UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5830096724

COMBINED SCIENCE **0653/51**

Paper 5 Practical Test **October/November 2010**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in Instructions to Supervisors.

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, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Chemistry practical notes for this paper are printed on page 8.

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.

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1	
2	
3	
Total	

This document consists of **8** printed pages and **4** blank pages.

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1 This question is about the diseases kwashiorkor and diabetes, and how changes in the diet can help sufferers.

(a) Kwashiorkor is caused by lack of protein in the diet. You have five solutions, **A** to **E**. Two of these contain protein that may help a kwashiorkor sufferer, if they are included in the diet.

(i) Test **A** to **E** with biuret solution. Use about 2 cm^3 of the test solution, using a clean test-tube each time. Add an equal volume of biuret to each tube.

Record your results in Table 1.1. [2]

Table 1.1

solution	colour observed		
	biuret solution	iodine solution	Benedict's solution
A			
B			
C			
D			
E			

(ii) Which solutions contained protein?

..... and ..... [1]

(b) Sufferers of diabetes are often advised to have their carbohydrate in the form of starch rather than sugar.

(i) Test the three solutions that do not contain protein to find which one contains starch. Place about 2 cm^3 of the solution into a test-tube and add a few drops of iodine. Use a clean test-tube each time.

Record your observations in Table 1.1. [2]

(ii) Which solution contained starch? ..... [1]

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(c) You should now have **two** solutions which do not contain either protein or starch. One of these contains glucose. Diabetics should avoid eating large amounts of glucose.

(i) Test these two solutions for the reducing sugar, glucose, as follows.
To about 2 cm^3 of the solution add an equal volume of Benedict's solution. Place the tube in a hot water bath for a few minutes.

Record your observations in Table 1.1. [1]

(ii) Which solution contained glucose?

..... [1]

(d) One of the **two** protein solutions that you have identified in part **(a)(ii)** contains the enzyme amylase. When starch solution is allowed to react with amylase for five minutes at room temperature, it is broken down to a reducing sugar.

Plan an experiment to find which of the two protein solutions contains the enzyme.

.....

.....

.....

.....

..... [2]

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2 A student made the following statement.

> "When two lamps are connected in series, the total power output is half that for a single lamp."

You are going to test the correctness of this statement by carrying out the following experiment.

Set up the circuit as shown in Fig. 2.1.

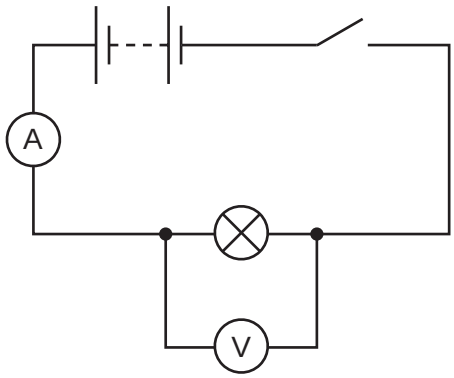

Fig. 2.1

(a) Close the switch. Measure and record in Table 2.1 the current and the potential difference in the circuit together with each unit. Open the switch. [3]

(b) Disconnect the voltmeter. Connect the second lamp in series with the first as shown in Fig. 2.2.

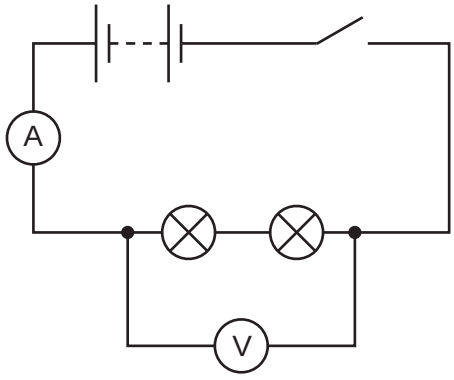

Fig. 2.2

Connect the voltmeter across both lamps.

Close the switch. Measure the current and potential difference in the circuit with both lamps connected.

Record these values in Table 2.1.

Open the switch.

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Table 2.1

	current unit = ...	potential difference unit = ...	power = current value x p.d. value unit = ...
single lamp			
2 lamps in series			

Power is the product of the voltage and current. Complete Table 2.1 by calculating the values of power. [1]

(c) Use the values from **(b)** to make your comment on the statement "When two lamps are connected in series, the total power output is half that for a single lamp," made by the student.

.....

.....

..... [2]

A second student made the following statement.

"When two lamps are connected in parallel, the total power output is double that for a single lamp."

You are going to test the correctness of this statement.

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(d) Connect the two lamps in parallel. Connect the voltmeter as shown in Fig. 2.3.

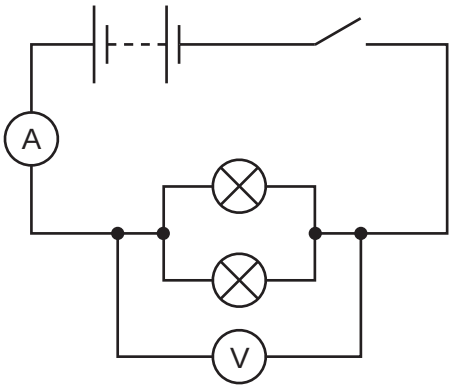

Fig. 2.3

Close the switch and measure the current and potential difference.

Record these values in Table 2.2.

Open the switch.

Table 2.2

	current unit = ...	potential difference unit = ...	power = current value x p.d. value unit = ...
single lamp			
2 lamps in parallel			

Complete Table 2.2 by calculating the power. Remember that you have already found the potential difference and the current for a single lamp. [2]

(e) Using the values you have calculated in Table 2.2 for the power produced by two lamps in parallel, comment on the statement "When two lamps are connected in parallel, the total power output is double that for a single lamp," made by the second student.

.....

.....

..... [2]

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3 Compound **X** dissolves in water to give a solution containing three different ions.

Carry out the following tests to identify these three ions.

Divide compound **X** into three equal portions.

(a) Heat strongly one portion of **X** in a hard glass test-tube for several minutes. After the water vapour has been given off, continue heating until no further change. Allow to cool.

Record your observations.

changes to solid .....

.....

..... [3]

(b) To a second portion of **X**, add about 2 cm^3 of aqueous sodium hydroxide and warm gently.

Test any gas with litmus paper.

Record your observations.

litmus paper .....

name of gas ..... [2]

(c) Dissolve the third portion of **X** in 10 cm^3 water and divide the solution into two parts.

(i) To one part, add about 3 cm^3 aqueous sodium hydroxide.

Record the colour of the precipitate.

colour of precipitate ..... [1]

(ii) Using the second part of the solution of **X**, add dilute hydrochloric acid, followed by aqueous barium chloride.

Record your observations.

..... [1]

(d) Name the three ions in compound **X**.

1 .....

2 .....

3 ..... [3]

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CHEMISTRY PRACTICAL NOTES

Test for anions

anion	*test*	*test result*
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 *or* aqueous barium nitrate	white ppt.

Test for aqueous cations

cation	*effect of aqueous sodium hydroxide*	*effect of aqueous ammonia*
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

gas	*test and test results*
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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