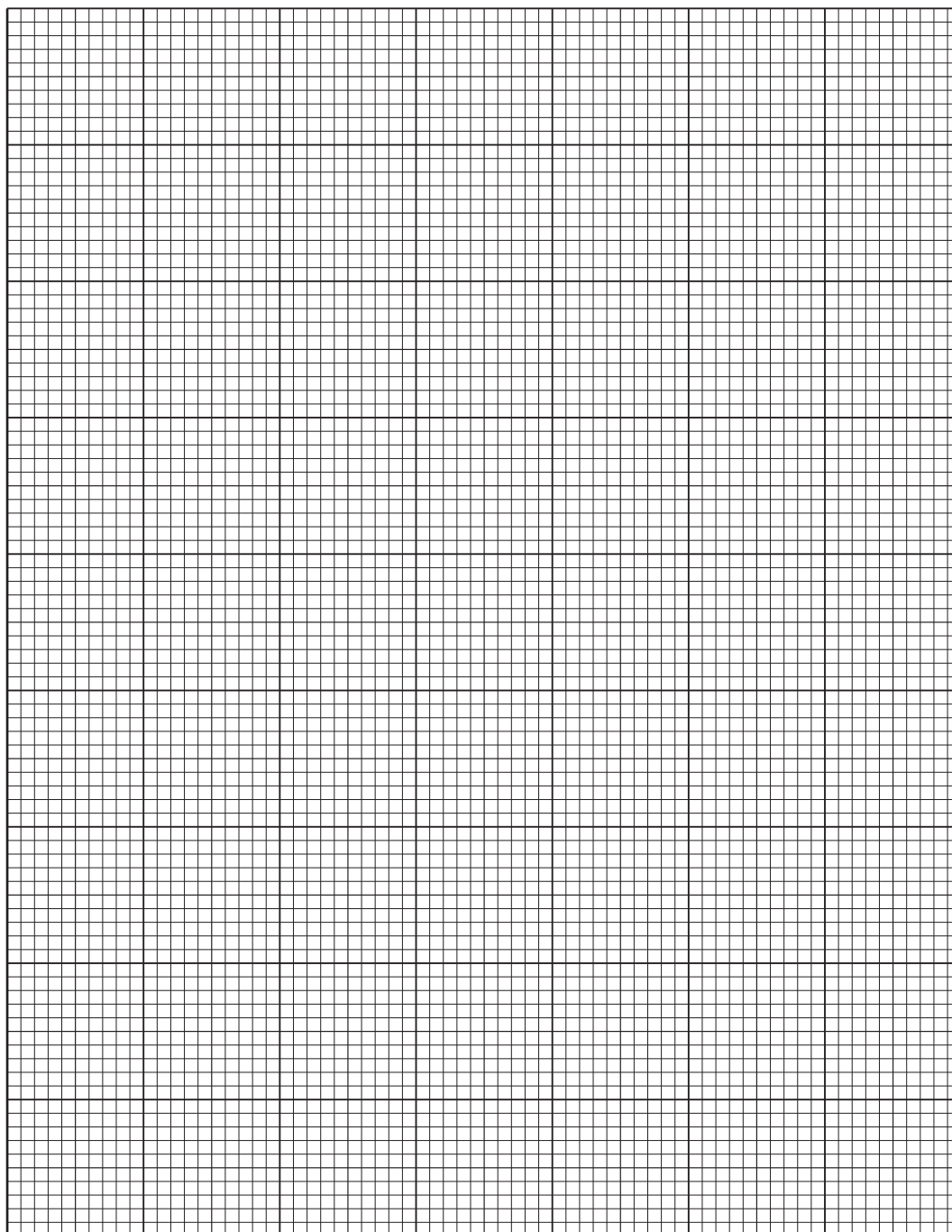
- (iv) For each value of x in the table, calculate the value of $\frac{1}{x}$ and record these values in Table 2.1 to 2 decimal places. [1]

- (b) (i) On the grid provided, plot a graph of m/g (vertical axis) against $\frac{1}{x}$ (horizontal axis).

Start the vertical axis at 60 g.

The horizontal axis does not need to start from zero.

Draw the best fit straight line.

m/g  $\frac{1}{x}$

[3]

- (ii) Calculate the gradient of your line.

Show all working and indicate on your graph the values you chose to enable the gradient to be calculated.

gradient of line = [2]

- (c) The gradient of the line is related to the mass M of the fixed load, by the equation

$$M = \frac{\text{gradient}}{45.0}$$

Determine the mass M of the fixed load to 2 significant figures.

$M = \dots\dots\dots$ g [1]

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- 3 You are going to investigate how the concentration of a reactant affects the rate of a reaction.

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In this reaction potassium iodate reacts with a reducing agent to produce iodine. Solution **A** is potassium iodate solution. Solution **B** contains the reducing agent.

- (a) (i) • Use the measuring cylinder labelled **A** to place 10 cm^3 of solution **A** into a conical flask.
- Add 5 cm^3 of starch solution to the conical flask using the test-tube with the 5 cm^3 mark.
 - Use the measuring cylinder labelled **B** to measure 5 cm^3 of solution **B**.
 - Start the timer as you add this 5 cm^3 of solution **B** to the conical flask.
 - Stop the timer when the mixture goes blue-black.
 - Record in Table 3.1, on page 12, the time taken to the nearest second, for the mixture to go blue-black. [1]

Please turn over for Table 3.1.

Table 3.1

volume A / cm ³	volume water / cm ³	time / s	$\frac{1}{\text{time}}$
10	0		
8	2		
6	4		
4	6		

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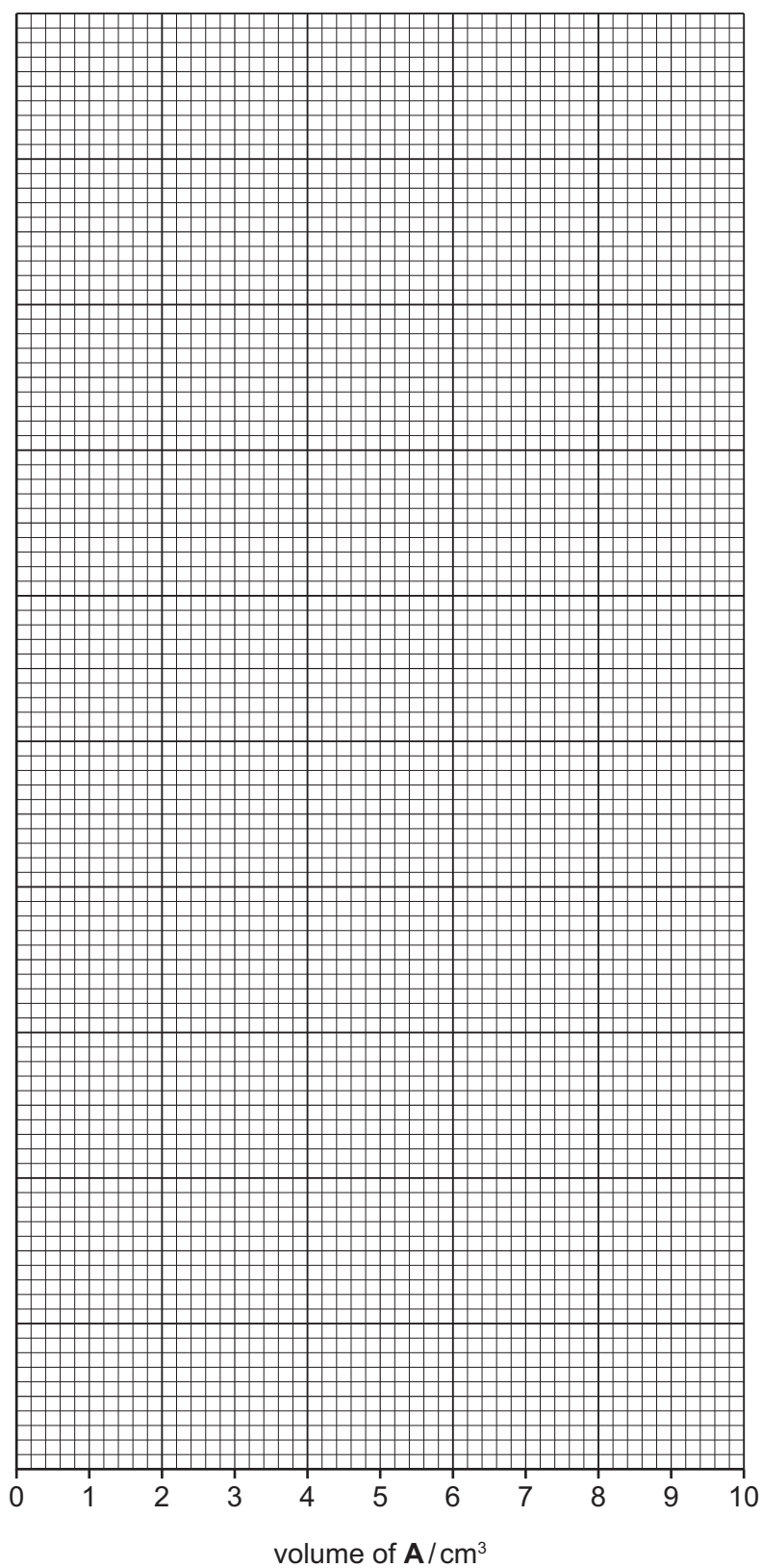
- (ii)
- Pour out the completed reaction into the waste container and wash out the conical flask.
 - Use the measuring cylinder labelled **A** to place 8 cm³ of solution **A** into a conical flask.
 - Also using the measuring cylinder labelled **A**, add 2 cm³ of water to the conical flask.
 - Add 5 cm³ of starch solution to the conical flask using the test-tube with the 5 cm³ mark.
 - Use the measuring cylinder labelled **B** to measure out 5 cm³ of solution **B**. Start the timer as you add the 5 cm³ of solution **B** to the conical flask.
 - Stop the timer when the mixture goes blue-black.
 - Record in Table 3.1 the time taken, to the nearest second, for the mixture to go blue-black. [1]

- (iii) Repeat the steps in (a)(ii) changing the volumes of solution **A** and water as shown in Table 3.1. [3]

- (b) (i) Calculate $\frac{1}{\text{time}}$ (rate) for each value of time and enter the results in the last column of Table 3.1.

[1]

- (ii) Plot a graph of $\frac{1}{\text{time}}$ (vertical axis) against the volume **A** / cm³ drawing the best straight line through the origin.

$\frac{1}{\text{time}}$ (rate)

[3]

- (c) State what your graph tells you about how the rate of the reaction depends upon the volume of reactant **A** used.

.....

..... [1]

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CHEMISTRY PRACTICAL NOTES

Test for anions

<i>anion</i>	<i>test</i>	<i>test result</i>
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify then add aqueous barium chloride <i>or</i> aqueous barium nitrate	white ppt.

Test for aqueous cations

<i>cation</i>	<i>effect of aqueous sodium hydroxide</i>	<i>effect of aqueous ammonia</i>
ammonium (NH_4^+)	ammonia produced on warming	-
copper(II) (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess giving a colourless solution	white ppt., soluble in excess giving a colourless solution

Test for gases

<i>gas</i>	<i>test and test results</i>
ammonia (NH_3)	turns damp red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	“pops” with a lighted splint
oxygen (O_2)	relights a glowing splint

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