SULIT
4541/1
Kimia
Kertas 1
September
2005
1¼ jam

PEPERIKSAAN PERCUBAAN SPM 2005
MAKTAB RENDAH SAINS MARA

http://cikguadura.wordpress.com/

KIMIA

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*

2. *Soalan di halaman kiri adalah dalam bahasa Melayu. Soalan di halaman kanan adalah yang sepadan dalam bahasa Inggeris.*

3. *Calon dikehendaki membaca maklumat di halaman 2 atau halaman 3*

Kertas soalan ini mempunyai 53 halaman bercetak

INFORMATION FOR CANDIDATES

1. *This question paper consists of 50 questions.*

2. *Answer* **all** *questions.*

3. *Answer each question by blackening the correct space on the answer sheet.*

4. *Blacken only* **one** *space for each question.*

5. *If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.*

6. *The diagrams in the questions provided are not drawn to scale unless stated.*

7. *You may use a non-programmable scientific calculator.*

Question 1 *to* **Question 50***, are followed by four options* **A, B, C,** *and* **D.** *Choose* **the best option** *for each question and* **blacken** *the corresponding space on the objective answer sheet.*

1 Atom X has a proton number 9 and the nucleon number is 19. Which of the following symbols is for atom X?

A $^{10}_{9}X$

B $^{19}_{9}X$

C $^{19}_{10}X$

D $^{9}_{10}X$

2 Which of the following electron arrangement of an atom has eight electrons valence?

A 2.6

B 2.8.2

C 2.8.8

D 2.8.8.2

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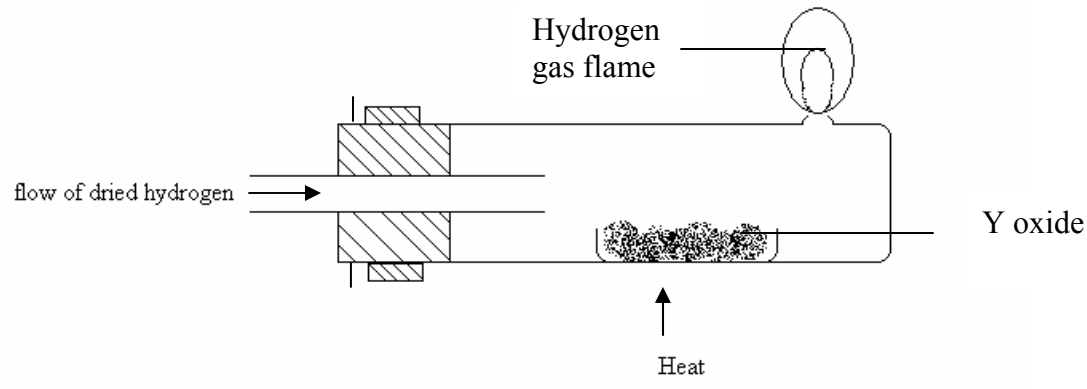
3 The diagram shows the method used to determine the empirical formula of a metal oxide Y.



Which of the following oxide is possible for metal oxide Y?

A Zinc oxide

B Sodium oxide

C Magnesium oxide

D Copper(II) oxide

4 Which of the following gases is a monoatom gas?

A Fluorine

B Helium

C Oxygen

D Nitrogen

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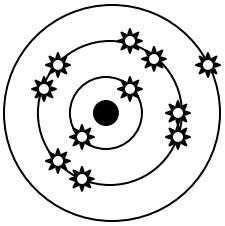
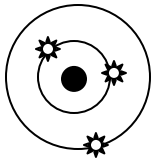
5 The diagram shows the electron configuration of lithium atom and sodium atom.



Sodium



Lithium

Both atoms are in Group 1 of the Periodic Table. Which of the following statements are true about lithium and sodium element?

I The size of lithium atom is smaller than sodium atom
II The density of sodium is less than lithium
III The hardness of sodium is higher than lithium
IV The melting point of lithium is higher than sodium

A I and II only
B II and III only
C I and IV only
D I,II,III and IV

6 In liquid state oxygen molecules are held together by

A Van der Waals forces
B electrostatic force
C covalent bonding
D hydrogen bonding

[Lihat sebelah

7 Chlorine gas reacts with water to form a

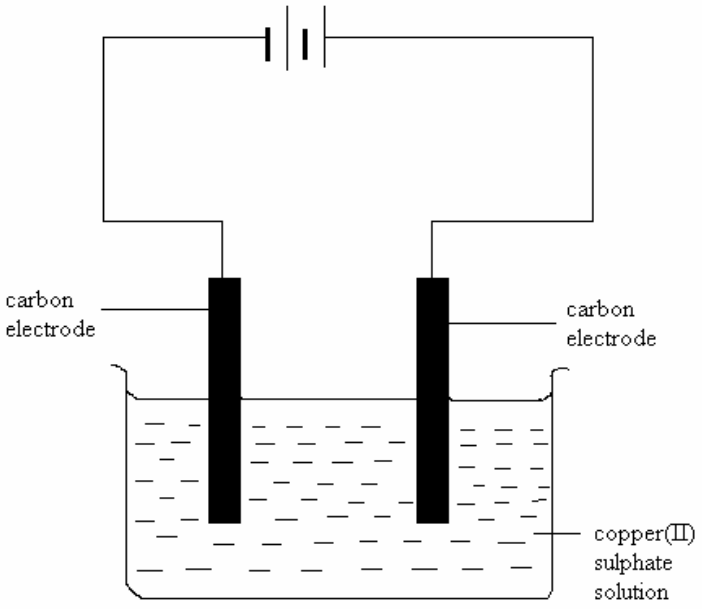
A brown coloured solution

B yellow coloured solution

C solution of pH 12

D solution that bleaches the colour of litmus paper.

8 The diagram shows the set-up of the apparatus for an electrolytic cell.



Which of the following ions are attracted to anode and cathode?

	Anode	Cathode
A	SO_4^{2-}	Cu^{2+}
B	Cu^{2+}	OH^-
C	SO_4^{2-}, OH^-	Cu^{2+}, H^+
D	Cu^{2+}, H^+	SO_4^{2-}, OH^-

[Lihat sebelah

9 Which of the following statements are true about dry cell?

I The cell is rechargeable

II Zinc is the negative electrode

III Sodium hydroxide is the electrolyte in the cell

IV The presence of manganese(IV) oxide reduces cell polarization

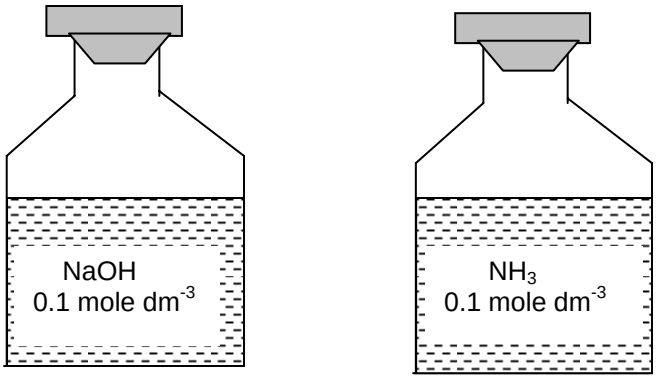
A I and II only

B II and IV only

C I, II and III only

D I, II, III and IV

10 The figures show two aqueous solutions.



Which of the following statements is true?

A Both solutions are strong alkaline

B The pH of both solutions are equal

C Both solutions are strong electrolyte

D 25.0 cm^3 of each solution requires 25.0 cm^3 of 0.1 mole dm^{-3} hydrochloric acid to be neutralized

[Lihat sebelah

11 Which of the following facts is matched correctly?

	Acid formula	Types of acid	Basicity of acid
A	HNO_3	Weak acid	3
B	H_2CO_3	Strong acid	2
C	HCl	Weak acid	1
D	H_2SO_4	Strong acid	2

12 Which of the following salts is water soluble?

A Calcium sulphate

B Silver chloride

C Sodium carbonate

D Lead(II) sulphate

13 The table shows industrial products and their usage.

	Industrial product	Usage
I	Photochromic glass	Boiling tube
II	Ceramic	Heat resistant kitchen ware
III	Concrete	Railway track base
IV	Fiber glass plastic	Water storage tank

Which of the following are true?

A I and III only

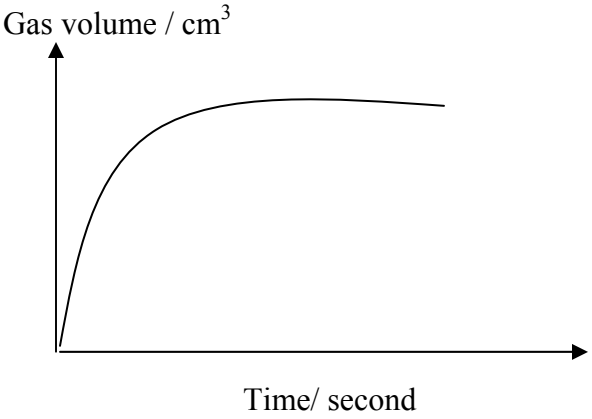
B II and III only

C II and IV only

D II, III and IV only

[Lihat sebelah

14 The graph shows the volume of gas produced against time for the reaction of sodium carbonate and hydrochloric acid.



The gradient of the graph decreases with time because

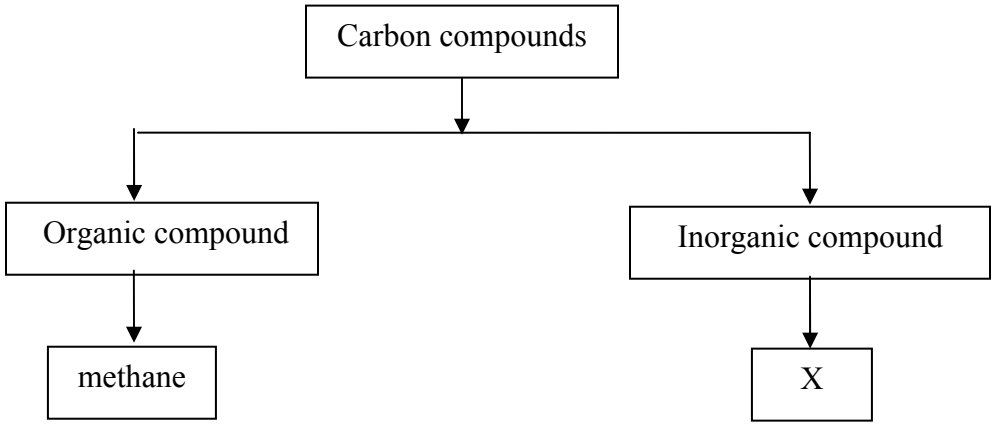
A catalyst is not used

B temperature of reaction decreases

C volume of mixture decreases

D concentration of hydrochloric acid decreases

15 The chart shows the classification of carbon compounds.



X is

A carbon dioxide

B ethanoic acid

C methanol

D glucose

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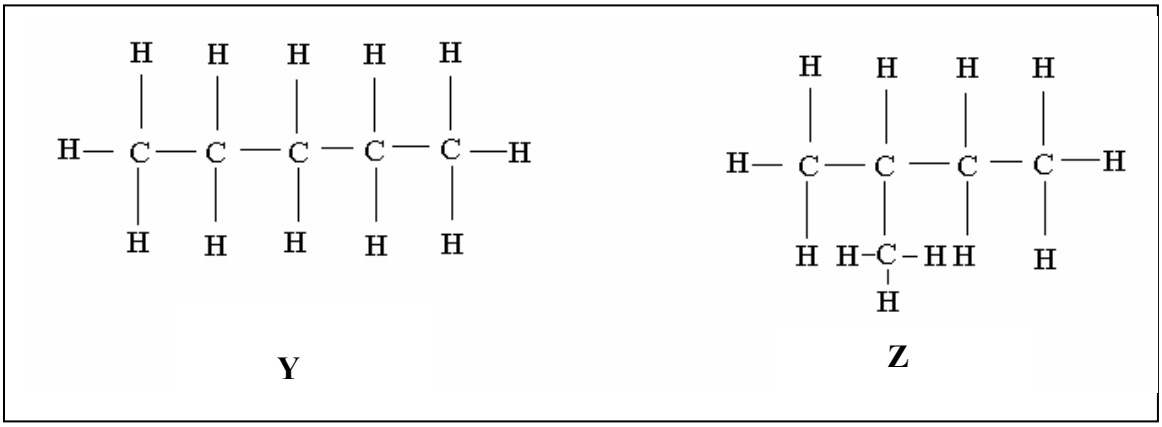
16 The diagram shows structural formulae of substances Y and Z.



Substances Y and Z have similar

A boiling points

B molecular formulae

C structural formulae

D IUPAC names

17 Which of the following statements refer to oxidation?

I Process of losing oxygen

II Process of gaining hydrogen

III Process of losing electrons

IV Process of increasing oxidation number.

A I and II only

B III and IV only

C I, II and III only

D I, II , III and IV.

[Lihat sebelah

18 The following ionic equation represents a redox reaction

$$2\,Fe^{2+} + Br_2 \rightarrow 2\,Fe^{3+} + 2\,Br^-$$

Which of the following statements is true?

A Iron(II) ion , Fe^{2+} has been oxidized

B Iron(III) ion , Fe^{3+} has been reduced

C Bromine is the reducing agent

D Oxidation number of bromine increases from +1 to +2

19 The following thermochemical equation represents the formation of hydrogen chloride gas.

$$H_{2\,(g)} + Cl_{2\,(g)} \rightarrow 2\,HCl_{(g)} \qquad \Delta H = -x\ kJ\ mole^{-1}$$

Which of the following statements are true for the reaction?

I It is an endothermic reaction.

II Heat energy is absorbed during bond breaking of hydrogen and chlorine molecules

III Heat energy is released during the formation of hydrogen chloride molecules

IV x kJ of heat is liberated when 1 mole of hydrogen chloride produced.

A I and III only

B II and IV only

C I , II and III only

D II , III and IV only

[Lihat sebelah

20 Which of the following medicine and its usage have been matched correctly?

	Medicine	Usage
I	Streptomycin	Pneumonia treatment
II	Aspirin	Releasing pain
III	Amphetamine	Controlling depression
IV	Insulin	Diabetes mellitus treatment

A I and III only

B II and IV only

C I , II and IV only

D I , II , III and IV

21 The melting point and boiling point of substance M is $-37\,^{0}$C and $5\,^{0}$C respectively.

The physical state of substance M at room temperature is

A gas

B liquid

C solid

D gas and liquid

22 The table shows atoms with their respective proton number.

Atom	Proton Number
W	7
X	9
Y	17
Z	19

Which of the following pairs have the same chemical properties?

A W and Y

B W and X

C X and Y

D X and Z

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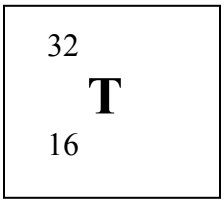
23 The diagram shows the atomic symbol of element T.



Which of the following combination represents the ionic formula and electron arrangement of ion T?

	Ionic Formula	Electron arrangement
A	T^{2-}	2.8.8
B	T^{2+}	2.8.8
C	T^{2-}	2.8.6
D	T^{2+}	2.8.4

24 The number of valence electrons for atoms X and Y are 5 and 7 respectively. Which of the following chemical formula and type of bonding are true for the compound formed between X and Y?

	Chemical Formula	Type of bonding
A	XY_2	ionic
B	XY_2	covalent
C	XY_3	covalent
D	XY_3	ionic

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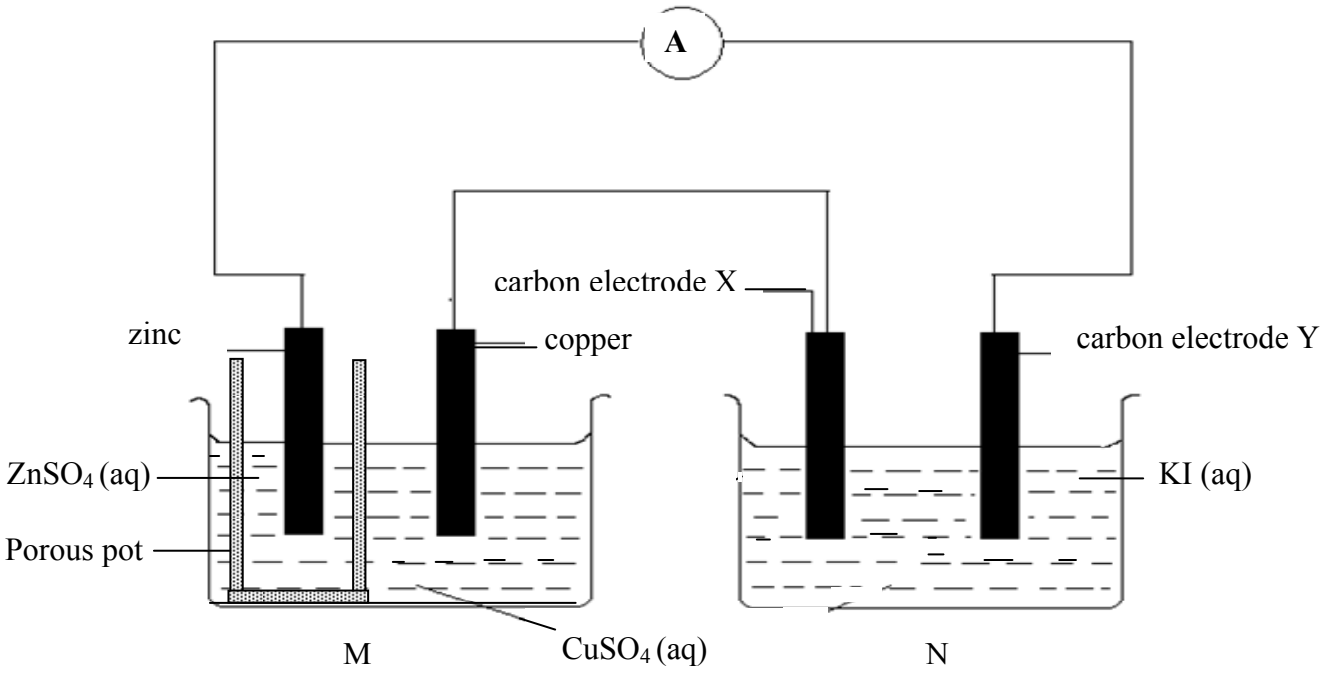
25 The diagram shows the set up of the apparatus for an electrochemical cell



What is the observation expected for this experiment?

A Brown gas is released at electrode X

B Zinc electrode becomes thinner

C Gray deposit is formed at electrode Y

D Intensity of blue colour in beaker M does not change

[Lihat sebelah

26 The table shows the observation of the experiment on solution P.

Experiment	Observation
Add sodium hydroxide solution gradually until in excess	White precipitate formed and dissolved in excess sodium hydroxide solution
Add ammonia aqueous gradually until in excess	White precipitate formed and does not dissolved in excess ammonia aqueous

Possible cations for solution P are

I Mg^{2+}

II Zn^{2+}

III Al^{3+}

IV Pb^{2+}

A I and II only

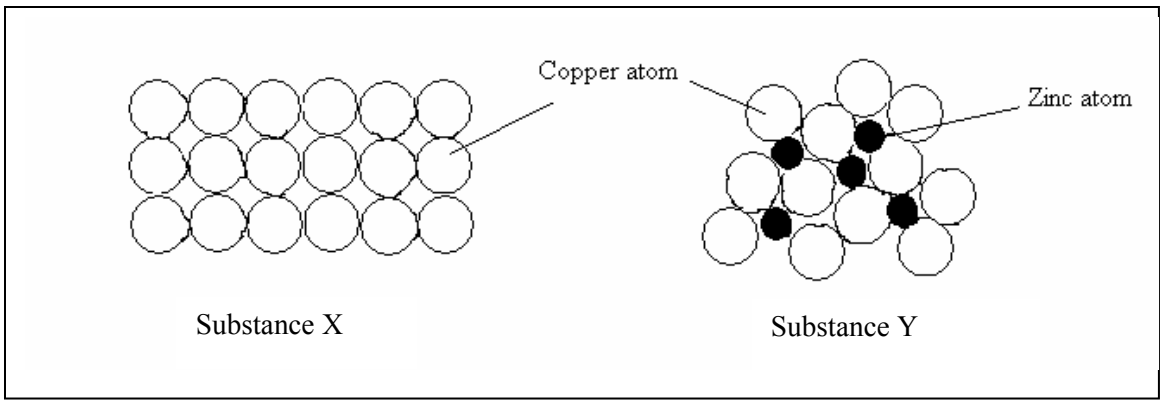
B I and IV only

C II and III only

D III and IV only

[Lihat sebelah

27 Diagram shows the atomic arrangements of substances X and Y.



Substance Y is harder than substance X because atoms in Y

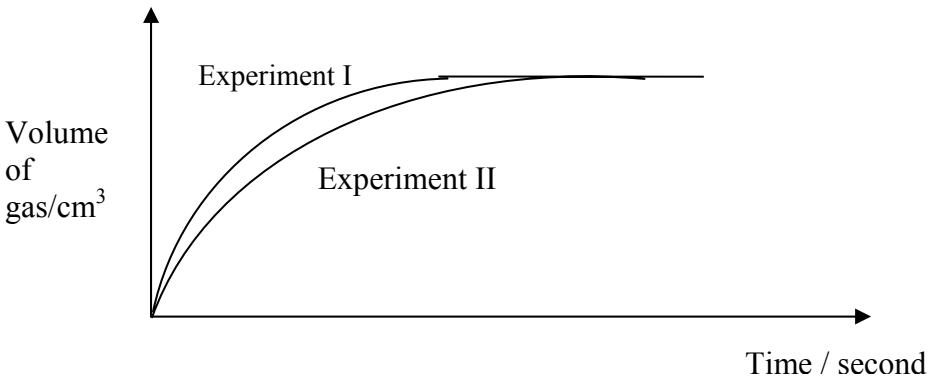
A are strongly bonded to each other

B are closer to each other

C do not slip easily

D are properly arranged

28 The graph shows the total volume of carbon dioxide against time for the reaction between calcium carbonate and excess hydrochloric acid.



Which of the following will produce the curves shown?

A Both experiments conducted in different temperature

B Both experiment conducted by using the same acid concentration

C Smaller size of calcium carbonate granules is used in experiment II

D Mass of calcium carbonate used in experiment I is greater.

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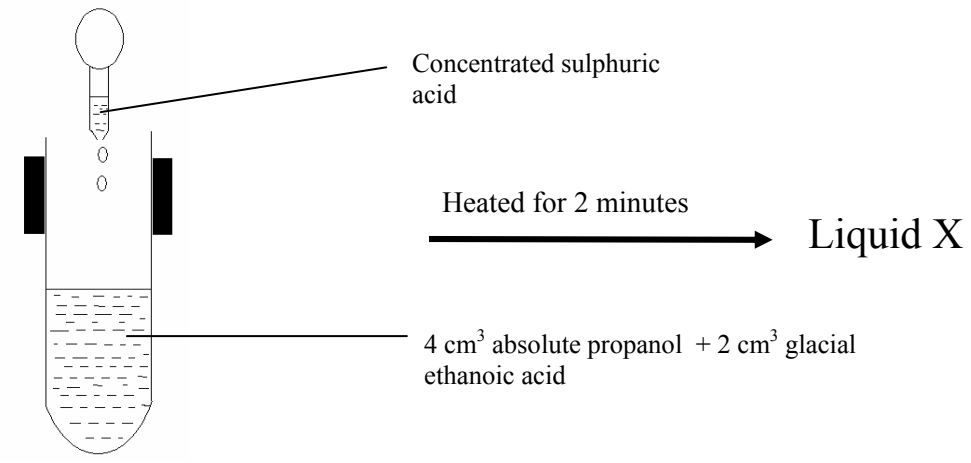
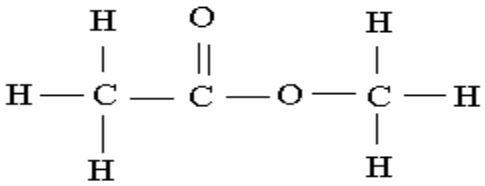
29 The diagram shows a chemical reaction to form a sweet scented liquid X.

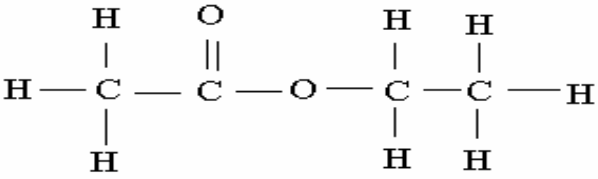


Which of the following structural formulae represents liquid X?

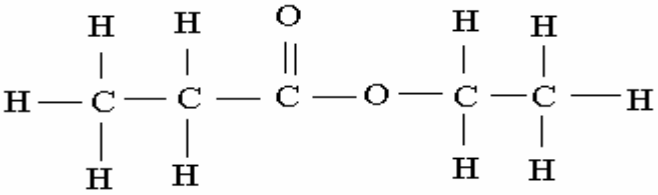
A



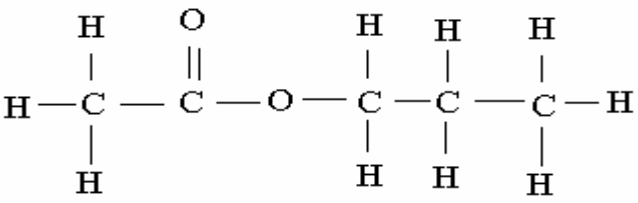
B



C



D



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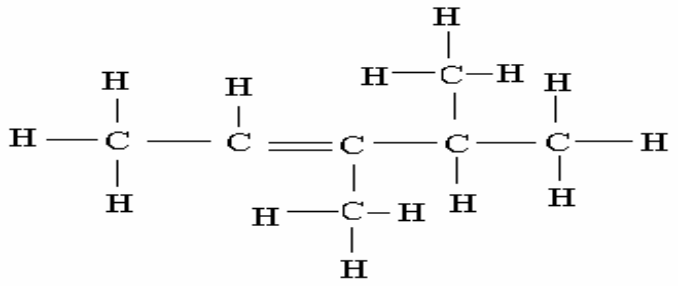
30 The diagram shows structural formula of a carbon compound.



IUPAC name for this compound is

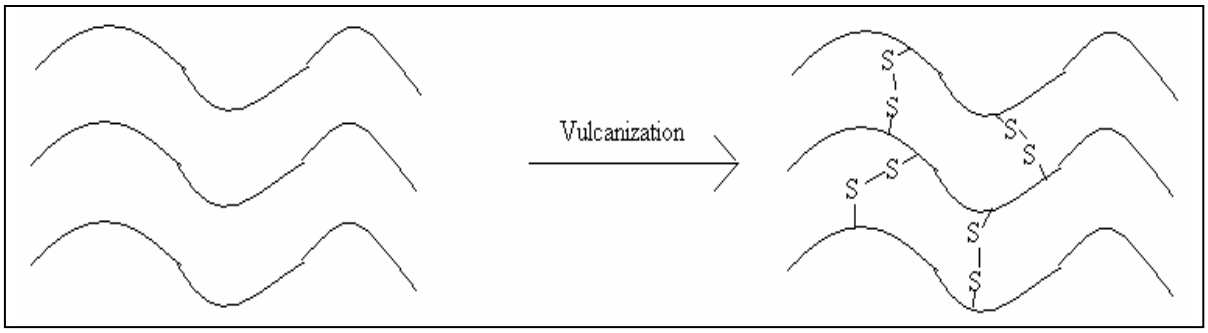
A 3,4-methylpent-3-ene

B 2,3-dimethylpent-2-ene

C 2,3-dimethylpent-3-ene

D 3,4-dimethylpent-2-ene

31 The diagram shows the structural change caused by the vulcanization of material P.



Material P **Material Q**

Which of the following statements are true about the diagram?

I Q is harder than P

II Q is easily oxidized compared to P

III Q is more elastic than P

IV Q is more heat resistible than P

A I and III only

B II and IV only

C I, III and IV only

D I, II, III and IV

[Lihat sebelah

32 The oxidation number of copper increases when

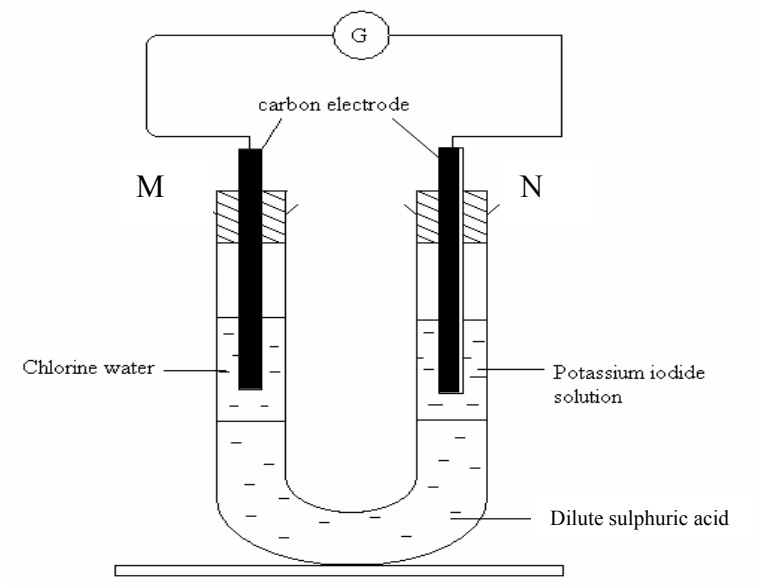
A copper(II) carbonate powder is strongly heated

B copper(II) oxide reacts with dilute sulphuric acid

C a piece of zinc strip reacts with copper(II) nitrate solution

D a piece of copper strip reacts with silver nitrate solution

33 The diagram shows an experiment of transferring electron at a distance.



Which of the following statements are true?

I Iodide ions act as a reducing agent

II A yellow-brownish solution is formed at N electrode

III Electrons transfer through the sulphuric acid solution

IV Yellow-greenish bubbles is released at M electrode

A I and II only

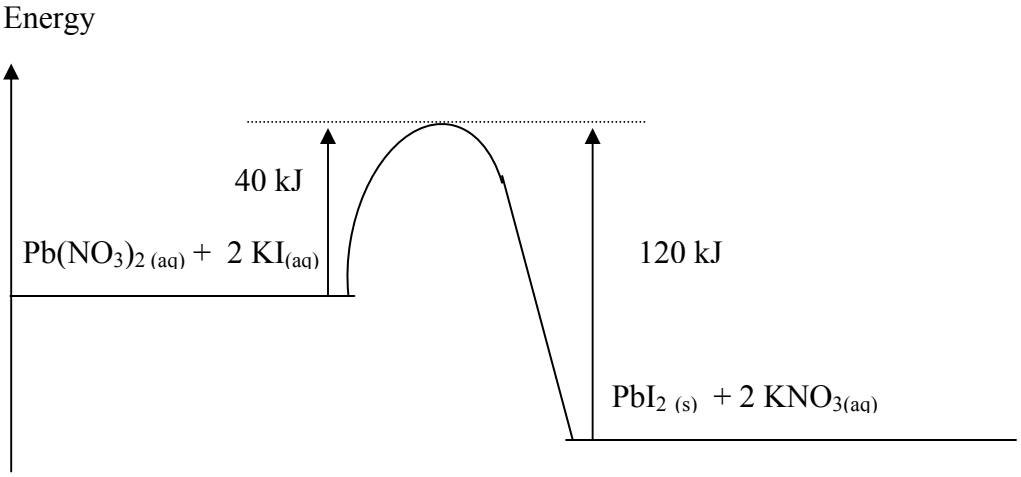
B II and III only

C I, III and IV only

D I, II, III and IV

[Lihat sebelah

34 The diagram shows the energy level of a chemical reaction



Which of the following statements can be inferred from the diagram?

I Formation of 1 mole of lead(II) iodide releases 80 kJ of heat.

II Activation energy for the reaction is 120 $kJmole^{-1}$ of heat.

III 80 kJ of heat energy is released when 1 mole of lead(II) nitrate reacts with 2 moles of potassium iodide.

IV Ionic equation for the reaction is $K^{+}_{(ak)} + NO_3^{-}{}_{(ak)} \rightarrow KNO_{3\,(ak)}$

A I only

B I and III only

C III and IV only

D I , II , III and IV

35 The cleansing effect of detergent is more effective in hard water compared to soap because detergent

A forms a soluble salt with metal ion in hard water

B has hydrophobic part which is more soluble in hard water.

C has hydrophilic part which is more soluble in water

D has hydrocarbon chain which makes detergent dissociate less in hard water

[Lihat sebelah

36 Ion M^{3-} has 16 neutrons and the electron arrangement is 2.8.8
What is the nucleon number of element M?

A 15
B 16
C 31
D 34

37 An oil tanker ship collided with a barrier reef and spilled 8×10^{7} m^3 of oil. If the size of one molecule of oil is 2×10^{-9} m estimate the area covered by the spilled oil?

A 2.5×10^{15} m^2
B 2.5×10^{16} m^2
C 4.0×10^{15} m^2
D 4.0×10^{16} m^2

38 Which of the following amount of substances contains the same number of atom as in 0.69 g of sodium?
Use the information that the relative atomic mass of C = 12, O = 16, Na = 23, Ca = 40 and the Avogadro constant = 6×10^{23} $mole^{-1}$

A 0.06 g hydrogen gas
B 0.12 g calcium
C 0.48 g oxygen gas
D 0.69 g carbon

[Lihat sebelah

39 The following equation represents the reaction between hydrochloric acid with excess powdered zinc.

$$Zn + 2\,HCl \rightarrow ZnCl_2 + H_2$$

If 19.50 g of powdered zinc reacts with 100 cm^3 of 2.0 mol dm^{-3} hydrochloric acid, what is the mass of the unreacted zinc?
Use the information that the relative atomic mass of Zn = 65.

A 13.0 g
B 6.5 g
C 0.4 g
D 0.3 g

40 The equation shows a precipitation reaction of potassium phosphate

$$\boldsymbol{a}\ K_3PO_{4\,(aq)} + \boldsymbol{b}\ Ca(NO_3)_{2\,(aq)} \rightarrow \boldsymbol{c}\ KNO_{3\,(aq)} + \boldsymbol{d}\ Ca_3(PO_4)_{2(s)}$$

The corresponding values of ***a*** , ***b***, ***c***, and ***d*** are

A 1 , 6 , 3 , 2
B 2 , 3 , 6 , 1
C 6 , 2 , 1 , 3
D 3 , 1 , 2 , 6

[Lihat sebelah

41 The table shows the proton number of five atoms U, V, W , X and Y.

Atom	Proton number
U	10
V	12
W	14
X	17
Y	19

Which of the following pairs formed a compound with high melting and boiling points?

A U and W

B V and Y

C X and Y

D W and X

42 The table shows the results of an experiment on chemical cell using different pairs of metal electrodes immersed in a copper(II) sulphate solution.

Electrodes		Voltmeter reading/ V
Positive	Negative	
P	Q	0.5
P	S	2.7
Q	R	1.0
R	S	1.2

The ascending arrangement according to the tendency of releasing electrons is

A S, R, Q, P

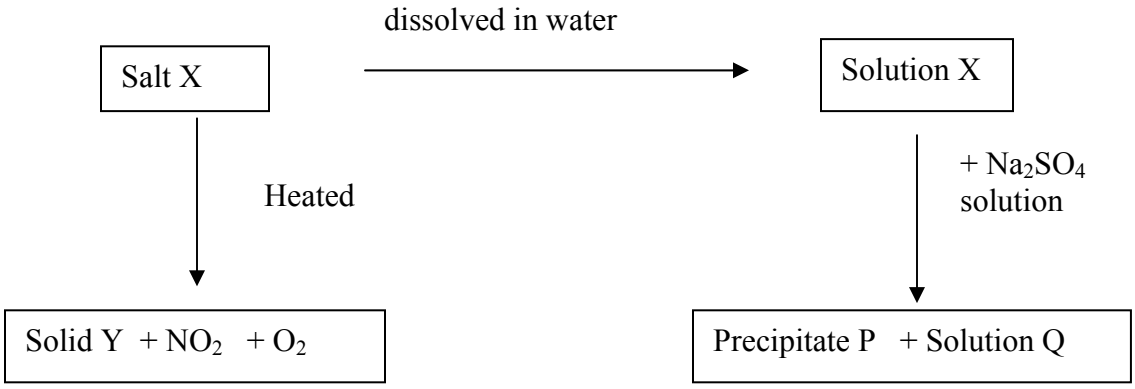
B P, Q, S , R

C P, R, Q, S

D P, Q, R , S

[Lihat sebelah

43 The flow chart shows the analysis process of salt X. The heating of salt X yields residue Y that is brown when hot and turns yellow when cold.



Which of the following pairs represent solid Y and precipitate P?

	Solid Y	**Precipitate P**
A	Lead(II) oxide	Lead(II) sulphate
B	Zinc oxide	Zinc nitrate
C	Zinc oxide	Zinc sulphate
D	Lead(II) oxide	Lead(II) nitrate

44 The table shows the total volume of hydrogen gas collected at regular time interval for the reaction between magnesium and nitric acid.

Time/ s	0	30	60	90	120
Gas volume / cm^3	0	15	25	30	30

What is the average rate of the reaction.

A 0.25 $cm^3 s^{-1}$

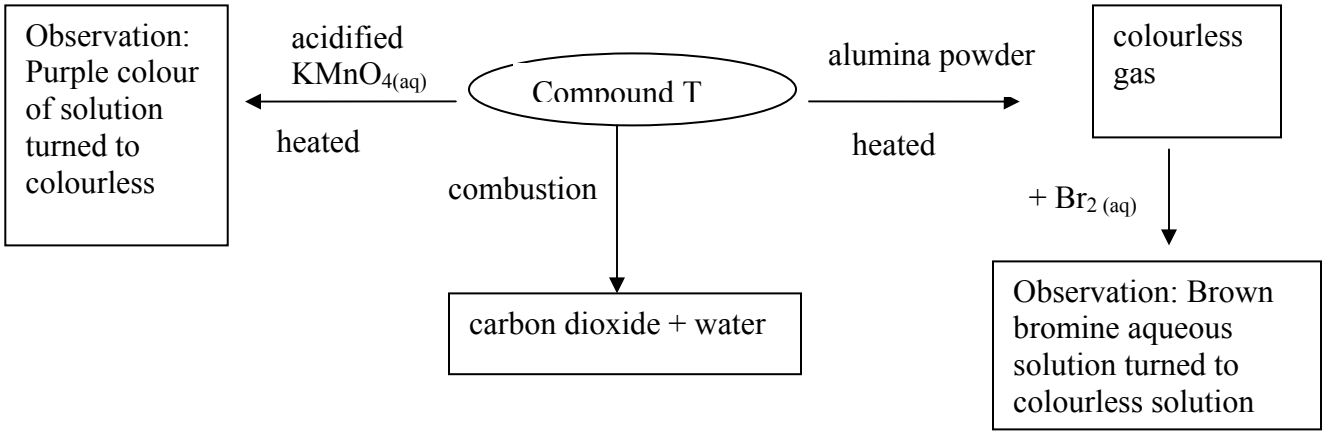
B 0.33 $cm^3 s^{-1}$

C 0.83 $cm^3 s^{-1}$

D 1.11 $cm^3 s^{-1}$

[Lihat sebelah

45 The flow chart shows the chemical properties of a compound T.



Which of the following compounds have similar chemical properties as compound T?

I Ethanol
II Ethene
III Propanol
IV Ethanoic acid

A I and II only
B I and III only
C III and IV only
D I, III and IV only

46 What is the oxidation number of sulphur in $Na_2S_2O_3$?

A +2
B +3
C +4
D +6

[Lihat sebelah

47 The following ionic equation shows the reaction between iron(II) sulphate solution and acidified potassium dichromate(VI) solution .

$$Cr_2O_7^{2-} + 14\,H^+ + 6\,Fe^{2+} \rightarrow 2\,Cr^{3+} + 6\,Fe^{3+} + 7\,H_2O$$

Which of the following statements are true about this reaction?

I Orange coloured acidified potassium dichromate(VI) solution is decolourized

II Dichromate(VI) ion is reduced to chromium(III) ion

III Oxidation number of iron increased from +2 to +3

IV Electrons are transferred from dichromate(VI) ions to iron(II) ions

A I and II only

B II and III only

C I , II and III only

D II , III and IV only

48 When 100 cm^3 of 1.0 mol dm^{-3} hydrochloric acid reacts with 100 cm^3 of 1.0 mol dm^{-3} potassium hydrogen carbonate solution the temperature decreased by $y\,^0C$. What is the decrease in temperature for the reaction when 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid reacts with 50 cm^3 of 1.0 mol dm^{-3} potassium hydrogen carbonate solution ?

A $0.1\,y\,^0C$

B $0.5\,y\,^0C$

C $y\,^0C$

D $2\,y\,^0C$

[Lihat sebelah

49 In a neutralization reaction , 50 cm^3 of 1.0 mole dm^{-3} nitric acid reacted with 50 cm^3 of 1.0 mole dm^{-3} sodium hydroxide solution . Which of the following acids can replace 50 cm^3 of 1.0 mole dm^{-3} nitric acid to release the same quantity of heat?

I 25 cm^3 of 2.0 mole dm^{-3} hydrochloric acid

II 25 cm^3 of 2.0 mole dm^{-3} sulphuric acid

III 20 cm^3 of 2.5 mole dm^{-3} nitric acid

IV 25 cm^3 of 1.0 mole dm^{-3} sulphuric acid

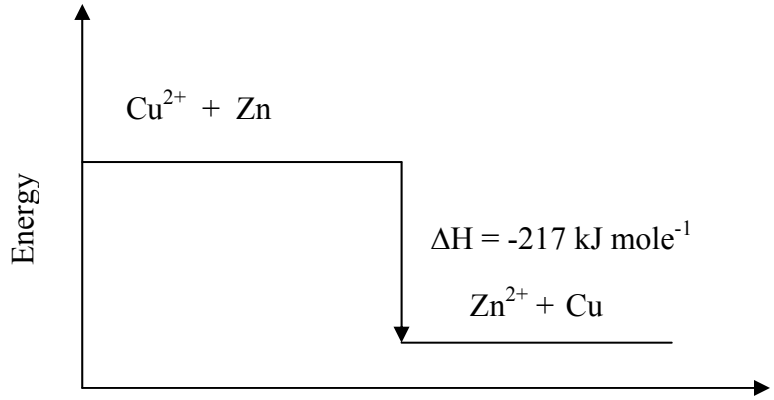
A I and II only

B III and IV only

C I , II and III only

D I , II, III and IV

50 The diagram shows the energy level for the displacement reaction of copper by zinc.



What is the total amount of heat released when 50.0 cm^3 of 0.5 mol dm^{-3} copper (II) sulphate solution reacts in access zinc.

A 5.4 kJ

B 10.8 kJ

C 21.6 kJ

D 54.0 kJ

END OF QUESTION PAPER

Nama: …… **Kelas: ……**

SULIT
4541/2
Kimia
Kertas 2
September
2005

2½ jam

4541/2

MAKTAB RENDAH SAINS MARA

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2005

http://cikguadura.wordpress.com/

KIMIA

Kertas 2

Dua jam tiga puluh minit

4 5 4 1 2

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan kelas anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan di halaman kiri adalah dalam bahasa Melayu. Soalan di halaman kanan adalah yang sepadan dalam bahasa Inggeris.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Melayu atau bahasa Inggeris.*
5. *Calon dikehendaki membaca maklumat di halaman 2 atau halaman 3.*

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	10	
	2	10	
	3	10	
	4	10	
	5	10	
	6	10	
B	1	20	
	2	20	
C	3	20	
	4	20	
Jumlah			

Kertas soalan ini mengandungi 47 halaman bercetak dan 1 halaman tidak bercetak

[Lihat sebelah
SULIT

INFORMATION FOR CANDIDATES

1. *This question paper consists of* ***three*** *sections:* ***Section A, Section B*** *and* ***Section C.***

2. *Answer* ***all*** *questions in* ***Section A. Write your answers for Section A in the spaces provided in the*** *question paper.*

3. *Answer one question from* ***Section B*** *and* ***one*** *question from* ***Section C****. Write your answers for* ***Section B*** *and* ***Section C*** *on the lined pages at the end of the question paper. Answer questions in* ***Section B*** *and* ***Section C*** *in detail. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answer.*

4. *Show your working, it may help you to get marks.*

5. *If you wish to cancel any answer, neatlly cross out the answer.*

6. *The diagrams in the questions are not drawn to scale unless stated.*

7. *Marks allocated for each question or part question are shown in brackets.*

8. *The time suggested to complete* ***Section A*** *is 90 minutes,* ***Section B*** *is 30 minutes and* ***Section C*** *is 30 minutes*

9. *You may use a non – programmable scientific calculator.*

10. *Hand in all your answer sheets at the end of the examination.*

For Examiner's Use

Section A

[60 *marks*]

Answer **all** *questions in this section.*
The time suggested to complete **Section A** *is 90 minutes*

1 Figure 1 shows the set-up of apparatus for an experiment to determine the empirical formula of Y oxide.

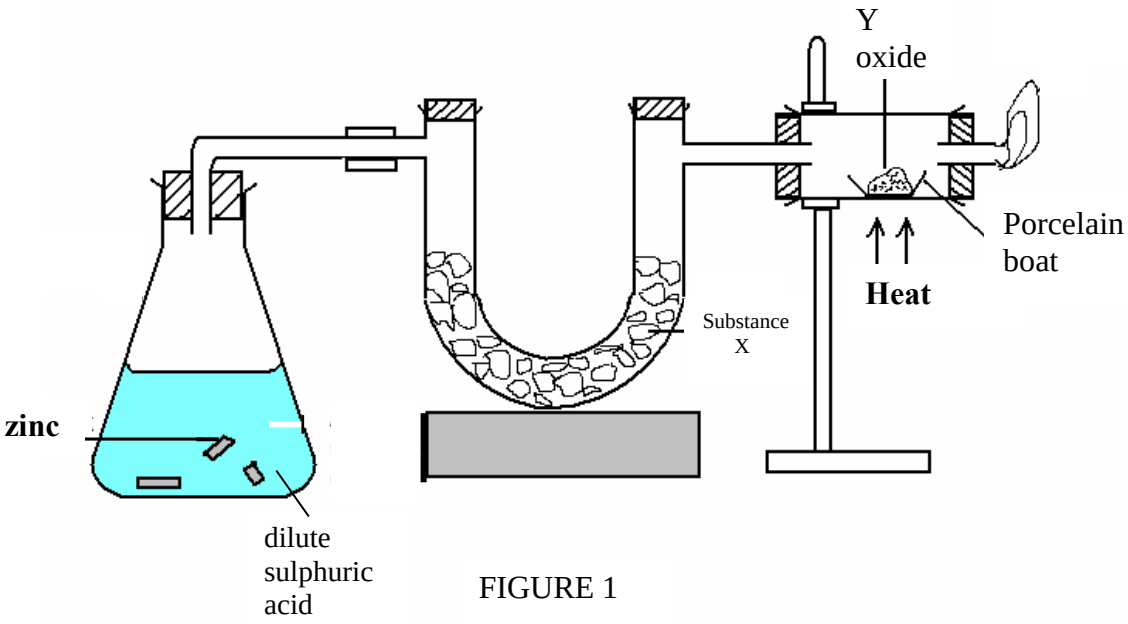


FIGURE 1

(a) Name the substance X used to dry the hidrogen gas.

1(a)

_____

[1 *mark*]

(b) Why is it necessary to dry the hidrogen gas?

1(b)

_____

[1 *mark*]

[Lihat sebelah

For Examiner's Use

(c) State **two** observations at the combustion tube in this experiment.

_____

_____

[2 *marks*]

1(c)

(d) Table 1 shows the results obtained when a sample of Y oxide reacts with hidrogen gas.

Mass of empty porcelain boat	105.8 g
Mass of porcelain boat + Y oxide	111.2 g
Mass of porcelain + Y	110.6 g

TABLE 1

(i) Calculate the number of moles of Y atoms in the sample.
Use the information that the relative atomic mass Y = 64

[2 *marks*]

1(d)(i)

(ii) Calculate the number of moles of oxygen atoms in the sample.
Use the information that the relative atomic mass O = 16

[2 *marks*]

1(d)(ii)

(iii) Determine the empirical formula of Y oxide.

[2 *marks*]

1(d)(iii)

Total

[**Lihat sebelah**

For Examiner's Use

2 Figure 2 shows part of the Periodic Table of Elements.

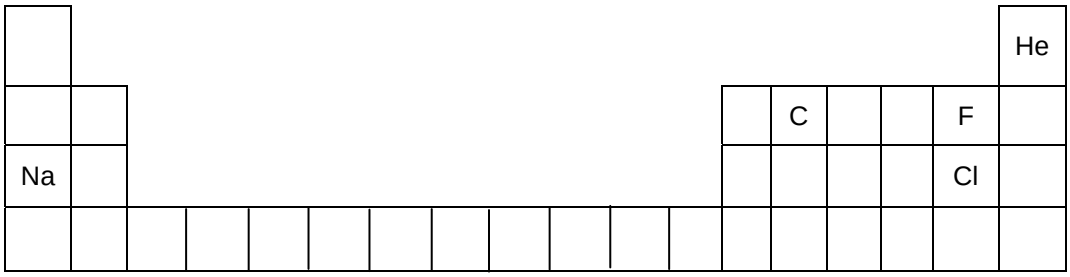


FIGURE 2

Based on Figure 2, answer the following questions.

(a) Determine the group and period for element C in the Periodic Table.

2(a)

_____

[1 *mark*]

(b) Draw the electron arrangement of the compound formed between the atoms of Na and Cl. [2 *marks*]

2(b)

(c) (i) The atoms of C and Cl can react with each other to form a compound X. Draw the electron arrangement of the compound X formed.

[2 *marks*]

2(c)(i)

For Examiner's Use

(ii) Figure 3 shows the set – up of apparatus to investigate the conductivity of liquid compound X.

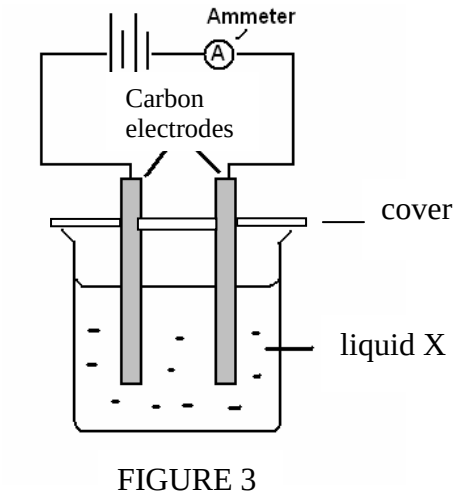


FIGURE 3

State **one** observation and give a reason for it.

_____

_____

_____

[2 *marks*]

2c(ii)

(d) F atom is more reactive than Cl atom. Explain why.

_____

_____

_____

_____

[3 *marks*]

2(d)

[**Lihat sebelah**

Total

For Examiner's Use

3. Figure 4 shows the set- up of apparatus for the Thermit reaction between aluminium and iron(III) oxide to produce iron metal and aluminium oxide.

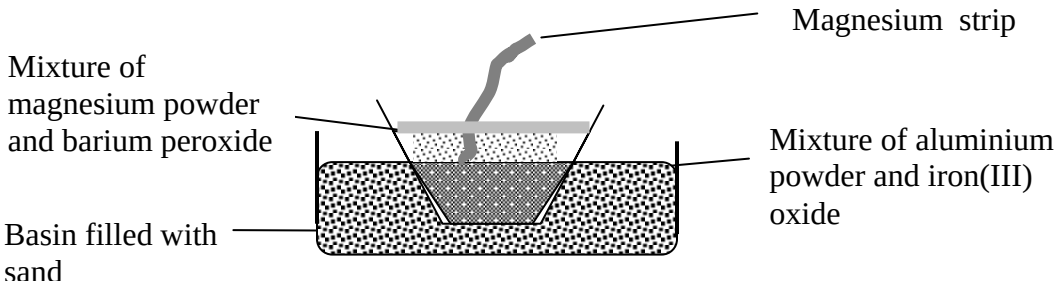


FIGURE 4

Based on this Thermit reaction,

(a) Name the types of reaction that occurs. **3**(a)

_____

[1 *mark*]

(b) (i) State the function of aluminium powder. **3**(b)(i)

_____

[1 *mark*]

(ii) Explain your answer in b(i) **3**(b)(ii)

_____

[1 *mark*]

(c) (i) Write the chemical equation for the reaction between aluminium and iron(III) oxide. **3**(c)(i)

_____

[1 *mark*]

(ii) Calculate the maximum mass of iron produced if 4.0 g of iron(III) oxide react with excess aluminium powder.
Use the information that the relative atomic mass Fe = 56, Al = 27, and O = 16. [3 *marks*]

For Examiner's Use

3(c)(ii)

(d) In industry, iron is extracted from its ore using carbon or hydrogen gas.

(i) Give **one** reason why Thermit reaction is not used in industry for the extraction of iron from its ore.

_____

[1 *mark*]

3d(i)

(ii) Explain why carbon **or** hydrogen is suitable to be used extensively for the extraction of iron in industry.

_____

_____

[2 *marks*]

3d(ii)

Total

[**Lihat sebelah**

For Examiner's Use

4 Three experiments were carried out to investigate the effect of the factors influencing the rates of reactions. Table 2 shows the mixture of substances used and the time taken to accumulate 25 cm^3 of gas evolved from each experiment.

Experiment	Mixture of substances	Time/s
I	25.0 cm^3 of hidrochloric acid 1.0 mole dm^{-3} + 2.0 g of magnesium strip.	50
II	25.0 cm^3 of hidrochloric acid 1.0 mole dm^{-3} + 2.0 g of magnesium strip + 3 drops of copper (II) sulphate solution.	30
III	12.5 cm^3 of sulphuric acid 1.0 mole dm^{-3} + 2.0 g of magnesium strip.	20

TABLE 2

(a) Sketch the graphs for the three experiments that show the liberation of 25.0 cm^3 of gas on the axes given.

[2 *marks*]

4(a)

(b) Why is the time taken to collect 25.0 cm^3 of gas in Experiment II is shorter than in Experiment I?

_____

[1 *mark*]

4(b)

For Examiner's Use

(c) Based on the collision theory, explain why the time taken to collect 25 cm^3 in Experiment III is shorter than in Experiment I.

_____

_____

_____

[3 *marks*]

4(c)

(d) Calculate the mass of magnesium that reacts with sulphuric acid to produce 25.0 cm^3 of gas in Experiment III.
Use the information that 1 mole of gas occupies a volume of 24 dm^3 at room temperature and pressure, relative atomic mass Mg = 24, H = 1, S = 32 and O = 16 .

[4 *marks*]

4(d)

Total

[**Lihat sebelah**

For Examiner's Use

5 Figure 5 shows the flow chart of a series of conversions related to alcohol Z .

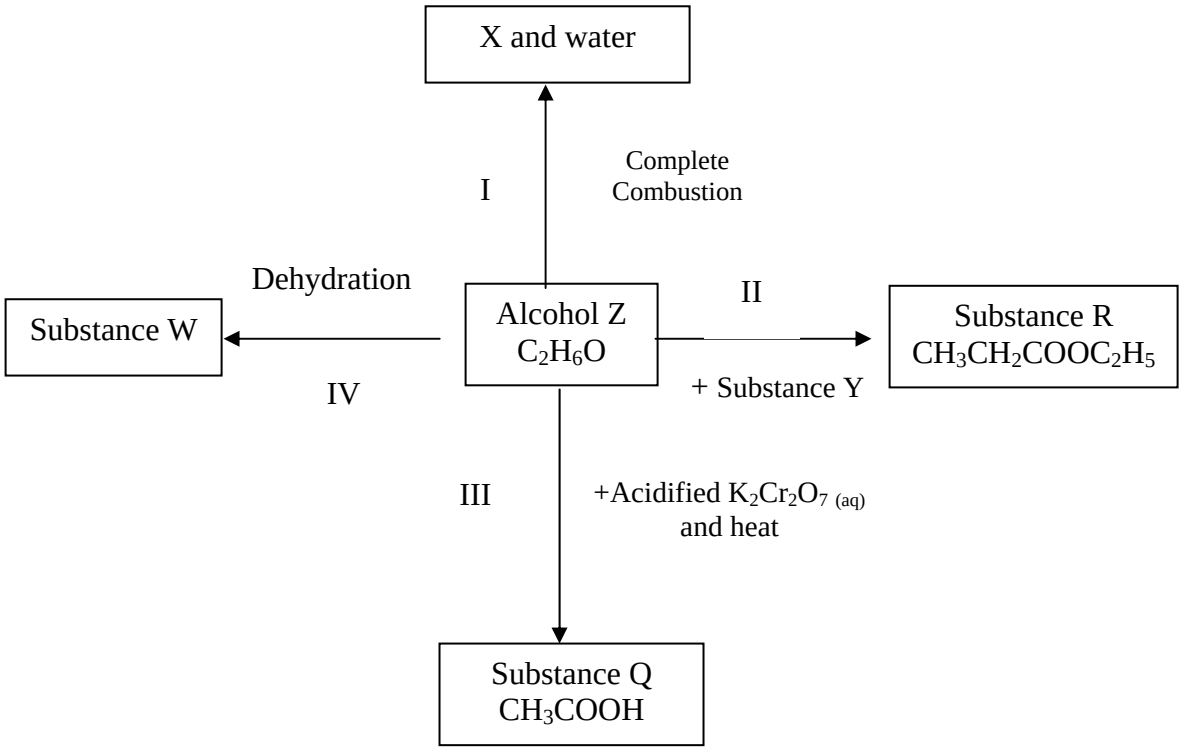


FIGURE 5

Based on Figure 5, answer the following questions :

(a) Name substance X?

_____

[1 *mark*]

5(a)

(b) Describe briefly the method of preparing substance R from alcohol Z in the laboratory.

_____

_____

_____

[3 *marks*]

5(b)

[**Lihat sebelah**

For Examiner's Use

(c) (i) What is observed in conversion III ?

_____

[1 *mark*]

5(c)(i)

(ii) Write a chemical equation for the reaction in conversion III.

_____

[1 *mark*]

5(c)(ii)

(d) (i) Draw the structural formula of substance W and name it.

[2 *marks*]

5(d)(i)

(ii) Draw the set- up of apparatus that can be used to obtain substance W from alcohol Z.

[2 *marks*]

5(d)(ii)

Total

For Examiner's Use

6 Figure 6 shows the set- up of apparatus to investigate the reactions that occur in cell A and cell B

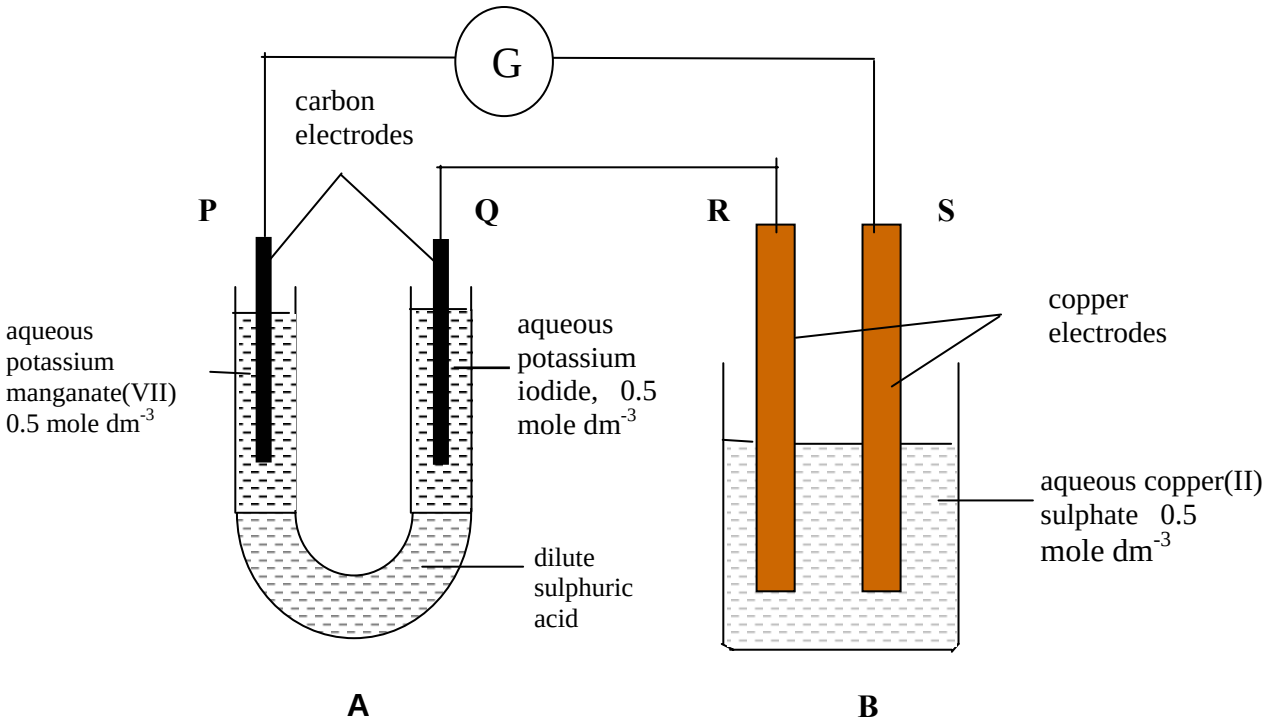


FIGURE 6

(a) Half-cell reaction in cell A is represented by a half-equation,

$MnO_4^- + 8H^+ + 5e \rightarrow Mn^{2+} + 4H_2O$

(i) State the energy change that occurs in cell A

_____

[1 *mark*] **6**(a)(i)

(ii) State **one** observation at Q electrode.

_____

_____

[1 *mark*] **6**(a)(ii)

(iii) Write the half equation for the reaction at Q electrode.

_____

[1 *mark*] **6**(a)(iii)

[**Lihat sebelah**

For Examiner's Use

(b) Refering to cell B;

(i) State one observation at R electrode

_____

[1 *mark*]

6(b)(i) ☐

(ii) What was observed in the change of intensity of blue aqeuous copper(II) sulphate? Explain your answer.

_____

_____

_____

[2 *marks*]

6(b)(ii) ☐

(iii) Write the overall equation for the reaction in cell B

_____

[1 *mark*]

6(b)(iii) ☐

(c) On Figure 6, mark the direction of electron flow between cells A and B

[1 *mark*]

6(c) ☐

(d) (i) What would be observed on the reading of the galvanometer if the experiment is repeated by replacing dilute sulphuric acid in cell A with tetrachloromethane?

_____

[1 *mark*]

6(d)(i) ☐

(ii) Give your reason for the answer given in d(i)

_____

_____

[1 *mark*]

6(d)(ii) ☐

(e) If copper electrodes R and S were replaced with carbon (graphite) electrodes, what could be observed at S electrode?

_____

[1 mark]

6(e) ☐

Total ☐

[**Lihat sebelah**

Section B

[20 *marks*]

Answer any **one** *question from this section.*
The time sugessted to complete this **section** *is 30 minutes*

1 Table 1 shows the pH values of two different types of acid.

Types of acid	Concentration of acid	pH value
Hidrochloric acid	0.1 mole dm^{-3}	1.0
Sulphuric acid	0.1 mole dm^{-3}	0.7

TABLE 1

(a) Explain why the pH value of both acids are different. [4 *marks*]

(b) 5 g of zinc sulphate salt is required to be prepared from the reaction between zinc metal with sulphuric acid of 0.5 mole dm^{-3}

(i) Write a chemical equation for the formation of zinc sulphate salt. [1 *mark*]

(ii) Calculate the minimum volume of sulphuric acid 0.5 mole dm^{-3} required to prepare the salt if excess zinc is used.
Use the information that the relative atomic mass of Zn = 65, S = 32, and O = 16 [3 *marks*]

(iii) Explain briefly how zinc sulphate crystals can be separated from the salt solution. [2 *marks*]

[Lihat sebelah

(c) Figure 1 shows 3 beakers containing three different salt solutions labeled X, Y and Z

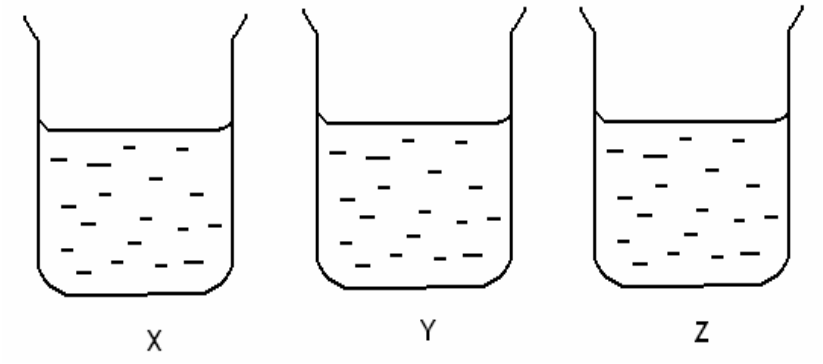


FIGURE 1

Three beakers labeled X, Y and Z may contained the following salt solutions

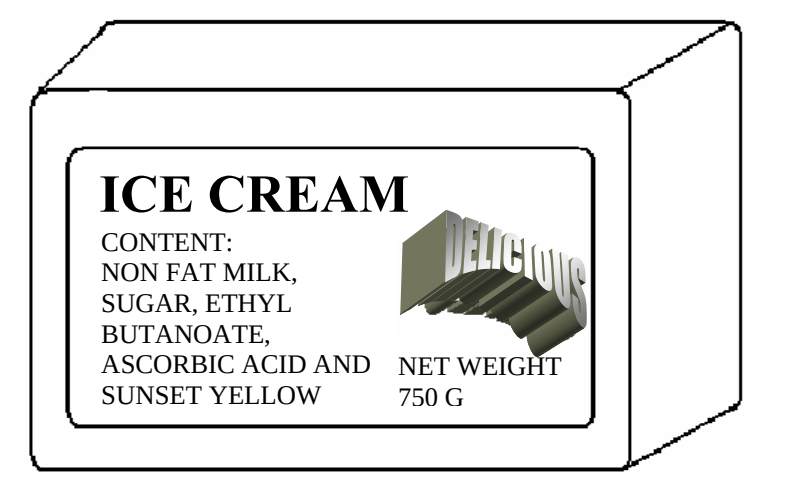
- Calcium nitrate
- Magnesium nitrate
- Magnesium chloride

You are provided only with ammonia and silver nitrate solutions.

Describe how you could differentiate between the 3 salt solutions by using the two provided reagents. Include your observations and conclusions.

[10 *marks*]

2 (a) Figure 2 shows the label found on an ice cream wrapper.



FIRURE 2

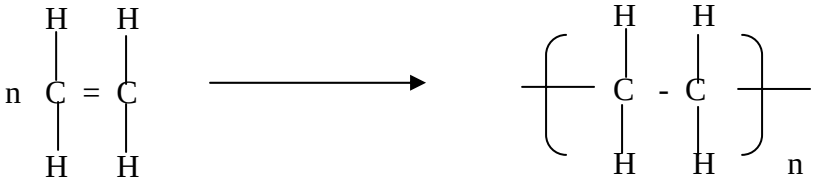
(i) Based on the label , explain briefly the function of ascorbic acid, sunset yellow and ethyl butanoate.

[3 *marks*]

(ii) Draw the structural formula for ethyl butanoate found in the ice – cream.

[1 *mark*]

(b) Polythene and polypropene are synthetic polymers widely used in daily life. The following chemical equation shows the polymerisation of ethene to polyethene



(i) Write the chemical equation for the polymerisation of propene to polyethene. [1 *mark*]

(ii) Explain the usage of synthetic polymer substances that can contribute towards the problems of enviromental polution.

[3 *marks*]

(iii) Suggest **two** ways how the problems in b(ii) could be reduced. [2 *marks*]

[Lihat sebelah

(c) The flow chart in Figure 3 shows how the production of four compounds derived from nitrogen that can be used as fertilizers.

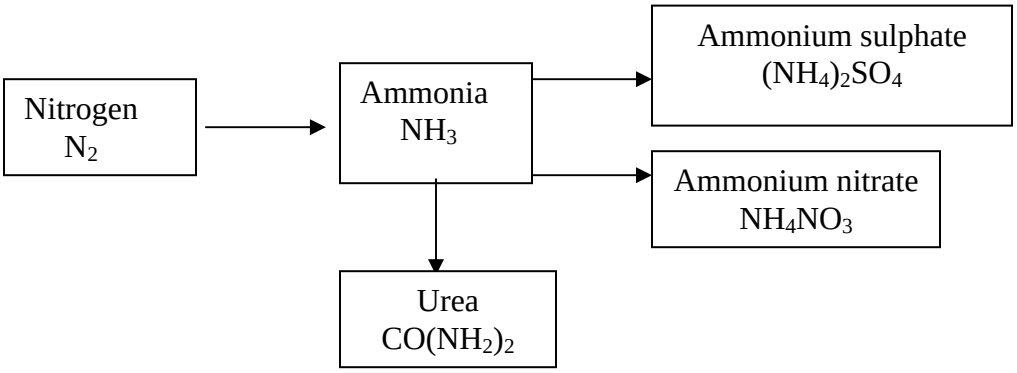


FIGURE 3

(i) State **two** reasons why ammonia is not suitable to be used directly as fertilizer.

[2 *marks*]

(ii) Compare the nitrogen content in ammonium sulphate , ammonium nitrate and urea.
Use the information that relative atomic mass N = 14, H = 1, O = 16, C=12, and S = 32

[3 *marks*]

(iii) Farmers neutralise the acidity of their agricultural soil by adding the alkaline calcium hydroxide. Why do calcium hydroxide and ammonium fertiliser are not suitable to be added to the soil at the same time?

[2 *marks*]

(iv) Explain briefly how to confirm the presence of ammonium ions in a solution of ammonium fertilizer.

[3 *marks*]

[Lihat sebelah

Section C

[20 marks]

Answer any **one** *question from this section.*
The time suggested to complete this **section** *is 30 minutes.*

3 (a) Figure 4 shows a tyre of a vehicle developed from vulcanized natural rubber.

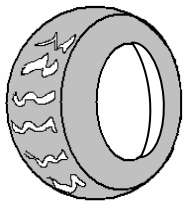


FIGURE 4

(i) Explain why vulcanization process can change the structure of natural rubber.

[2 *marks*]

(ii) Compare the characteristics of nonvalcanized natural rubber with valcanized natural rubber.

[2 *marks*]

[Lihat sebelah

(b) Table 2 shows the result of 2 experiments to differentiate between oil A and oil B

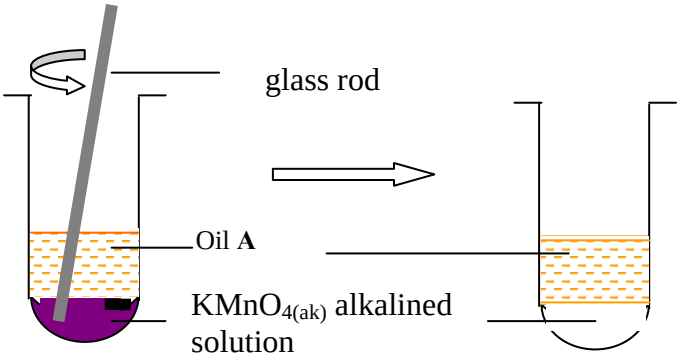
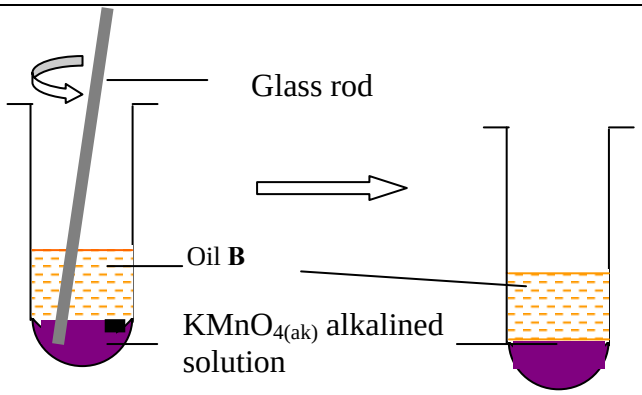
Experiment	Observation
	Purple colour decolourised to become colourless
	Purple colour doesn't change

TABLE 2

(b) (i) Name the types of oil present in oil A and oil B. [1 *mark*]

(ii) Based on the observation above , compare and contrast between oil A and oil B. In your answer include the possible example for each of the oil.

[5 *marks*]

(c) Sugar cane juice can be processed to produce fuel that is renewable and nature friendly. Describe an experiment to produce the fuel. In your discription include

- Substance required
- Procedure to carry out the experiment
- Confirmation test on the yield formed [10 *marks*]

[Lihat sebelah

4 Table 3 shows examples of chemical reactions.

	Reaction	ΔH value
I	Combustion of ethanol in excess oxygen	-1376 kJ/mole
II	Combustion of propanol in excess oxygen	- 2015 kJ/mole
III	Dissociation of calcium carbonate	+ 570 kJ/mole

TABLE 3

(a) (i) Write the thermochemical equations of reaction I and III.

[2 *marks*]

(ii) Explain why does the heat of combustion of ethanol is different compared to propanol

[2 *marks*]

(b) State the differences between reaction I and reaction III based on the information above. [6 *marks*]

(c) Describe an experiment to determine the heat of combustion of ethanol, in your explanation include the following.

- Diagram of the apparatus
- List of reagents and apparatus used
- Procedure
- Precautionary steps taken.

[10 *marks*]

END OF QUESTION PAPER

Untuk Kegunaan Pemeriksa / For examiner's use

RUANGAN JAWAPAN / SPACE FOR YOUR ANSWERS

Bahagian/Section: …… **No. Soalan/Question No: ……**

Untuk Kegunaan Pemeriksa / For examiner's use

Bahagian/Section: …… **No. Soalan/Question No: ……**

Untuk Kegunaan Pemeriksa / For examiner's use

Bahagian/Section: …… **No. Soalan/Question No: ……**

Untuk Kegunaan Pemeriksa / For examiner's use

Bahagian/Section: …… No. Soalan/Question No: ……

Untuk Kegunaan Pemeriksa / For examiner's use

Bahagian/Section: …… **No. Soalan/Question No: ……**

Nama: …… **Kelas: ……**

SULIT
4541/3
Kimia
Kertas 3
September
2005

1½ jam

4541/3

MAKTAB RENDAH SAINS MARA

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2005

http://cikguadura.wordpress.com/

KIMIA

Kertas 3

Satu jam tiga puluh minit

4541/3

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan kelas anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan di halaman kiri adalah dalam bahasa Melayu. Soalan di halaman kanan adalah yang sepadan dalam bahasa Inggeris.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Melayu atau bahasa Inggeris.*
5. *Calon dikehendaki membaca maklumat di halaman 2 atau halaman 3.*

Untuk Kegunaan Pemeriksa		
Soalan	Markah Penuh	Markah Diperoleh
1	9	
2	24	
3	Respons 15	
	Laporan 2	
Jumlah	50	

Kertas soalan ini mengandungi 24 halaman bercetak

[Lihat sebelah
SULIT

INFORMATION FOR CANDIDATES

1. *This question paper consists of three questions. Answer* **all** *questions.*

2. *Write your answers for* **Question 1** *and* **Question 2** *in the spaces provided in the question paper.*

3. *Write your answers for* **Question 3** *on the lined pages at the end of the question paper in detail. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.*

4. *Show your working, it may help you to get marks.*

5. *If you wish to cancel any answer, neatly cross out the answer.*

6. *The diagrams in the questions are not drawn to scale unless stated.*

7. *Marks allocated for each question or part question are shown in brackets.*

8. *The time suggested to complete* **Question 1** *and* **Question 2** *is 45 minutes and* **Question 3** *is 45 minutes.*

9. *You may use a non-programmable scientific calculator.*

10. *Hand in all your answer sheets at the end of the examination.*

Marks awarded:

Score	Description
3	**Excellent**: The best response
2	**Satisfactory**: An average response
1	**Weak**: An inaccurate response
0	No response *or* wrong response

Answer **all** *questions.*
The time suggested to complete **Question 1** *and* **Question 2** *is 45 minutes.*

1 A student carried out an experiment to estimate the size of an oil particle , ***t*** cm. The steps and set - up of apparatus of the experiment are shown in Figure 1.

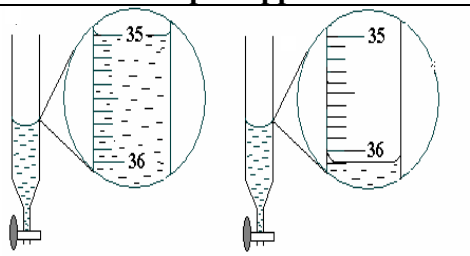
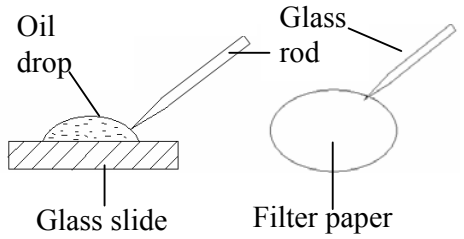
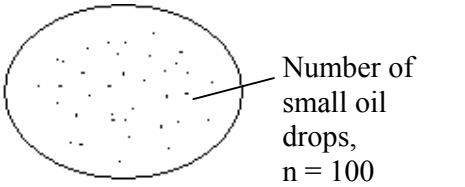
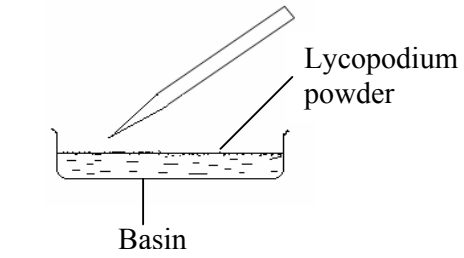
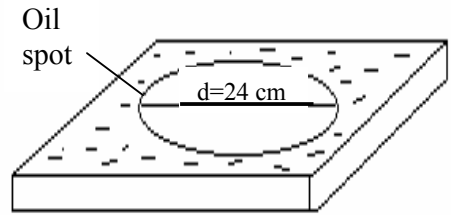
Step of experiment	Set – up of apparatus
1. The volume of 50 oil drops is determined.	 Initial reading Final reading
2. An oil drop from the burette is placed on a glass slide. A glass rod with a fine end is dipped into the oil drop and transferred to a piece of filter paper.	
3. The step is repeated until all the oil drop is transferred. The number of small oil drops is recorded (n).	
4. The glass rod with a fine end is dipped into the oil drop and is touched on to the water surface covered with lycopodium powder.	
5. The diameter of the oil spot is measured immediately (d).	

FIGURE 1

[Lihat sebelah

For Examiner's Use

(a) Record the following readings :

Initial reading of burette: _____ cm^3

Final reading of burette: _____ cm^3

[3 *marks*]

1(a)

(b) Complete the following table:

(i) Determine the volume of one drop of oil.	
(ii) Determine the volume of a tiny drop of oil.	
(iii) Determine the size of an oil particle (***t***). ($\pi = 3.142$)	

1(b)

[3 *marks*]

(c) Another student excessively sprinkle the lycopodium powder on the water surface. What is the effect on the estimated size of the oil molecule obtained, and state your reason.

1(c)

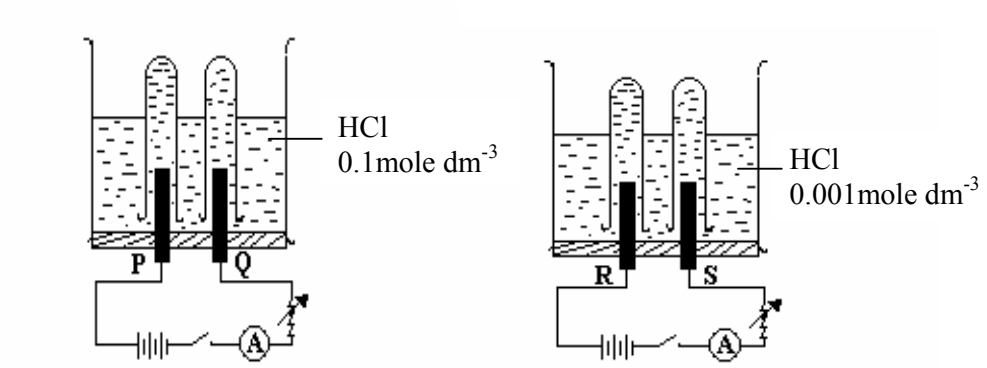
Total

[3 *marks*]

[Lihat sebelah

2 Figure 2 shows the set – up of apparatus of two experiments to investigate the effect of electrolyte concentration on the products of electrolysis.
In Experiment I, 0.1 mole dm^{-3} of hydrochloric acid is used while in Experiment II, 0.001 mole dm^{-3} of hydrochloric acid is used.

For Examiner's Use



Electrolysis of HCl 0.1 mole dm^{-3} **Experiment I**

Electrolysis of HCl 0.001 mole dm^{-3} **Experiment II**

FIGURE 2

(a) State the variables involved in this experiment.

Manipulated variable

_____

Responding variable

_____

Controlled variable

_____

[3 *marks*]

2(a)

(b) State the hypothesis for the experiment.

_____

_____

[3 *marks*]

2(b)

[Lihat sebelah

(c) Construct a table and categorise the ions that are attracted to the anode and the cathode for both experiments.

For Examiner's Use

2(c)

[3 *marks*]

(d) **Complete** and **label** the diagram in Figure 3 to show the volume of the gases evolved at electrodes R and S, 5 minutes after the experiments took place .

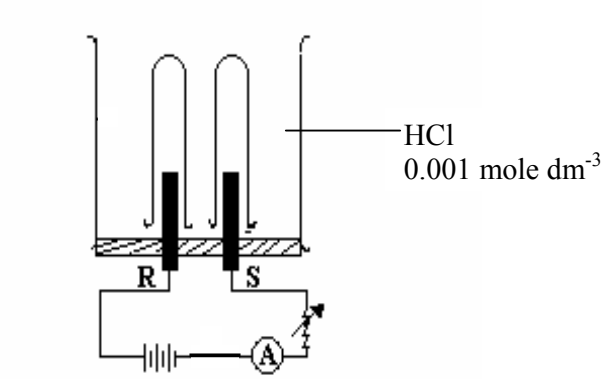


FIGURE 3

2(d)

[3 *marks*]

[Lihat sebelah

(e) Write the half ionic equations for the reactions that occurred at the electrodes P,Q and R in Experiments I and II.

For Examiner's Use

Experiment I:

Electrode	Half ionic equation
P	
Q	

Experiment II

Electrode	Half ionic equation
R	
S	$2H^+ + 2e \rightarrow H_2$

2(e)

[3 *marks*]

(f) What is the inference that can be deduced based on the answers in (e)?

_____

_____

_____

2(f)

[3 *marks*]

(g)

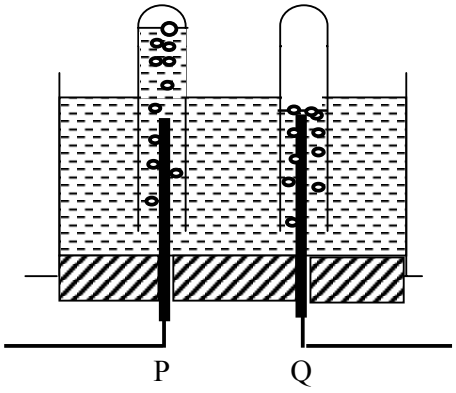


Diagram shows part of the apparatus set up for Experiment 1, two minutes after the circuit was connected. State your observation.

_____

_____

2(g)

[3 *marks*]

[Lihat sebelah

(h) 2 cm^3 of potassium iodide solution 1.0 mole dm^{-3} is added to the gas that was collected at electrode P and then the mixture is shaken.
The observation obtained is shown in Figure 4.

For Examiner's Use

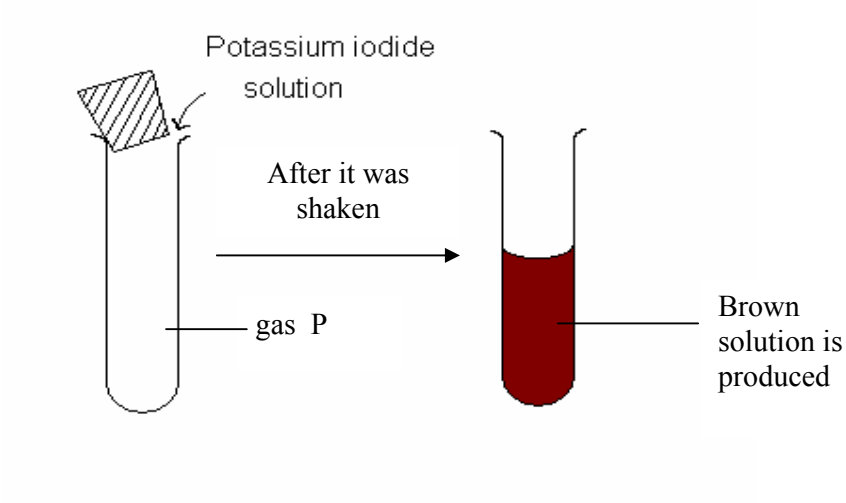


FIGURE 4

Based on the changes that has occured, explain the chemical property of the gas that was evolved at electrode P.

_____

_____

_____

[3 *marks*]

2(h)

Total

[Lihat sebelah

3

The neutralization reaction between sodium hydroxide and hydrochloric acid releases 57 kJ $mole^{-1}$ of heat while the neutralization reaction between sodium hydroxide and ethanoic acid releases 55 kJ $mole^{-1}$ of heat.

Based on the above statement, you are required to design an experiment to determine and compare the heat of neutralization between sodium hydroxide and a named strong acid and a weak acid.

In designing your experiment it must include the following items:

(a) Problem statement

(b) Statement of hypothesis

(c) Lists of substances and apparatus

(d) Procedure of the experiment

(e) Tabulation of data

[17 *marks*]

END OF QUESTION PAPER

RUANG UNTUK JAWAPAN / SPACE FOR ANSWER

Bahagian/Section:……. **No. Soalan/Question No.:…….**

Untuk Kegunaan Pemeriksa/ For Examiner's Use

Bahagian/Section: ……. **No. Soalan/Question No. :……**

Untuk Kegunaan Pemeriksa/ For Examiner's Use

Bahagian/Section:……. **No. Soalan/Queation No. :…….**

Untuk Kegunaan Pemeriksa/ For Examiner's Use

Untuk Kegunaan Pemeriksa/ For Examiner's Use

Bahagian/Section: ……. **No. Soalan/Question No. : …….**

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Untuk Kegunaan Pemeriksa/ For Examiner's Use

[Lihat sebelah

Untuk Kegunaan Pemeriksa/ For Examiner's Use

Bahagian/Section: ……. **No. Soalan/Question No. :……**