NAMA:... Tingkatan :.............................

SEKOLAH BERASRAMA PENUH

BAHAGIAN SEKOLAH
KEMENTERIAN PELAJARAN MALAYSIA
PEPERIKSAAN PERTENGAHAN TAHUN

FORM 5 CHEMISTRY
Paper 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan tingkatan pada ruang yang disediakan.*
2. *Jawab **semua** soalan daripada **Bahagian A**. Tuliskan jawapan anda dalam ruang yang disediakan*
3. *Jawab **satu** soalan daripada **Bahagian B** dan **satu** soalan daripada **Bahagian C**.Jawapan kepada **bahagian B** dan **Bahagian C** hendaklah ditulis pada kertas tulis.*
4. *Anda diminta menjawab dengan lebih terperinci untuk Bahagian B dan Bahagian C. Jawapan mestilah jelas dan logik. Persamaan, gambar rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda boleh digunakan.*
5. *Anda hendaklah menyerahkan kertas tulis dan kertas tambahan, jika digunakan bersama-sama dengan kertas soalan.*
6. *Penggunaan kalkulator saintifik yang tidak boleh diprogramkan adalah dibenarkan.*

Bahagian	Soalan	Markah penuh	Markah diperoleh
A	1	10	
	2	10	
	3	10	
	4	10	
	5	10	
	6	10	
B	7	20	
	8	20	
C	9	20	
	10	20	
		Jumlah	

Kertas soalan ini mengandungi 17   halaman bercetak

[lihat sebelah
SULIT

1 Table 1 shows 3 halogens with their respective proton number.

Halogen	Proton Number
P	9
Q	17
R	35

TABLE 1

(a) State the group number for the halogens in the Periodic Table..

....
[1mark]

(b) Write the electron arrangement for

(i) atom P

....
[1mark]

(ii) atom Q

....
[1mark]

(c) Based on your answer in (b), deduce in which period in the Periodic Table the

following elements are located..

(i) element P

....
[1mark]

(ii) element Q

....
[1mark]

(d) The number of neutrons for atom Q is 19. Write the symbol for atom Q in the form of

$_Z^A X$.

....
[1 mark]

(e)   As you go down the group for halogens from P to R, state the change in
        properties with respect to
        (i) the size of the atom

....
                                                                                    [1 mark]
        (ii) electronegativity

.
....
                                                                                    [1 mark]
        (iii) melting points and boiling points

.
....
                                                                                    [1 mark]
(f)   Iron glows brightly when reacting with element Q. Write the chemical equation for
       the reaction.

....
                                                                                    [1 mark]

2 Figure 2 shows the set up of the apparatus used in an experiment to determine the empirical formula of an oxide of copper
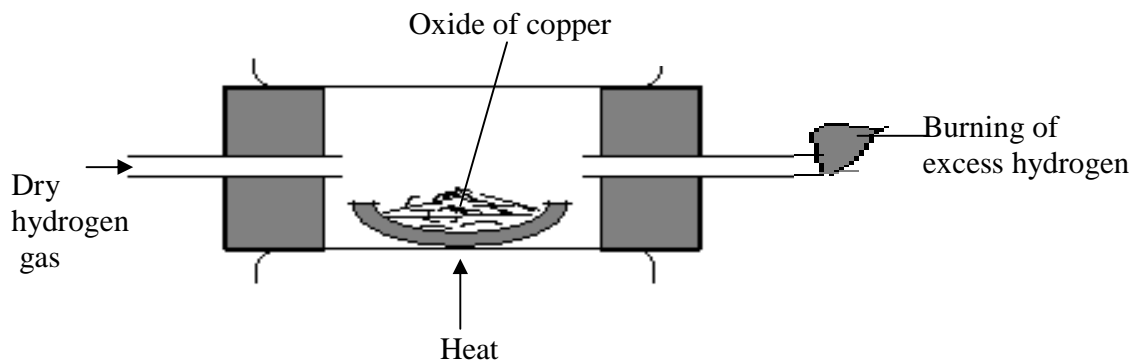

FIGURE 2

The following data was obtained:

Mass of combustion tube + porcelain dish	= 25.30 g
Mass of combustion tube + porcelain dish + oxide of copper	= 53.30 g
Mass of combustion tube + porcelain dish + copper	= 47.70 g

(a) What is meant by empirical formula?

....

....
[1mark]

(b) Write the chemical equation for the reaction used to produce hydrogen gas.

....
[1mark]

(c) Based on the data given

   (i) Calculate the mass of copper and the mass of oxygen contained in the sample of oxide of copper.

      Mass of copper ....g.

      Mass of oxygen ....g

[2 marks]

(ii) Calculate the mol ratio of copper to oxygen.

Given that the relative atomic mass of O = 16, Cu= 64

[2 marks]

(iii) Write the empirical formula of the oxide of copper.

....
[1 mark]

(iv)   Write the chemical equation for the reaction between hydrogen and the
oxide of copper.

....
[1 mark]

(d)   The empirical formula for magnesium oxide can be determined by direct heating
of magnesium. Draw the set up of the apparatus to carry out this experiment.

[2 marks]

3. Figure 3 shows the location of seven elements A, D, E, G, J, L and M in the Periodic Table. These are not the actual symbols of the elements.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A													D		E		G
																J	
L																	
					M												

FIGURE 3

Using the letters in the Periodic Table of the elements in Figure 3, answer the following questions

(a) Write the formula for the ion formed from an atom of
   (i)   element L

   ....
   [1 mark]
   (ii)   element E

   …………………………………………………………………………..
   [1 mark]

(b) Which of the element is not chemically reactive? Explain why.

   …………………………………………………………………………………

   ………………………………………………………………………………….
   [2 *marks*]

(c) Element L reacts with element J to form a compound

   (i)   State the type of bond present in this compound

   ……………………………………………………………………………
   [1 mark]

(ii) Write the chemical formula of this compound

……………………………………………………………………
[1 mark]

(iii) Draw the diagram of electron arrangement for the compound that is formed between L and J.

[2 marks]

(iv) State one condition by which the compound in c (iii) conducts electricity. Explain your answer.

……………………………………………………………………

……………………………………………………………………
[2 marks]

4. Figure 4 shows the set up of the apparatus used to electrolyse copper(II) sulphate solution using copper electrodes
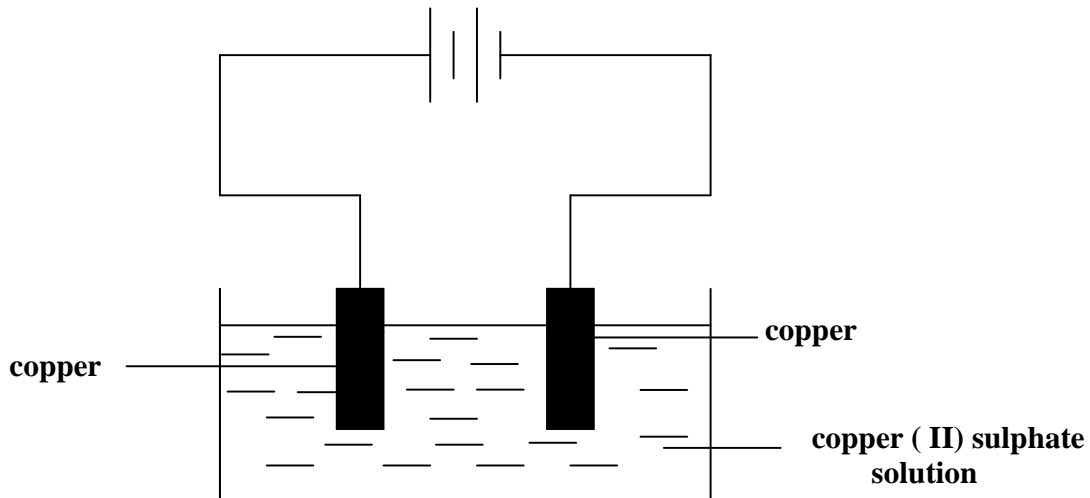
FIGURE 4

(a) Write the formula of all the anions present in the solution.

....
[1 mark]

(b) Write the half ionic equation for the reaction at the

   (i) anode

. ...
[1 mark]

   (ii) cathode

....
[1 mark]

(c) (i) From your observations, what happens to the intensity of the blue colour of the copper(II) sulphate solution during electrolysis?

....
[1 mark]

(ii) Explain your answer.

....

....

....

[2 marks]

(d) If the experiment is repeated with the copper electrodes being replaced by carbon electrodes, name the products formed at the

(i) anode

....

[1 mark]

(ii) cathode

....

[1 mark]

(e) The volume of the gas collected at the anode is 24 cm^3. Determine the number of molecules of the gas collected at room temperature.
Use the information that 1 mole of gas occupies a volume of 24.0 dm^3 at room conditions. Avogadro's Number = $6.02 \times 10^{23} mol^-$

[2 marks]

5   Figure 5 shows a series of changes involving solid W.

| Solid X | + | Y | + | Z |

↑ Heat

Solid W

↓ Water

Solution W

Potassium iodide   Ammonia solution

Q   White precipitate R
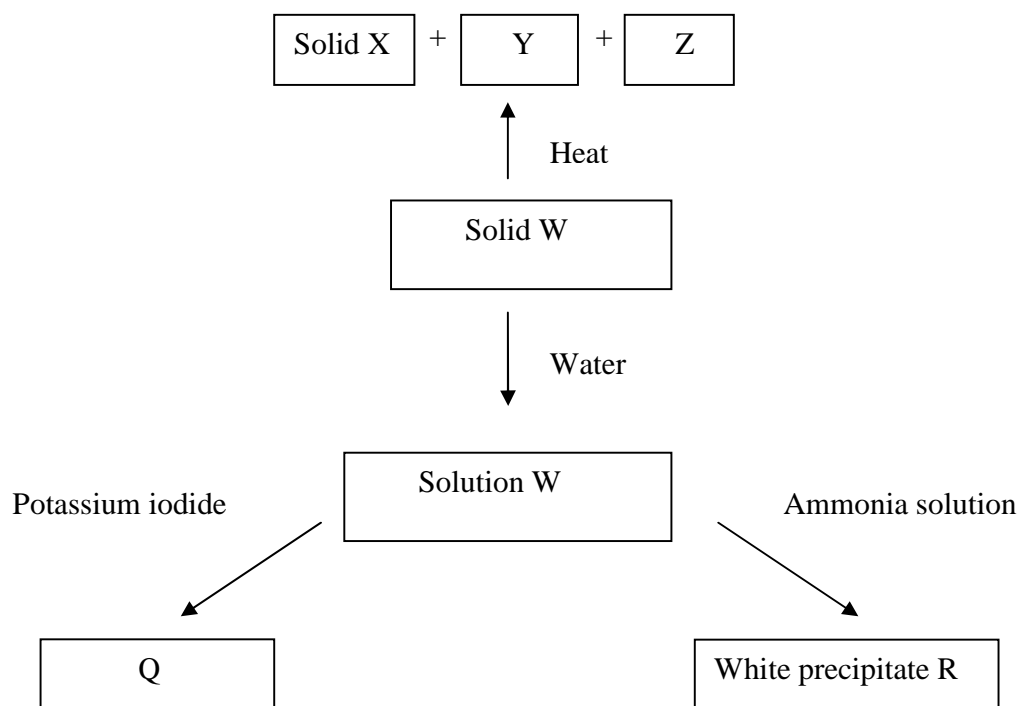
FIGURE 5

Gas Y is colourless. Gas Z is brown in colour. Solid X is brown in colour when hot and yellow in colour when cold.

(a)   Identify :

(i)   gas Y :...

(ii)   gas Z   :...

(iii)   solid X :..
[3 marks]

(b)   Describe a chemical test to identify the gas Y.

....

....

....
[2 marks]

(c) (i) Name the cation in solution W.

....
[1 mark]

(ii) Write the ionic equation for the reaction between solution W and ammonia solution.

....
[1 mark]

(iii) Name the white precipitate R.

....
[1 mark]

(d) In another experiment , potassium iodide solution is added to solution W.

(i) State what can be observed .

....
[1 mark]

(ii) Name the reaction that takes place in d (i)

....
[1 mark]

6 Figure 6 shows some common polymers.

- Polyethene
- Perspex
- Polymer Q
- PVC
- Protein

FIGURE 6

(a) What is meant by `polymer'.

……………………………………………………………………………………………

………………………………………………………………………………………..

[1 *mark*]

(b) The polymerization of glucose produces polymer Q. Name polymer Q.

....

[1 *mark*]

(c) Name the monomer of

(i) protein : ………………………………………………………………………

(ii) polyethene : …………………………………………………………………….

[2 *marks*]

(d) Draw the structural formula for the polymerization of the monomers of polyethene .

polymerization ⟶
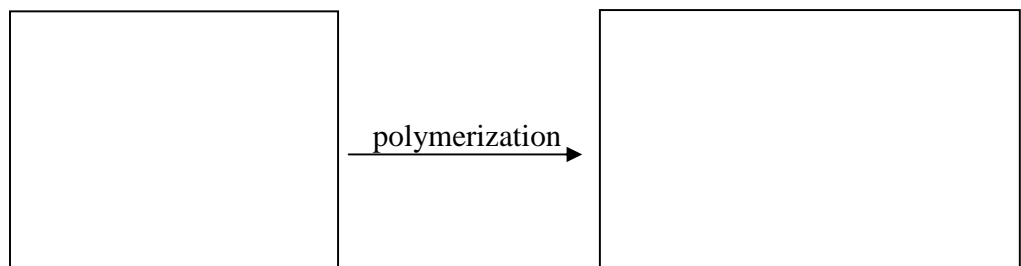
[2 *marks*]

(e) State one example of a natural polymer other than those in the list in Figure 6.

....
[1 *mark*]

(f) What is the main source of polyethene, perspex and PVC?

....
[1 *mark*]

(g) Explain how PVC causes the environmental problem.

....

....
[1 *mark*]

(h) State one use of perspex in our daily life.

....
[1 *mark*]

Section B (20 marks)
Answer any **one** question from this section.
The suggested time to answer section B is **30** minutes.

7. (a) Fried rice stored in a refrigerator lasts longer than fried rice stored in a kitchen cabinet. Explain why. (4 marks)

(b) A group of pupils carried out three experiments to investigate the factors affecting the rate of a reaction.
Table 7 shows information about the reactants and the temperature used in each experiment.

Experiment	Reactants	Temperature / ºC
I	Excess zinc granules and 25 cm³ of 0.5 mol dm^{-3} hydrochloric acid	30
II	Excess zinc granules and 25 cm³ of 0.5 mol dm^{-3} hydrochloric acid	40
III	Excess zinc powder and 25cm³ of 0.5 mol dm^{-3} hydrochloric acid	40

TABLE 7

The graph shows the result of these experiments.

14
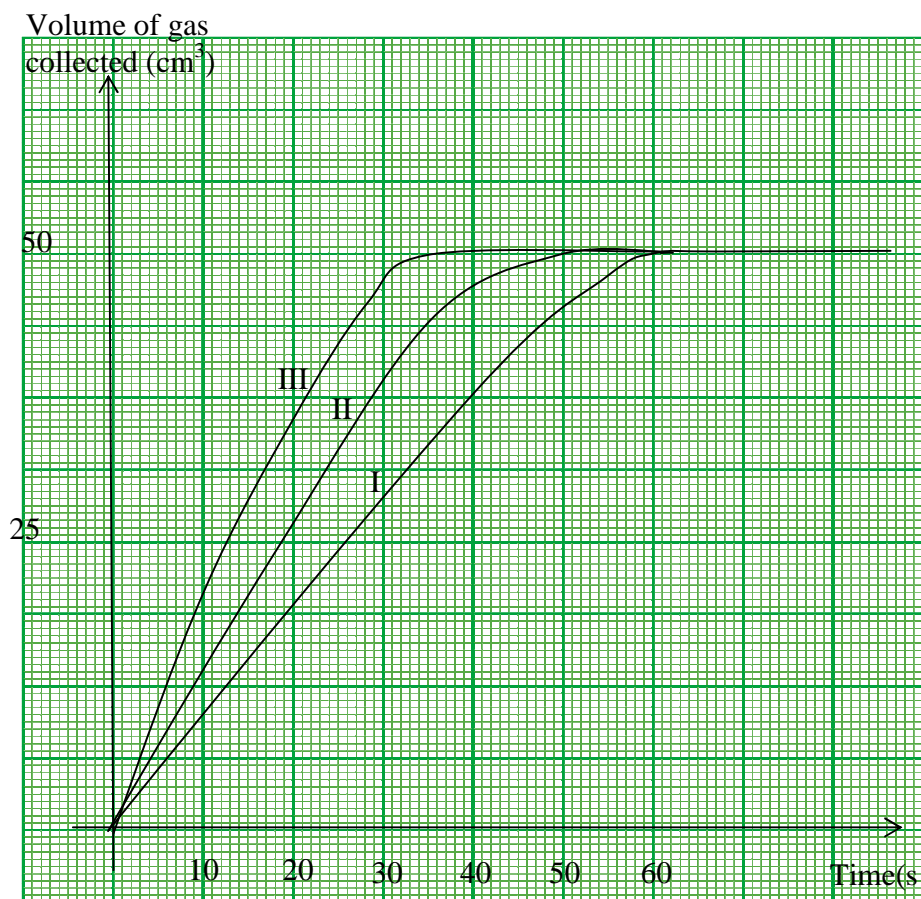
(i) Calculate the average rate of reaction for Experiment I. [2 marks]

(ii) Based on the table and graph, compare the rate of reaction between :

⟶ Experiment I and II

⟶ Experiment II and III

In each case, explain the difference in rate of reaction with reference to the
collision theory. [10 marks]

(iii) The chemical equation below shows the reaction between zinc and
hydrochloric acid.

$$Zn \ + \ 2HCl \ \longrightarrow \ ZnCl_2 \ + \ H_2$$
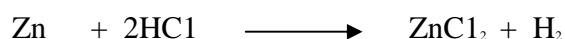
Given that the relative atomic mass of Zn = 65, and the molar volume of any gas
is 24 dm³ mol⁻ at room conditions.

Calculate the maximum volume of hydrogen gas produced in Experiment III.
[4 marks]

8 Figure 8.1 shows the chemical symbols which represent three elements, P, Q
and R.
These letters are not the actual symbols of the elements.

24	12	16
P	Q	R
12	6	8
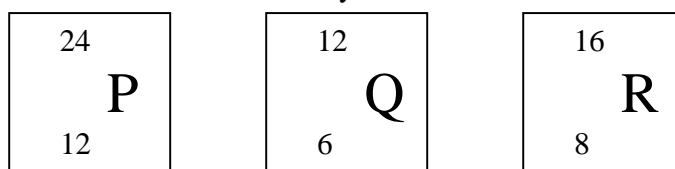
Figure 8.1

(a) Write the electron arrangement for atoms P and Q

[2 marks]

(c) Using the information in the Figure 8.1, explain how two different compounds can be
formed from the following pairs of elements.
(i) P and R

(ii) Q and R

[12 marks]

15

(d)   Table 8.2 shows the melting and boiling points of two chemical compounds at room temperature.

Compound	Melting Point (^{O}C)	Boiling Point (^{O}C)
Tetrachloromethane	- 23	76.8
Aluminium oxide	2030	2970

Table 8.2

Compare the melting and boiling points of tetrachloromethane and aluminium oxide.

Explain why the two compounds have different physical states at room temperature.

[6 marks]

Section C (20 marks)
Answer any **one** question from this section.
The suggested time to answer section C is **30** minutes.

9   (a)   (i)   .What is the functional group of alkenes?

           (ii)   Write the molecular formula and the name for the fourth member of alkenes.

           (iii)   Based on your answer in (a) (ii), draw the structural formulae of **three** possible isomers.

[6 *marks*]

   (b)   The flow chart below shows the chemical conversion of propan-1-ol to gas X and then gas X to gas Y.

Propan-1-ol	$\xrightarrow{\text{dehydration}}$	Gas X	$\xrightarrow{\text{hydrogenation}}$	Gas Y
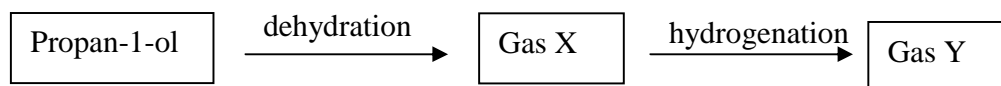
           (i)   With the help of suitable diagrams, describe a laboratory experiment to prepare gas X from the dehydration reaction of propan-1-ol.

               In your answer, include the chemical equation and explanation on how to ensure that gas X is already produced.

[10 *marks*]

           (ii)   Name gas Y.
               Gas X burns with a more sooty flame than gas Y. Explain why.
               Given that the relative atomic mass of C = 12 and H = 1.

[4 *marks*]

10   (a)   Describe an experiment to determine the concentration of an alkali solution by using the titration method.
               In your answer include the chemical equation and all the relevant calculations involved.

[12 marks]

   (b)   Describe an experiment to prepare a pure sample of dry copper (II) carbonate using only the chemical substances given. You are provided with sodium carbonate, nitric acid solution, copper (II) oxide and all the required apparatus. .In your answer, write down the chemical equations for the reactions.

[8 marks]

END OF QUESTION PAPER