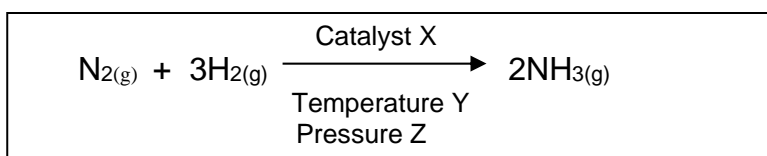


SMK ROSLI DHOBY SIBU
CHEMISTRY 4541 / 1
SPM TRIAL EXAM
PAPER 1
1 HOUR AND 15 MINUTES

Instruction: For Question 1 to Question 50, each question is followed by four options, **A, B, C** and **D**. Choose **one** correct answer for each question.

1. Which of the following statement is true for one mole of a substance?
- A 1 mole of copper contains more particles than 1 mole of water
 B 1 mole of oxygen gas contains 6.02×10^{23} atoms
 C 1 mole of water contains the same number of atoms as in 12 g of carbon-12
 D 1 mole of carbon dioxide contains the same number of molecules as the number of atoms in 12 g of carbon-12

2. The chemical equation shows the reaction of the Haber process.



Which of the following represent catalyst X, temperature Y and pressure Z?

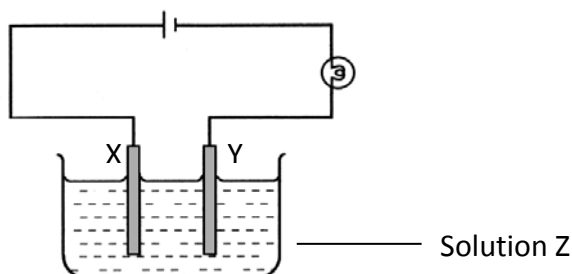
	Catalyst X	Temperature Y / °C	Pressure Z / atm
A	Iron	200	1
B	Iron	450	200
C	Platinum	900	450
D	Vanadium(V) Oxide	450	200

3. Which of the following homologous series and its functional group are correctly paired?

	Homologous Series	Functional group
I	Ester	$\begin{array}{c} \text{O} \\ \\ -\text{C}-\text{O}- \end{array}$
II	Alkane	$-\text{C}=\text{C}-$
III	Alcohol	$\begin{array}{c} \\ -\text{C}-\text{OH} \\ \end{array}$
IV	Carboxylic acid	$\begin{array}{c} \text{O} \\ \\ -\text{C}-\text{O}-\text{H} \end{array}$

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

4. Which of the following causes alkaline properties of ammonia aqueous solution?
- A Hydrogen ion
 B Hydroxide ion
 C Ammonium ion
 D Ammonia molecules
5. The diagram shows the set-up of the apparatus used for the purification of a metal through electrolysis.



Which of the following combinations is suitable to be used for the purification of copper metal?

	Electrode X	Electrode Y	Solution Z
A	Pure copper	Impure copper	Copper(II) nitrate
B	Impure copper	Pure copper	Copper (II) carbonate
C	Pure copper	Impure copper	Sulphuric acid
D	Impure copper	Pure copper	Copper(II) sulphate

6. Which of the following salts is prepared using double decomposition reaction?
- A Copper(II) sulphate
 B Magnesium nitrate
 C Lead(II) chloride
 D Potassium carbonate

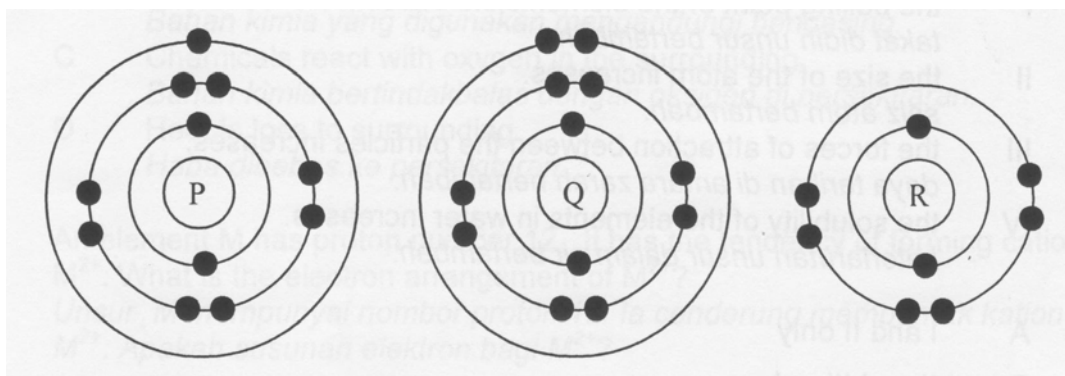
7.

Atom Q Electron arrangement = 2.8.5 Number of neutrons = 16

Based on the information given above, what is the nucleon number of atom Q?

- A 30
 B 31
 C 33
 D 35

8. The diagram below shows the electron arrangement of atoms P, Q and R.



R can react with P and Q to form two different compounds. What are the formulae of the compounds formed?

	<u>P and R</u>	<u>Q and R</u>
A	P ₂ R	QR ₂
B	P ₂ R	QR
C	PR	QR ₂
D	PR ₂	QR ₃

9. Which of the following statements are true to show the differences between 0.1 mol dm⁻³ of hydrochloric acid and 0.1 mol dm⁻³ ethanoic acid?

- I pH value of hydrochloric acid is lower than pH value of ethanoic acid
- II Concentration of hydrogen ion in hydrochloric acid is lower compared with ethanoic acid
- III The degree of dissociation of hydrochloric acid in water is higher than ethanoic acid
- IV Hydrochloric acid can react with magnesium while ethanoic acid cannot.

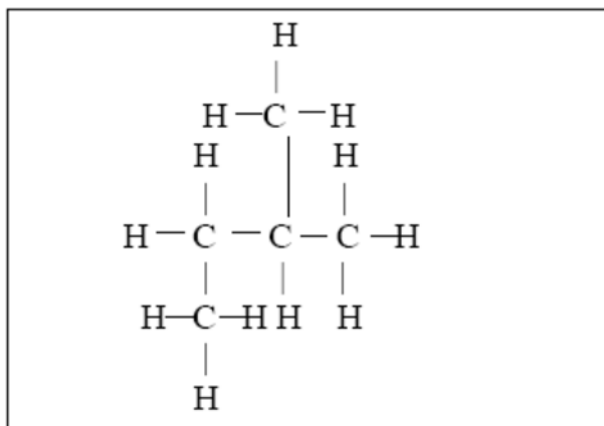
- A I and III only
- B II and IV only
- C I, III and IV only
- D II, III and IV only

10. The rate of decomposition of hydrogen peroxide solution is increased by adding a little manganese(IV) oxide as a catalyst.

Which of the following is the role of catalyst to increase the rate of reaction?

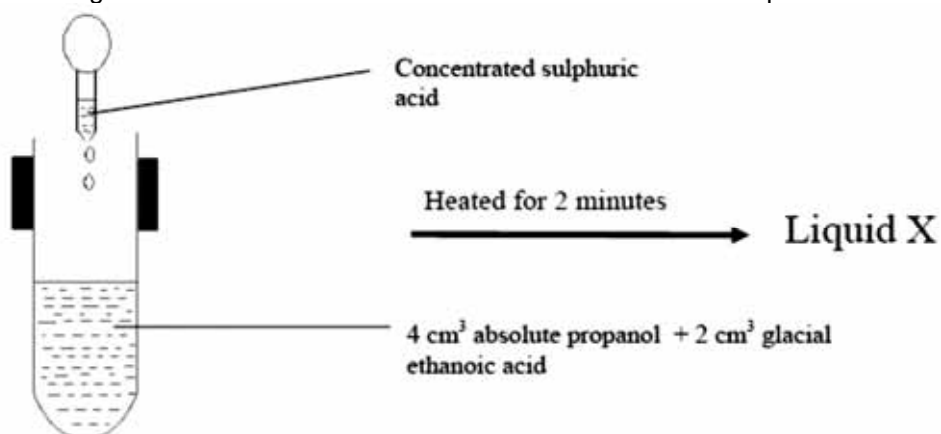
- A It lowers the level of activation energy in the reaction
- B It increase the kinetic energy of the reacting particles
- C It increase the total surface area of the reacting particles
- D It increase the number of collision per second in the reaction

11. The diagram shows the structural formulae of compound X

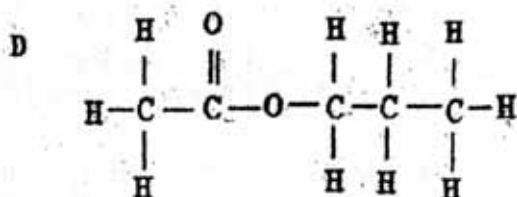
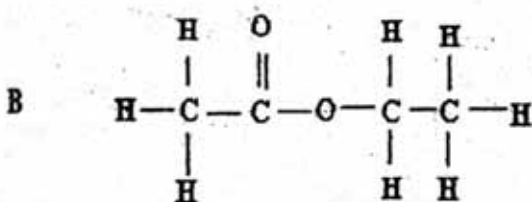
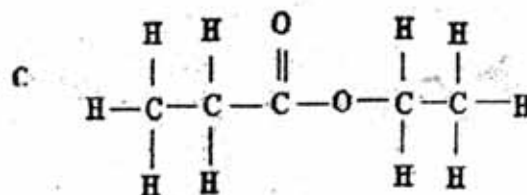
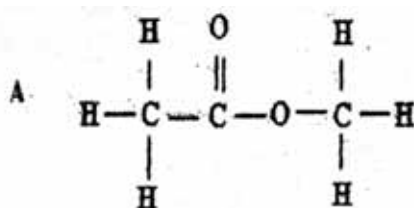


Which of the following is the IUPAC name of this compound?

- A 2-methylbutane
 B 3-methylbutane
 C 1,2-dimethylpropane
 D 2,4-dimethylpropane
12. The diagram shows a chemical reaction to form sweet scented liquid X.



Which of the following structural formula represents the liquid X?



13. The melting point and boiling point of substance M is $-37\text{ }^{\circ}\text{C}$ and $5\text{ }^{\circ}\text{C}$ respectively. The physical state of substance M at room temperature is
- A gas
 B liquid
 C solid
 D gas and liquid
14. The diagram shows the position of elements W, X, Y and Z in the periodic table. W, X, Y and Z are not the actual symbol of the elements.

Which of the following atom has electron arrangement 2.8.6?

- A W
 B X
 C Y
 D Z
15. X, Y and Z are the elements in the same period in the Periodic Table.

Element	Characteristic of oxide
X	Acidic
Y	Basic
Z	Amphoteric

Which of the following is the arrangement of the elements X, Y and Z in order of increasing proton number?

- A $X \rightarrow Y \rightarrow Z$
 B $Y \rightarrow X \rightarrow Z$
 C $X \rightarrow Z \rightarrow Y$
 D $Y \rightarrow Z \rightarrow X$
16. Reaction I : $X_{(s)} + Y^{2+}_{(aq)} \rightarrow X^{2+}_{(aq)} + Y_{(s)}$
 Reaction II : $Z_{(s)} + X^{2+}_{(aq)} \rightarrow Z^{2+}_{(aq)} + X_{(s)}$

The equation above shows the displacement reaction among metal X, Y and Z, Which of the following is true about the reaction?

- A X and Y are more reactive than Z
 B X and Z are strong oxidising agent
 C The arrangement in an descending order according to their electropositivity is Z, X, Y
 D No reaction happen when metal Z is immersed in a solution of Y salt
17. In which of the chemical reactions releases heat to the surroundings?
- A Dissolving potassium nitrate salt in water
 B Dissolving ammonium chloride in water
 C Adding calcium carbonate to nitric acid
 D Adding sodium hydrogen carbonate to hydrochloric acid

18. The table shows two elements and their respective relative atomic masses. These letters not represent the actual symbol of the elements.

Element	Relative atomic mass
X	12
Y	6

Which of the following is true about atoms X and Y?

- A The mass of 1 mol of atom X is 12 g and the mass of 1 mol of atom Y is 6 g
 B The number of moles of 12 g of X is twice than the number of moles in 6 g atom Y
 C The mass of 1 mol of atom X is half of the mass of 1 mol of atom Y
 D 12 g of atom X has the same the number of particles in 12 g of atom Y
19. Which of the following is a property of potassium chloride?
- A Volatile
 B Insoluble in water
 C Has a high boiling point and low melting point
 D Conducts electricity in the molten state

20. Which of the following pairs is correct?

	<u>Type of modern medicine</u>	<u>Example</u>
A	Analgesic	Streptomycin
B	Antibiotic	Penicillin
C	Psychotherapeutic	Codeine
D	Hormone	Barbiturate

21. What is used by a diabetic patient to replace sugar in his cofee?

- A Acacia gum
 B Aspartame
 C Sodium benzoate
 D Monosodium glutamate

22. The table shows the number of protons, neutrons and electrons for particles F and G.

Particle	Number of protons	Number of neutrons
F	12	12
G	19	20

Which of the following is true about particles F and G?

- A The mass of one atom F is 24 g
 B The nucleon number of atom G is 37
 C The number of electrons of particle F is 10 and the number of electrons of particle G is 18
 D The number of valence electrons of particle F is 2 and the number of valence electron of particle G is 1
23. Which of the following statements is true showing the difference between soda lime glass and borosilicate glass?

	<u>Soda lime glass</u>	<u>Borosilicate glass</u>
A	Low thermal expansion coefficient	High thermal expansion coefficient
B	Transparent to visible light	Not transparent to visible light
C	Does not withstand heating	Heat-resistant
D	Electrical insulator	Electrical conductor

24. Which of the following particles contain 10 electrons?
[Proton number : Ne=10, Na=11, Mg=12]

I Na
II Ne
III Na⁺
IV Mg²⁺

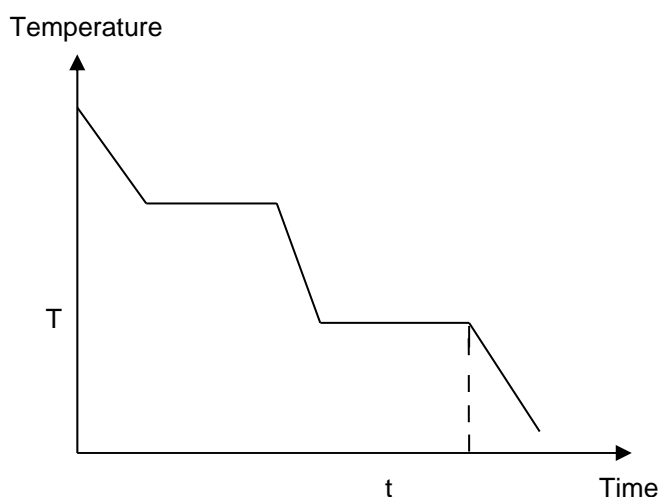
A I, II and III only
B I, II and IV only
C I, III and IV only
D II, III and IV only

25. 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

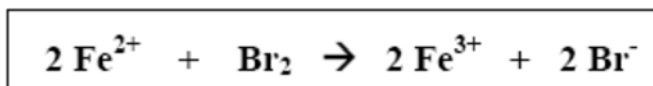
A I and II only
B III and IV only
C I, II and III only
D II, III and IV only

26. The diagram shows the graph obtained during cooling of pure substance that was heated until gas. Which of the process occurred at temperature, T and the physical state at time, t?



	<u>Process at temperature T</u>	<u>Physical state at time t</u>
A	Boiling	Gas and liquid
B	Condensation	Gas and liquid
C	Freezing	Liquid and solid
D	Sublimation	Liquid and solid

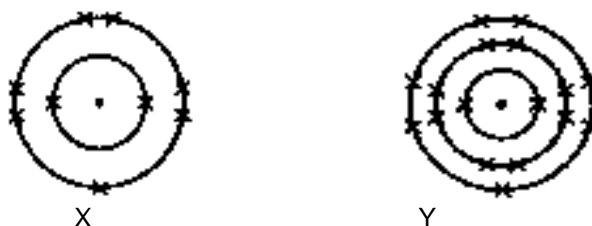
27. The following ionic equation represents a redox reaction.



Which of the following statements is true?

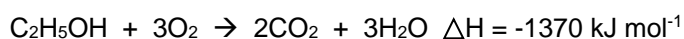
A Iron(II) ion is the reducing agent
B Bromine has been oxidized
C The oxidation number of bromine increases
D Iron(II) ion gains electron

28. The table shows the diagram of electron arrangement of elements X and Y. X and Y are not the actual symbols of the elements.



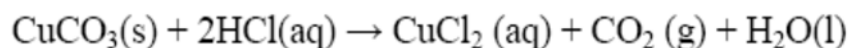
Which statements are true about elements X and Y?

- I X and Y exists as diatomic molecules
 II Y is more reactive than X
 III X has a higher melting point than Y
 IV Elements X and Y are in the same group in the Periodic Table
- A I and IV only
 B II and IV only
 C I, II and III only
 D II, III and IV only
29. The heat of combustion of ethanol is 1370 kJ mol^{-1} . The chemical reaction is given in the equation below.



If 6.9 g of ethanol is burnt in excess oxygen, how much is the heat released?
 [Relative atomic mass: C=12, H=1, O=16]

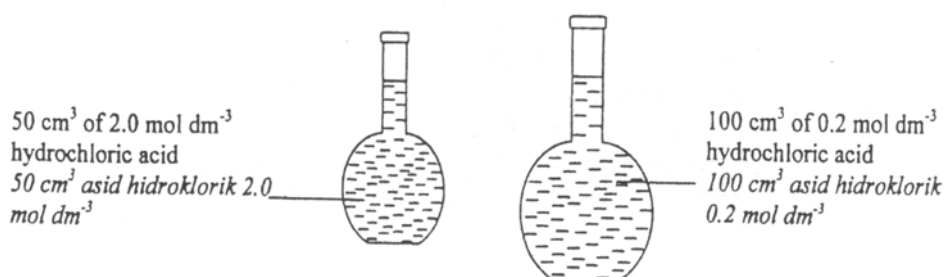
- A 198.69 kJ C 9459.9 kJ
 B 205.5 kJ D 27400 kJ
30. The following equation shows the reaction between copper(II) carbonate and hydrochloric acid.



6.2 g of copper(II) carbonate is added to 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid. What is the mass of copper(II) carbonate left at the end of the reaction?
 [Relative atomic mass: Cu=64, C=12, O=16]

- A 0.8 g
 B 3.1 g
 C 3.9 g
 D 6.2 g
31. Which of the underlined elements has the highest oxidation number?
- A K₂Cr₂O₇
 B FeCl₃
 C PbCl₄
 D Cu₂O

32. Which reagent is used to confirm the present of Fe^{2+} ion in the solution?
- A Nessler reagent
 B Potassium iodide solution
 C Potassium hexacyanoferrate(III) solution
 D Acidified potassium manganate(VII) solution
33. Which of the following is a use of sodium-24 isotope?
- A Determine the age of fossil
 B Diagnose thyroid problems
 C Kill cancer cells
 D Detect the leakage of gas pipes
34. When 1.0 mol dm^{-3} of sodium nitrate solution is electrolysed using carbon electrodes, what is formed at cathode?
- A Hydrogen gas
 B Oxygen gas
 C Sodium atom
 D Nitrogen dioxide gas
35. The diagram shows two volumetric flask containing 2.0 mol dm^{-3} of hydrochloric acid and 0.2 mol dm^{-3} hydrochloric acid.



What is the volume of 2.0 mol dm^{-3} hydrochloric acid needed to prepare 100 cm^3 of 0.2 mol dm^{-3} hydrochloric acid?

- A 5.0 cm^3
 B 10.0 cm^3
 C 15.0 cm^3
 D 20.0 cm^3
36. Which compound has the correct formula?

	Compound	Formula
A	Barium hydroxide	BaOH
B	Lead(II) oxide	PbO_2
C	Magnesium sulphate	$\text{Mg}(\text{SO}_4)_2$
D	Silver carbonate	Ag_2CO_3

37. What is the number of hydrogen atom in 1 mole of water?
 [Avogadro constant : $6.02 \times 10^{23} \text{ mol}^{-1}$]
- A 6.02×10^{22}
 B 3.01×10^{23}
 C 6.02×10^{23}
 D 1.204×10^{24}

38. The diagram shows a racing car. The body of the car is made of substance M.

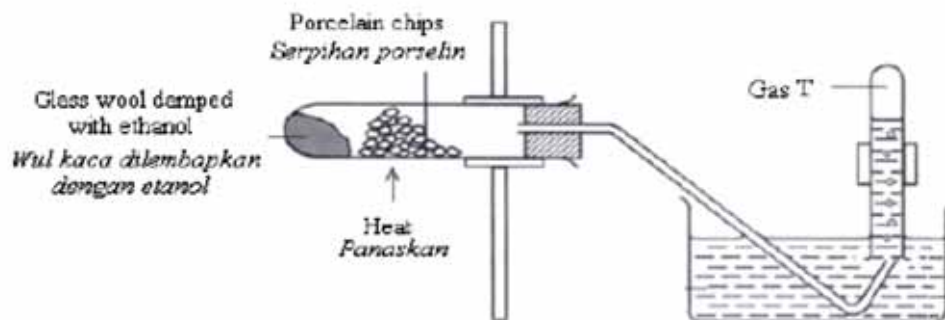


Substance M has the following properties:

- strong
- light
- withstand high temperature
- flexible with a high tensile strength

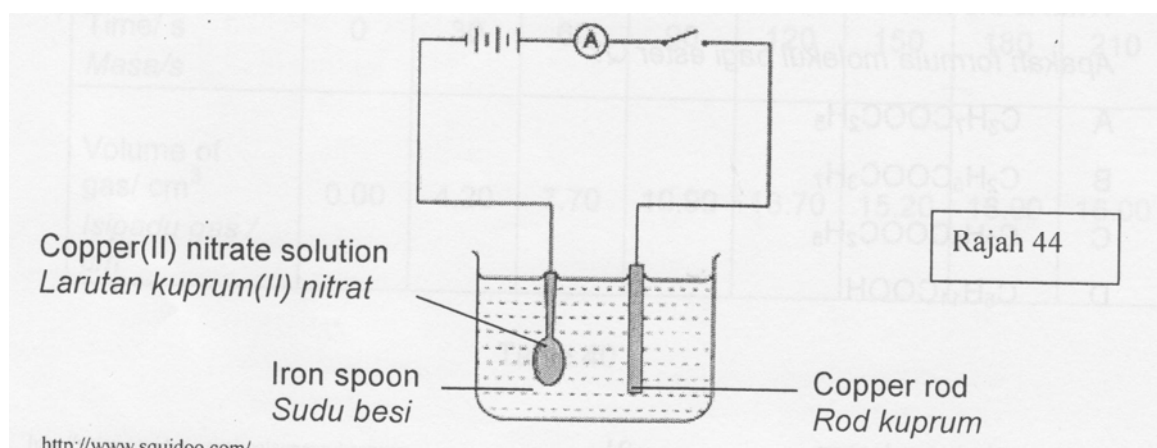
Which of the following is substance M?

- A Ceramic
 B Alloy
 C Polymer
 D Composite material
39. The diagram shows the apparatus set-up used to prepare gas T.



Which of the following is the characteristic of gas T?

- A Greenish yellow in colour
 B Change damp blue litmus to red
 C Decolourised brown colour of bromine water
 D Changes orange colour of acidified potassium dichromate(VI) to green
40. An iron spoon is electroplated. The apparatus used is shown in the diagram.



Which of the following is the correct half-equations occurred at the anode and at the cathode?

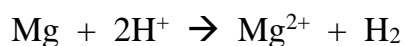
	Anode	Cathode
A	$\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$	$\text{Fe} + 2\text{e}^- \rightarrow \text{Fe}^{2+}$
B	$4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$	$\text{Fe}^{2+} + 2\text{e}^- \rightarrow \text{Fe}$
C	$\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$	$\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$
D	$4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$	$2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$

41. The table shows the reading of a voltmeter for each pair of metals which are immersed in an electrolyte to form a simple voltaic cell.

Positive terminal	Negative terminal	Reading of the voltmeter/V
P	Q	1.05
R	Q	0.42
S	R	0.51

From the results, what is the reading of the voltmeter of a voltaic cell that consists of a pair of P and S metals?

- A 0.12 V
 B 0.63 V
 C 0.93 V
 D 1.98 V
42. Reduction of 7.55 g of oxide of metal M yields 5.95 g of M metal. Determine the empirical formula of oxide of metal M. [Relative atomic mass : M =119, O=16]
- A MO
 B MO₂
 C M₂O
 D M₂O₃
43. 0.36 g of magnesium reacts with excess sulphuric acid to produce hydrogen gas. The ionic equation for the reaction is :



Calculate the volume of hydrogen gas released in this reaction.

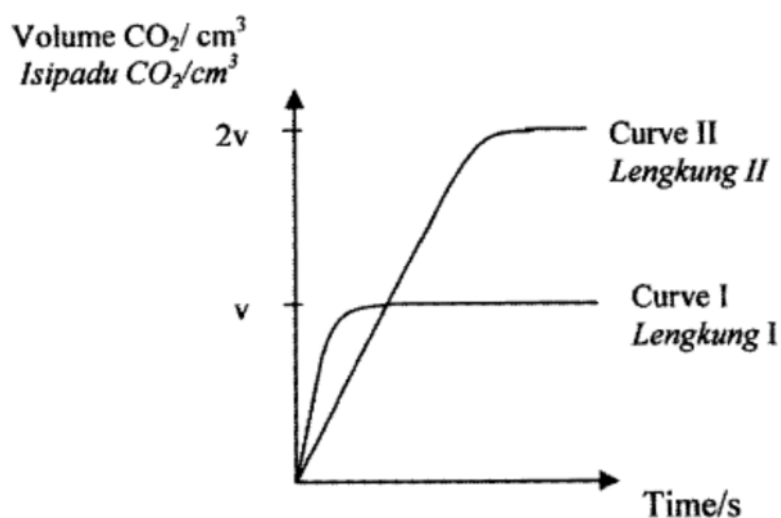
[Relative atomic mass of Mg=24, 1 mol of gas occupies 24 dm³ at room temperature]

- A 150 cm³
 B 180 cm³
 C 360 cm³
 D 720 cm³
- 44.
- | | |
|-----|--|
| I | $\text{CH}_4 + \text{Cl}_2 \xrightarrow{uv} \text{CH}_3\text{Cl} + \text{HCl}$ |
| II | $\text{C}_2\text{H}_4 + \text{Br}_2 \longrightarrow \text{C}_2\text{H}_4\text{Br}_2$ |
| III | $\text{C}_2\text{H}_5\text{OH} \xrightarrow{\text{porcelain}} \text{C}_2\text{H}_4 + \text{H}_2\text{O}$ |

The reaction I, II and III shown above is

	I	II	III
A	Substitution	Addition	Dehydration
B	Substitution	Oxidation	Dehydration
C	Addition	Substitution	Oxidation
D	Chlorination	Addition	Hydration

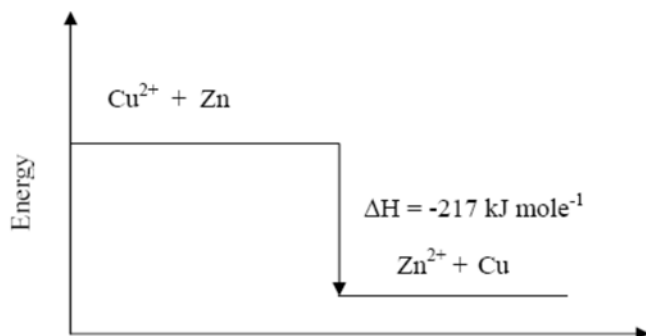
45. Latex can be kept in liquid state so that it can be transported to factories by adding ...
- A ethanoic acid
 B formic acid
 C aqueous ammonia
 D ammonium sulphate
46. The curve II in the diagram produced from a reaction between 5 g of powdered marble with 100 cm³ of hydrochloric acid 0.5 mol dm⁻³.



Which of the following reaction will produce curve I?

- A 5 g of marble chip is added to 100 cm³ hydrochloric acid 1 mol dm⁻³
 B 5 g of powdered marble is added to 100 cm³ hydrochloric acid 1 mol dm⁻³
 C 5 g of marble chip is added to 50 cm³ hydrochloric acid 2 mol dm⁻³
 D 5 g of powdered marble is added to 25 cm³ hydrochloric acid 1 mol dm⁻³
47. Which of the following is a characteristic of a catalyst?
- A It changes the amount of products in the reaction
 B Chemically unchanged at the end of the reaction
 C Equal amount of catalyst and reactants are needed for the reaction
 D The mass of the catalyst decreases at the end of the reaction

48. An experiment is carried out by adding excess of zinc powder to 50 cm³ copper(II) sulphate 0.25 mol dm⁻³. The diagram shows the energy level diagram for the displacement reaction of copper by zinc.



Calculate the change in temperature in this experiment?
[Specific heat capacity of solution = 4.2 J g⁻¹ °C⁻¹]

- A 12.9 °C
B 10.3 °C
C 9.6 °C
D 1.2 °C
49. The table shows the total volume of oxygen, collected in the decomposition of hydrogen peroxide catalyzed by manganese(IV) oxide.

Time (min)	0	1	2	3	4
Volume of gas(cm ³)	0	12.20	20.60	28.70	36.60

What is the average rate of reaction during the second minute?

- A 0.13 cm³s⁻¹
B 0.14 cm³s⁻¹
C 0.17 cm³s⁻¹
D 0.20 cm³s⁻¹
50. The periodic table founded by Dmitri Mendeleev based on
- A metal and non-metals
B increasing atomic mass
C increasing number proton
D increasing number of electron

Prepared by:
MR.CHAI TECK KHIONG
2012

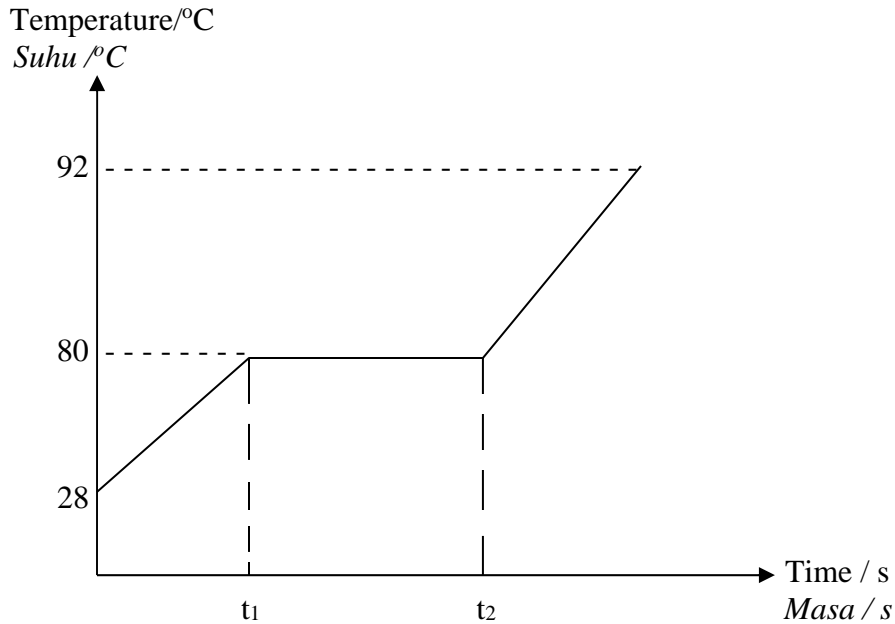
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MDM WONG LAI SIENG
HEAD OF CHEMISTRY DEPARMENT

Section A

[60 marks]

Answer **all** the questions in this section.

1. Graph 1 shows the temperature against time when solid P is heated.
Graf 1 menunjukkan suhu melawan masa bagi pemanasan pepejal P.

**Graph 1**

- (a) Based on the graph 1, answer the following questions.
Berdasarkan graf 1, jawab soalan-soalan berikut.

(i) What is meant by melting point?

Apakah yang dimaksudkan dengan takat lebur?

.....

[1 mark]

(ii) State the melting point of substance P.

Nyatakan takat lebur bahan P.

.....

[1 mark]

(iii) State the physical state of P from time t_1 to t_2 .

Nyatakan keadaan fizik P dari masa t_1 hingga t_2 .

.....

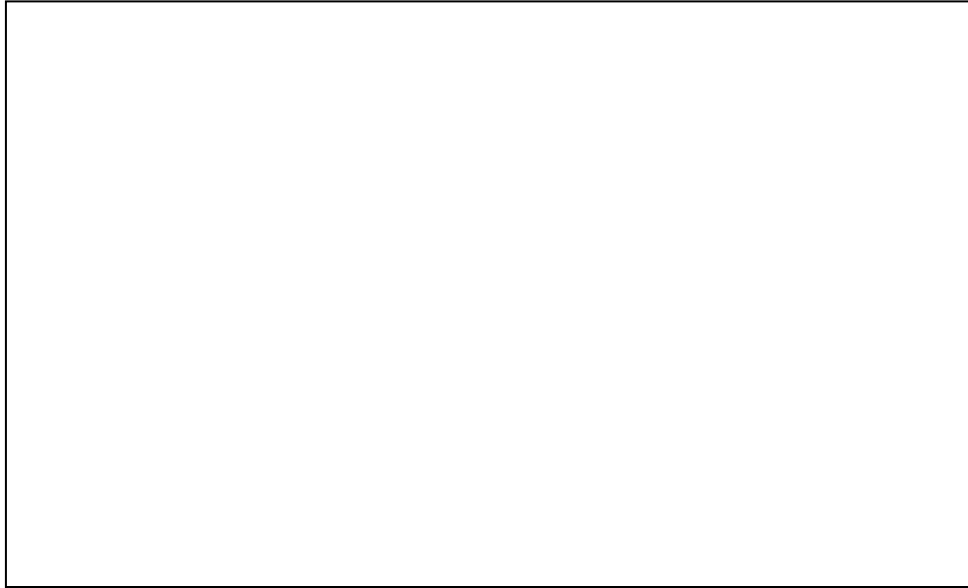
[1 mark]

- (iv) Explain why temperature remains constant from time t_1 to t_2 .
Terangkan mengapa suhu tidak berubah dari masa t_1 hingga t_2 .

.....

[2 marks]

- (v) Substance P is a flammable. Draw a labelled diagram to show the set-up of apparatus to determine the melting point of substance P.
Bahan P adalah mudah terbakar. Lukiskan sebuah gambar rajah berlabel yang menunjukkan susunan radas untuk menentukan takat lebur bahan P.



[2 marks]

- (b) When solid iodine is heated, it changes to purple vapour.
Apabila pepejal iodin dipanaskan, ia bertukar ke wap ungu.

- (i) Name the process involved.
Namakan proses yang terlibat.

.....
 [1 mark]

- (ii) Name **one** isotope of iodine and state its use.
*Namakan **satu** isotop untuk iodin dan nyatakan kegunaannya.*

.....
 [2 marks]

2. (a) In a close container, contains 6.0 dm^3 of carbon dioxide gas at room temperature.
Di dalam suatu bekas tertutup, terdapat 6.0 dm^3 gas karbon dioksida pada suhu bilik.
- (i) How many molecules are there in 6.0 dm^3 of carbon dioxide gas, CO_2 ?
Berapakah bilangan molekul yang terdapat dalam 6.0 dm^3 gas karbon dioksida .
 [1 mol of gas occupies 24 dm^3 at room temperature,
 Avogadro constant = $6.02 \times 10^{23} \text{ mol}^{-1}$]

[2 marks]

- (ii) Calculate the mass of carbon dioxide gas in the container.
Hitungkan jisim gas karbon dioksida di dalam bekas itu.
 [Relative molecular mass for $\text{CO}_2 = 44$]

[1 mark]

- (b) Diagram 2 shows the set-up of apparatus for an experiment to determine the empirical formula of magnesium oxide.
Rajah 2 menunjukkan susunan radas bagi satu eksperimen untuk menentukan formula empirik magnesium oksida.

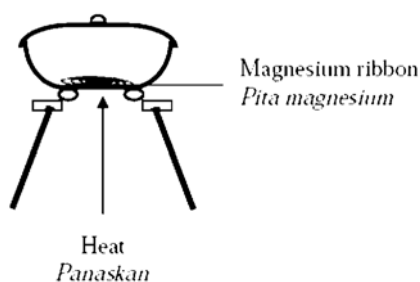


Diagram 2

Table 2 shows the results of this experiment.
Jadual 2 menunjukkan keputusan eksperimen ini.

Description <i>Penerangan</i>	Mass (g) <i>Jisim (g)</i>
Mass of crucible + lid <i>Jisim mangkuk pijar + penutup</i>	34.0
Mass of crucible + lid + magnesium ribbon <i>Jisim mangkuk pijar + penutup + pita magnesium</i>	36.4
Mass of crucible + lid + magnesium oxide <i>Jisim mangkuk pijar + penutup + magnesium oksida</i>	38.0

Table 2

- (i) What is the meaning of empirical formula?

Apakah maksud formula empirik?

.....

.....

[1 mark]

- (ii) Based on the table 2, determine the empirical formula of magnesium oxide by completing the table below.

Berdasarkan jadual 1, tentukan formula empirik magnesium oksida dengan menengkapkan jadual di bawah.

[Relative atomic mass: Mg=24, O=16]

Element	Magnesium, Mg	Oxygen, O
Mass (g) <i>Jisim (g)</i>	2.4
Number of moles <i>Bilangan mol</i>
Ratio of moles of atom <i>Nisbah mol atom</i>	1	1
Empirical formula <i>Formula empirik</i>	

[3 marks]

- (iii) Why was the crucible lid opened once in a while during the experiment?

Mengapakah penutup mangkuk pijar dibuka sekali sekala semasa eksperimen dijalankan?

.....

[1 mark]

- (iv) When carrying out experiment, how to ensure the metal is burnt completely?

Semasa menjalankan eksperimen ini, bagaimanakah memastikan logam itu terbakar dengan lengkapnya?

.....

.....

[2 marks]

3. A student was carried out three experiments to investigate one factor which influence the rate of reaction between zinc and hydrochloric acid.

Table 3.1 shows the results of the experiments.

Seorang pelajar telah menjalankan tiga eksperimen untuk mengkaji satu faktor yang mempengaruhi kadar tindak balas antara zink dan asid hidroklorik.

Jadual 3.1 menunjukkan keputusan eksperimen itu.

Experiment <i>Eksperimen</i>	I	II
Reactants <i>Bahan tindak balas</i>	6.5 g of zinc granules and 50 cm ³ of 0.2 mol dm ⁻³ hydrochloric acid <i>6.5 g ketulan zink dengan 50 cm³ 0.2 mol dm⁻³ asid hidroklorik</i>	6.5 g of zinc powder and 50 cm ³ of 0.2 mol dm ⁻³ hydrochloric acid <i>6.5 g serbuk zink dengan 50 cm³ 0.2 mol dm⁻³ asid hidroklorik</i>
Time taken for the maximum volume of gas collected (min) <i>Masa yang diambil untuk mengumpul isi padu maksimum gas (min)</i>	10.0	5.0
Observation when the reaction stopped. <i>Pemerhatian apabila tindak balas berhenti.</i>	Some zinc is left unreacted <i>Sedikit zink tertinggal tidak bertindak balas</i>	Some zinc is left unreacted <i>Sedikit zink tertinggal tidak bertindak balas</i>

Table 3.1

- (a) Write the chemical equation for the reaction between zinc and hydrochloric acid.
Tuliskan persamaan kimia bagi tindak balas antara zink dengan asid hidroklorik.

.....

[2 marks]

- (b) (i) Calculate the maximum volume of gas collected in Experiment II.
[Molar gas volume: 24 dm³ mol⁻¹ at room condition]
Hitungkan isi padu maksimum gas yang dikumpulkan dalam Eksperimen II.

[2 marks]

- (ii) Calculate the average rate of reaction for Experiment II in cm³s⁻¹.
Hitungkan kadar tindak balas purata bagi Eksperimen II dalam cm³s⁻¹.

[1 mark]

- (c) Using the collision theory, explain how of this factor increases the rate of reaction.
Terangkan dari segi teori perlanggaran bagaimana faktor ini meningkatkan kadar tindak balas.

.....

.....

.....

.....

[3 marks]

- (d) Volume of gas/ cm³
Isipadu gas/cm³

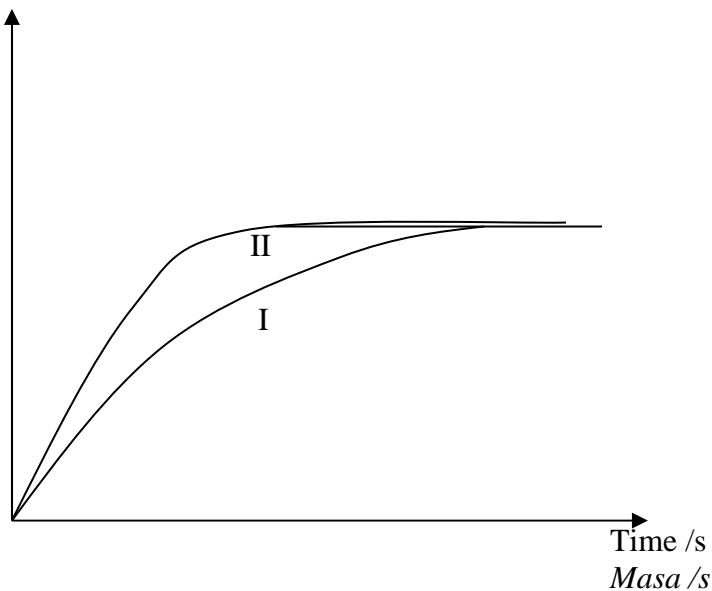


Diagram 3.2

- (i) Why the final volume of gas obtained in experiment I and II are the same.
Mengapakah isipadu akhir gas yang terhasil dalam eksperimen I dan II adalah sama?

.....

[1 mark]

- (ii) The experiment is repeated by using 6.5 g zinc powder and 50 cm³ of 0.4 mol dm⁻³ hydrochloric acid.

Sketch the graph for this experiment on the same axes in the diagram 3.2.
Eksperimen diulangi dengan menggunakan 6.5 g serbuk zink dan 50 cm³ asid hidroklorik 0.4 mol dm⁻³.

Lakarkan graf dengan menggunakan paksi yang sama dalam rajah 3.2.

[1 mark]

4. Diagram 4 shows the apparatus set-up of an experiment to investigate the reactions that take place in test tubes A, B and C.

Rajah 4 menunjukkan susunan radas eksperimen untuk mengkaji tindak balas yang berlaku dalam tabung uji A, B dan C.

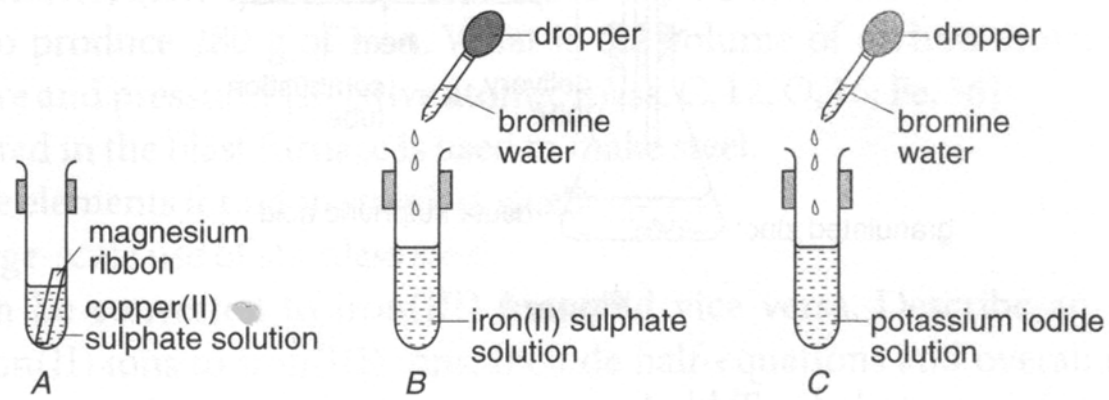


Diagram 4

- (a) Referring to the reaction that takes place in test tube A,
Merujuk kepada tindak balas yang berlaku pada tabung uji A,
- (i) State **two** observations for the reaction occurred in the test tube.
*Nyatakan **dua** pemerhatian bagi tindak balas yang berlaku pada tabung uji tersebut.*
-
-
- [2 marks]
- (ii) Write the complete ionic equation for the reaction.
Tuliskan persamaan ion yang lengkap bagi tindak balas tersebut.
-
- [1 mark]
- (b) Referring to the reaction that takes place in test tube B,
Merujuk kepada tindak balas yang berlaku pada tabung uji B,
- (i) What is the change in the oxidation number of iron?
Apakah perubahan nombor pengoksidaan ferum?
-
- [1 mark]
- (ii) Write half-equation to represent for the reaction that takes place in (b) (i).
Tuliskan persamaan setengah untuk menunjukkan tindak balas yang berlaku di (b) (i).
-
- [1 mark]

- (iii) What is the function of bromine water?
Apakah fungsi air bromin?

.....
[1 mark]

- (c) Referring to the reaction that takes place in test tube C,
Merujuk kepada tindak balas yang berlaku pada tabung uji C,

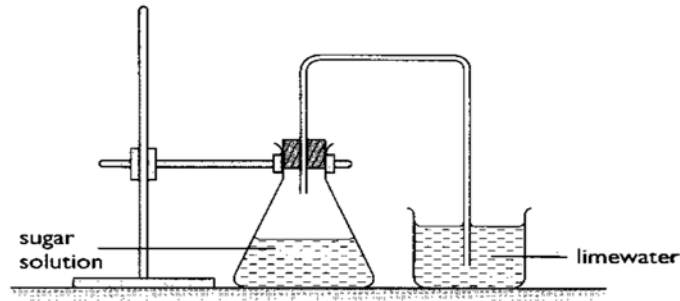
- (i) What is the colour change of the potassium iodide solution in the test tube when bromine water is added?
Apakah perubahan warna pada larutan kalium iodida di dalam tabung uji itu selepas air bromin ditambahkan ke dalam tabung uji.

.....
[1 mark]

- (ii) Name the product formed in the reaction that causes the colour change. Describe a confirmatory test to verify the product formed.
Namakan hasil yang terbentuk. Nyatakan ujian pengesahan bagi hasil yang terbentuk.

.....
.....
.....
[3 marks]

5. (a) The following apparatus shows fermentation process to produce ethanol from sugar.
Susunan radas itu menunjukkan proses penapaian untuk menghasilkan etanol daripada larutan gula.



- (i) Name a substance needs to be added into the sugar solution for the fermentation to occur.

Namakan bahan yang perlu ditambahkan kepada larutan gula untuk penapaian berlaku.

.....

[1 mark]

- (ii) Write a balanced chemical equation to represent this reaction.

Tuliskan persamaan kimia yang seimbang untuk mewakili tindak balas ini.

.....

[2 marks]

- (iii) Suggest a method to produce pure ethanol from this reaction.

Cadangkan satu kaedah yang dapat menghasilkan etanol tulen daripada tindak balas ini.

.....

[1 mark]

- (b) In an experiment, the complete combustion of 1.38 g of ethanol increases the temperature of 250 cm³ of water by 35°C. Determine the heat of combustion of ethanol.

[Relative atomic mass: C = 12, O = 16, H = 1]

[Specific heat capacity of solution = 4.2 J g⁻¹ °C⁻¹; Density of solution = 1 g cm⁻³]

Dalam satu eksperimen, pembakaran lengkap 1.38 g etanol menaikkan suhu 250 cm³ air sebanyak 35°C. Tentukan haba pembakaran bagi etanol itu.

[Jisim atom relatif: C = 12, O = 16, H = 1]

[Muatan haba tentu larutan = 4.2 J g⁻¹ °C⁻¹; Ketumpatan larutan = 1 g cm⁻³]

[3 marks]

- (b) Ethanol reacts with propanoic acid in the presence of concentrated sulphuric acid to produce an organic compound Y.

Etanol bertindak balas dengan asid propanoik dengan kehadiran asid sulfurik pekat untuk menghasilkan sebatian organik Y.

- (i) Name the homologous series to which compound Y belongs to.

Namakan siri homolog bagi sebatian Y.

.....

[1 mark]

- (ii) Draw the structural formula of compound Y.

Lukiskan formula struktur bagi sebatian Y.

[1 mark]

- (iii) State **one** physical property of compound Y produced which differ from ethanol and propanoic acid.

Nyatakan satu sifat fizikal bagi sebatian Y yang dihasilkan berlainan daripada etanol dan asid propanoik.

.....

[1 mark]

6. (a) Diagram 6.1 and 6.2 shows two objects.
Rajah 6.1 dan 6.2 menunjukkan dua objek.

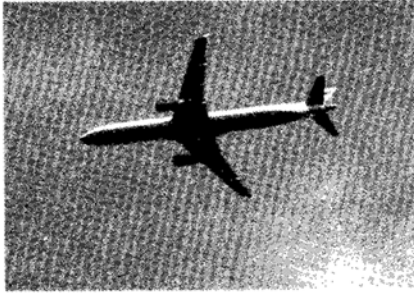


Diagram 6.1

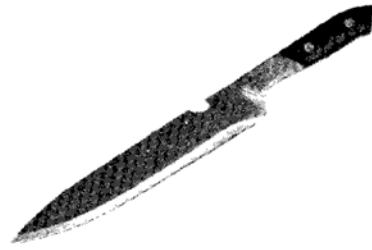


Diagram 6.2

- (i) Name the alloy used to make the objects in diagrams 6.1 and 6.2.
Namakan aloi yang digunakan untuk membuat objek di Rajah 6.1 dan 6.2.

Diagram 6.1 :

Diagram 6.2 :

[2 marks]

- (ii) State **one** specific property of the alloy used in diagrams 6.1 and 6.2.
*Nyatakan **satu** sifat spesifik aloi yang digunakan di rajah 6.1 and 6.2.*

Diagram 6.1 :

Diagram 6.2 :

[2 marks]

- (iii) Draw and label the arrangement of atoms in the alloy in diagram 6.1.
Lukis dan labelkan susunan atom dalam aloi di rajah 6.1.

[3 marks]

(b) Aspirin is one example of analgesic medicine.

Aspirin merupakan satu contoh ubat analgesik.

(i) What is the function of an analgesic?

Apakah fungsi analgesik?

.....
[1 mark]

(ii) Explain why gastric patient should not take aspirin.

Terangkan mengapa pesakit gastrik tidak boleh mengambil aspirin.

.....
[1 mark]

(iii) Suggest **one** medicine to replace aspirin.

*Cadangkan **satu** ubat yang boleh menggantikan aspirin.*

.....
[1 mark]

Section B

[20 marks]

Answer any **one** question only from this section
Jawab mana-mana satu soalan daripada bahagian ini

7. (a)

24 P $_{12}$

State the group and the period of element P in the Periodic Table of Elements.

Explain your answer.

Nyatakan kumpulan dan kala bagi unsur P dalam Jadual Berkala Unsur.

Terangkan jawapan anda.

[4 marks]

(b) Table 7.1 shows a group of 17 elements

Jadual 7.1 menunjukkan unsur-unsur kumpulan 17.

Element	Fluorine	Chlorine	Bromine	Iodine
Molecular formula	F ₂	Cl ₂	Br ₂	I ₂
Melting point (°C)	-220	-101	-7	114
Boiling point (°C)	-118	-35	59	184

Table 7.1

(i) Describe the changes in the melting and boiling points of group 17 elements when going down the group. Explain the difference.

Huraikan perubahan dalam takat lebur dan takat didih dalam unsur-unsur kumpulan 17 apabila menuruni kumpulan. Terangkan perbezaan tersebut.

[4 marks]

(ii) Compare the reactivity of elements chlorine and bromine in the reaction with water.

Explain your answer.

Bandingkan kereaktifan unsur klorin dan bromin dalam tindak balas dengan air?

Terangkan jawapan anda.

[5 marks]

(iii) Lithium reacts with chlorine gas to form an ionic compound.

With aid of labelled diagram, describe an experiment to prepare an ionic compound from the reaction between lithium and chlorine gas. Include a balanced chemical equation for the reaction.

Litium bertindak balas dengan gas klorin untuk membentuk sebatian ion.

Dengan bantuan gambar rajah berlabel, huraikan satu eksperimen untuk menyediakan satu sampel sebatian ion melalui tindak balas antara litium dengan gas klorin. Sertakan persamaan kimia yang terlibat.

[7 marks]

8. (a) Carbon can reduce oxide of metal M to form metal M. The metal M is located above iron in the reactivity series.

Suggest the identity of oxide of metal M and state an observation when the oxide of metal M you have named reacts with carbon.

Write a balanced chemical equation for the reaction occurred.

Karbon boleh menurunkan oksida logam M kepada logam M. Logam M adalah terletak di atas ferum dalam siri kereaktifan.

Cadangkan identiti oksida logam M dan nyatakan satu pemerhatian apabila oksida logam M yang anda namakan itu bertindak balas dengan karbon.

Tulis persamaan kimia yang seimbang untuk tindak balas yang berlaku.

[4 marks]

- (b) Diagram 8.1 shows an apparatus set-up to investigate the effect of two different metals, X and Y on the rusting of iron, Fe.

Rajah 8.1 menunjukkan susunan radas untuk mengkaji kesan dua logam, X dan Y yang berlainan ke atas pengaratan besi, Fe.

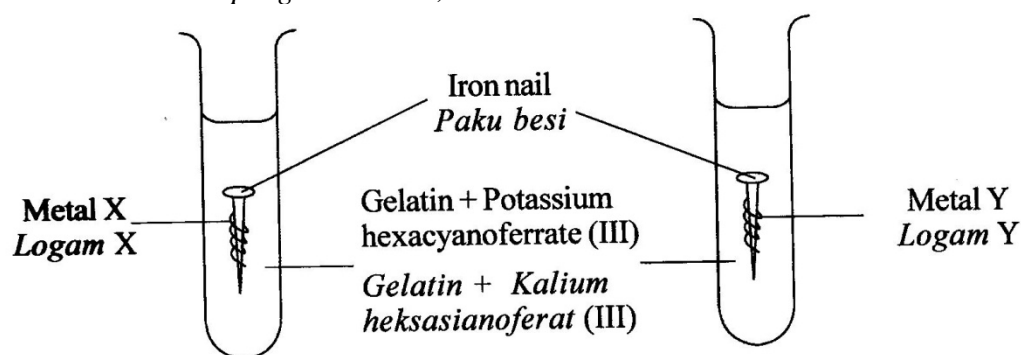


Diagram 8.1

The result of this experiment after three days is shown in Table 8.2

Keputusan eksperimen ini selepas tiga hari ditunjukkan dalam Jadual 8.2.

Pair of metals <i>Pasangan logam</i>	Observation <i>Pemerhatian</i>
Fe, X	Dark blue colour <i>Warna biru tua</i>
Fe, Y	No change <i>Tiada perubahan</i>

Jadual 8.2

Based on Table 8.2, suggest the identity of metals, X and Y.

Give two reasons for each of your choices.

Berdasarkan Jadual 8.2, cadangkan identiti logam, X dan Y.

Beri dua sebab untuk setiap pilihan anda.

[6 marks]

- (c) Diagram 8.3 shows the apparatus used to study transfer of electrons at a distance.
Rajah 8.3 menunjukkan radas yang digunakan untuk mengkaji pemindahan elektron pada suatu jarak

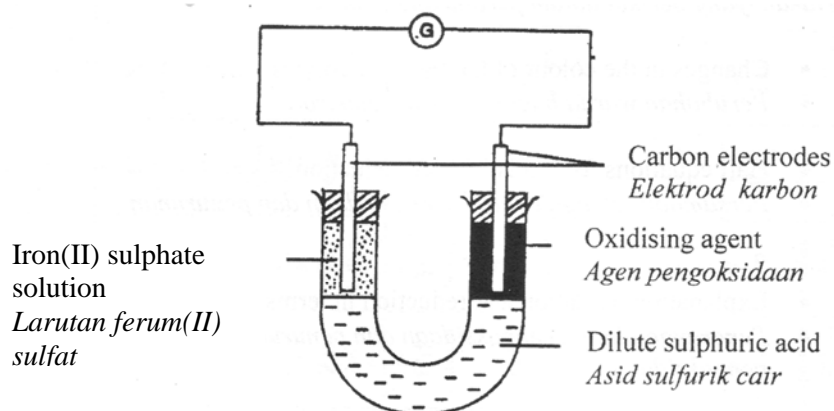


Diagram 8.3

By using a named of **one** suitable oxidizing agent, describe briefly the oxidation and reduction process for this experiment.

Dengan menamakan satu contoh agen pengoksidaan yang sesuai, huraikan tindak balas pengoksidaan dan penurunan untuk eksperimen ini.

Include the following in your discussion:

Sertakan yang berikut dalam perbincangan anda:

- Changes in the colour that can be observed after 20 minutes
Perubahan warna yang dapat diperhatikan selepas 20 minit
- Describe the oxidation and reduction process occurs in terms of transfer of electron
Huraikan proses pengoksidaan dan penurunan dari segi pemindahan elektron yang berlaku.
- Half-equations for oxidation and reduction
Setengah persamaan untuk pengoksidaan dan penurunan
- Describe a chemical test to confirm the product form at the negative terminal.
Huraikan satu ujian kimia untuk mengesahkan hasil yang terbentuk di kutub negatif.

[10 marks]

Section C

[20 marks]

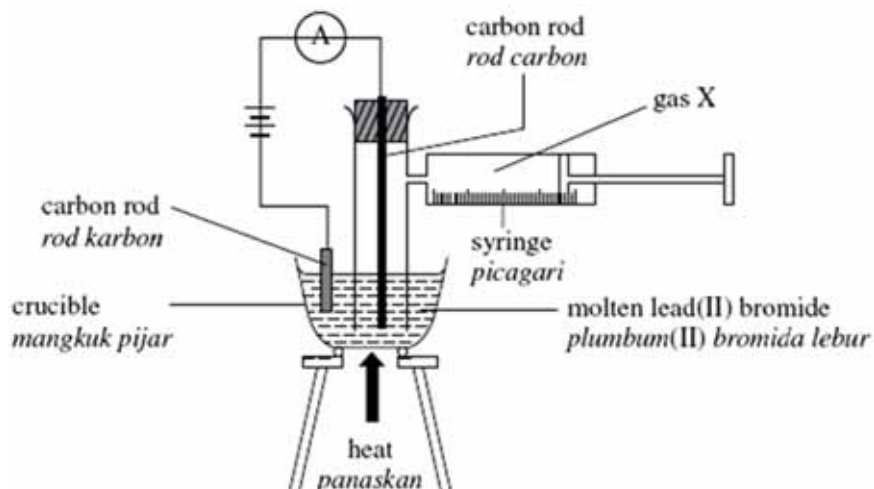
Answer **anyone** question only from this section.*Jawab mana-mana **satu** soalan*

9. (a) What is meant by 'electrolyte' and 'electrolysis'?

Apakah maksud 'elektrolisis' dan 'elektrolit'?

[2 marks]

- (b) Diagram 9 below shows the apparatus set up for the electrolysis molten lead(II) bromide.

Rajah 9 di bawah menunjukkan susunan radas bagi elektrolisis plumbum(II) bromida lebur.**Diagram 9**

What can be observed in this experiment? Describe the electrolysis process that occurs in diagram 9.

Apakah yang dapat diperhatikan dalam eksperiment tersebut? Huraikan proses elektrolisis yang berlaku di rajah 9.

[8 marks]

- (c) Magnesium and copper are two metals that can be used to build a simple voltaic cell. By using a suitable apparatus and chemical, describe how you can build the chemical cell. Include a labelled diagram in your answer and marks the direction of electron flow, the positive and negative terminal in your diagram.

Describe how the reaction in the cell can produce electrical energy.

Magnesium dan kuprum adalah dua logam yang digunakan untuk membina satu sel kimia ringkas. Dengan menggunakan radas dan bahan kimia yang sesuai, terangkan bagaimana anda boleh membina sel kimia itu. Masukkan satu rajah berlabel di dalam jawapan anda dan tandakan arah pengaliran electron, terminal positif dan terminal negatif dalam rajah anda.

Terangkan bagaimana tindak balas dalam sel kimia itu menghasilkan arus elektrik.

[10 marks]

10. (a) Diagram 10.1 show the energy level of Reaction I and Reaction II.
Rajah 10.1 menunjukkan aras tenaga bagi Tindak balas I dan Tindak balas II.

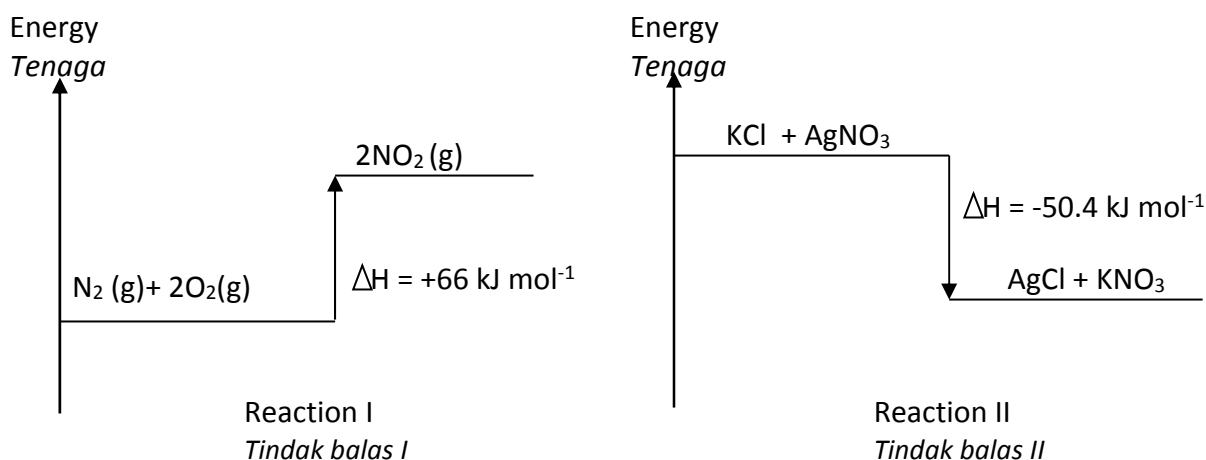


Diagram 10.1

Based on Diagram 10.1, compare the energy level diagram between Reaction I and Reaction II.

Berdasarkan Rajah 10.1, bandingkan gambar rajah aras tenaga antara Tindak balas I dan Tindak balas II.

[4 marks]

- (b) Table 10.2 shows the molecular formula and the heat of combustion for propanol and butanol.

Jadual 10 menunjukkan formula molekul dan haba pembakaran bagi propanol dan butanol

Alcohol <i>Alkohol</i>	Molecular Formula <i>Formula molekul</i>	Heat of combustion/ kJ mol^{-1} <i>Haba Pembakaran/ kJ mol^{-1}</i>
Propanol <i>Propanol</i>	$\text{C}_3\text{H}_7\text{OH}$	-2100
Butanol <i>Butanol</i>	$\text{C}_4\text{H}_9\text{OH}$	-2877

Table 10.2

Based on the information in Table 10.2, compare the heat of combustion between propanol and butanol. Explain why there is a difference in the values of the heat of combustion between propanol and butanol.

Berdasarkan maklumat dalam Jadual 10.2, bandingkan haba pembakaran di antara propanol dan butanol. Terangkan mengapa nilai haba pembakaran bagi propanol dan butanol berbeza.

[3 marks]

(c) By using a named example of an alcohol, describe a laboratory experiment to determine the heat of combustion. In your description, include the following aspects:

- Materials and apparatus needed
- Procedure of experiment
- A table to collect data
- Calculation method

[Relative atomic mass: C =12, O =16, H = 1]

[Specific heat capacity of solution = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$; Density of solution = 1 g cm^{-3}]

Dengan menggunakan satu contoh alkohol yang dinamakan, huraikan satu eksperimen makmal untuk menentukan haba pembakaran alkohol tersebut.

Dalam penerangan anda sertakan :

- *Bahan dan radas yang digunakan*
- *Prosedur eksperimen*
- *Penjadualan data*
- *Langkah-langkah pengiraan yang terlibat*

[Muatan haba tentu larutan = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$; Ketumpatan larutan = 1 g cm^{-3}]

[10 marks]

(d) In an experiment to determine the heat of displacement, excess zinc is added to 100 cm^3 of 0.5 mol dm^{-3} silver nitrate solution. Calculate the temperature change if the heat of displacement is -105 kJ mol^{-1} .

[Specific heat capacity of the solution = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$; Density of the solution = 1 g cm^{-3}]

Dalam eksperimen untuk menentukan haba penyesaran, zink berlebihan ditambahkan kepada 100 cm^3 0.5 mol dm^{-3} larutan argentum nitrat. Hitungkan perubahan suhu jika haba penyesaran dalam eksperimen itu ialah -105 kJ mol^{-1} .

[Muatan haba tentu larutan = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$; Ketumpatan larutan = 1 g cm^{-3}]

[3 marks]

END OF QUESTIONS

Prepared by :
Mr. Chai Teck Khiong
2012

Checked by:
.....
Mdm. Wong Lai Sieng
Head of Chemistry Department



SMK ROSLI DOHBY, SIBU

NAMA :

NO. KAD
PENGENALAN

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CHEMISTRY

PAPER 3

1 hour and 30 minutes

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 answer sheet. 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.

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

For Marker's use		
Marker's code :		
Question	Allocated marks	Score
1	24	
2	9	
3	17	
Total	50	

This question paper consists of 9 printed pages.

1. A student carried out an experiment to determine the concentration of hydrochloric acid used to react completely with 0.5 mol dm^{-3} of sodium hydroxide solution. Diagram 1.1 shows the set-up of apparatus for the experiment.

Satu eksperimen telah dijalankan untuk menentukan kepekatan asid hidroklorik yang diperlukan untuk bertindak balas lengkap dengan larutan natrium hidroksida 0.5 mol dm^{-3} .

Rajah 1.1 menunjukkan susunan radas bagi eksperimen itu.

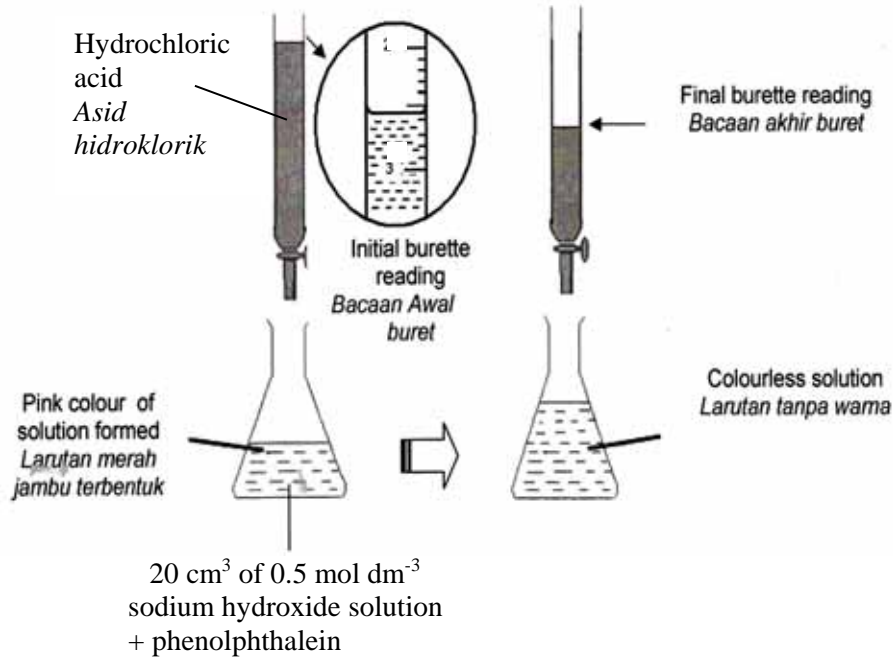
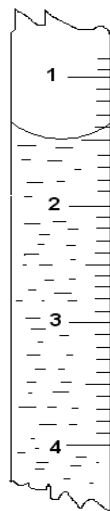


Diagram 1.1

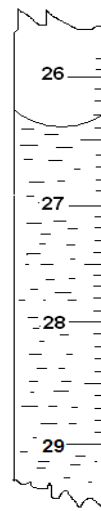
Diagram 1.2 shows the recorded burette readings for the three titrations.

Rajah 1.2 menunjukkan bacaan buret untuk tiga kali pentitratan.

Experiment I

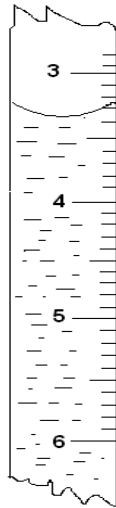


Initial reading cm^3
Bacaan awal

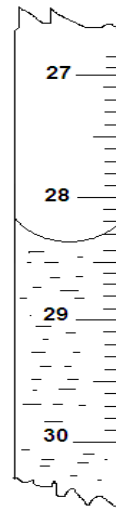


Final reading cm^3
Bacaan akhir

Experiment II

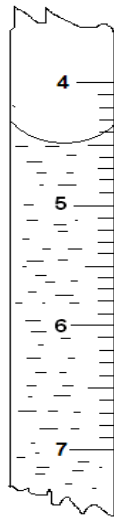


Initial readingcm³
Bacaan awal



Final reading cm³
Bacaan akhir

Experiment III



Initial reading cm³
Bacaan awal



Final reading cm³
Bacaan akhir

Diagram 1.2

- (a) Record the burette readings in the spaces provided in diagram 1.2
Catatkan bacaan buret pada ruang yang disediakan dalam rajah 1.2.

[3 marks]

1(a)

3	
---	--

- (b) Construct a table and record the initial burette reading, final burette reading and the volume of hydrochloric acid used for each titration.
Bina satu jadual dan rekodkan bacaan awal buret, bacaan akhir buret, dan isipadu asid hidroklorik yang digunakan untuk setiap titratan.

[3 marks]

1(b)

3	

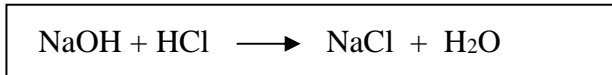
- (c) The addition of acid to the sodium hydroxide solution in the experiment is stopped when the end point of titration is achieved. Give the operational definition for the end point of titration.
Penambahan asid ke dalam larutan natrium hidroksida dihentikan serta-merta apabila takat akhir pentitratan tercapai. Nyatakan definisi secara operasi bagi takat akhir bagi eksperimen di atas.

[3 marks]

1(c)

3	

- (d) The chemical equation for the reaction is:
Persamaan kimia bagi tindak balas ini ialah



Calculate the concentration of hydrochloric acid used in the experiment.
Hitungkan kepekatan asid hidroklorik yang digunakan dalam eksperimen ini.

3	

- (e) In another experiment, hydrochloric acid is replaced by sulphuric acid, H_2SO_4 with the same concentration. It is found that the volume of hydrochloric acid is twice the volume of sulphuric acid needed to neutralise 20 cm^3 of sodium hydroxide solution.

Dalam satu eksperimen lain, asid hidroklorik digantikan dengan asid sulfurik, H_2SO_4 dengan kepekatan yang sama. Didapati isipadu asid hidroklorik adalah dua kali ganda isipadu asid sulfurik yang diperlukan untuk meneutralkan 20 cm^3 larutan natrium hidroksida.

Explain of this statement.
 Terangkan pernyataan tersebut.

.....

1(e)

3

[3 marks]

- (f)

Hydrochloric acid <i>Asid hidroklorik</i>	Ethanoic acid <i>Asid etanoik</i>
Sulphuric acid <i>Asid sulfurik</i>	Phosphoric acid <i>Asid fosforik</i>

Classify the acids into monoprotic acid, diprotic acid and triprotic acid.
 Kelaskan asid-asid berikut kepada asid monoprotik, asid diprotik dan asid triprotik.

1(f)

3

[3 marks]

- (g) The pupil conducted another experiment to find the relationship between the concentration of hydrochloric and the pH of the solution. Table 1.3 shows the reading of pH meter in different concentrations of hydrochloric acid.

Murid-murid menjalankan suatu eksperimen yang lain untuk mencari hubungan antara kepekatan asid hidroklorik dengan pH larutan. Jadual 1.3 menunjukkan bacaan meter pH dalam kepekatan asid hidroklorik yang berbeza.

Concentration of hydrochloric acid (mol dm^{-3}) <i>Kepekatan asid hidroklorik (mol dm^{-3})</i>	0.1	0.05	0.025	0.0125
pH value <i>Nilai pH</i>	1.00	1.30	1.60	1.90

Table 1.3

- (i) For this experiment, state the:
Bagi eksperimen ini, nyatakan:

Manipulated variable:
Pemboleh ubah dimanipulasikan

Responding variable:
Pemboleh ubah bergerak balas

Constant variable:
Pemboleh ubah yang dimalarkan

[3 marks]

1(g)(i)

3

- (ii) State a hypothesis for this experiment.
Nyatakan satu hipotesis untuk eksperimen ini.

.....
.....

[3 marks]

1(g)(ii)

3

2. A student carried out qualitative analysis on salt P to identify the cation and anion present in the salt through few steps:

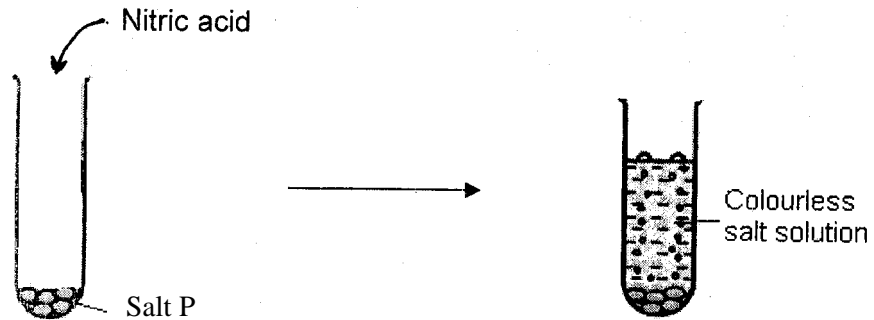
For
Examiner's
Use

Seorang pelajar menjalankan analisis kualitatif terhadap garam P untuk mengenal pasti kehadiran kation dan anion dalam garam tersebut melalui langkah-langkah berikut:

Step 1 [Langkah 1]

5 cm³ of nitric acid is poured into a test tube containing one spatula of salt P.

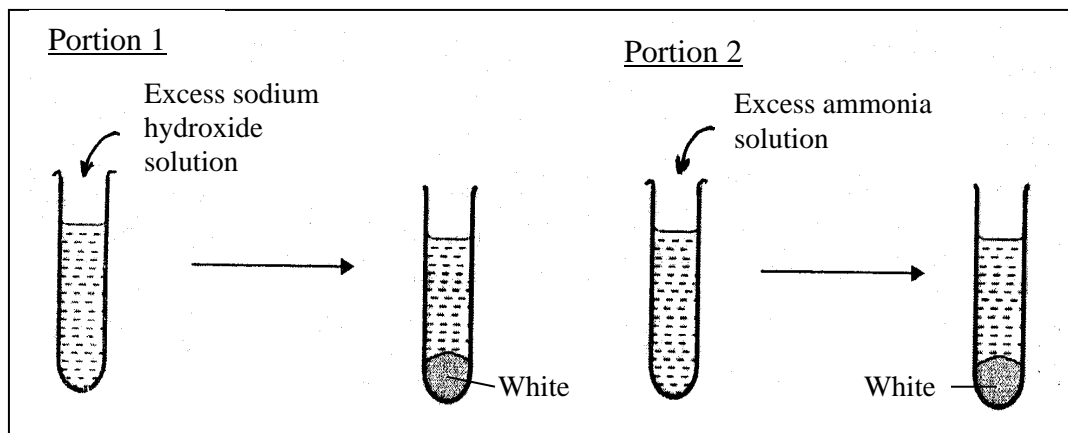
5 cm³ asid nitrik ditambah kepada garam P dalam sebuah tabung uji.



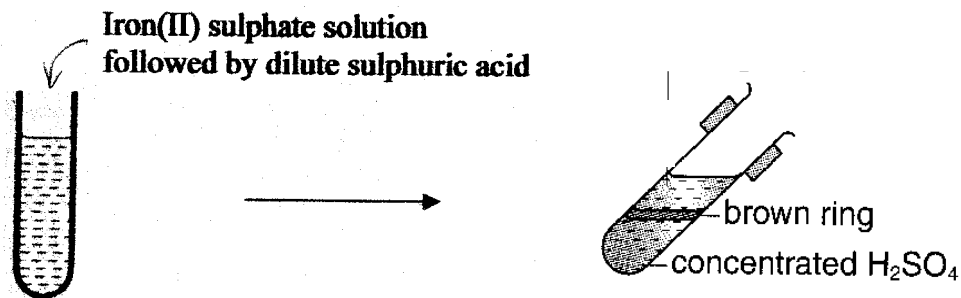
Step 2 [Langkah 2]

The resulting solution formed from Step 1 is divided into three portion.

Larutan yang terhasil dalam Langkah 1 dimasukkan ke dalam tiga tabung uji.



Portion 3



- (a) Record the observations and related inferences for each test tube shown in Step 2.
Catatkan pemerhatian dan inferens yang berkaitan dalam setiap tabung uji dalam langkah 3.

Method <i>Langkah</i>	Observations <i>Pemerhatian</i>	Inferences <i>Inferens</i>
Add sodium hydroxide to the first portion until in excess. <i>Larutan natrium hidroksida ditambahkan sehingga berlebihan dalam bahagian pertama.</i>		
Add ammonia solution into second portion until in excess. <i>Larutan ammonia ditambahkan sehingga berlebihan.</i>		
Add a little iron(II) sulphate followed by dilute sulphuric acid. Test tube is slanted and concentrated sulphuric acid is then added slowly along the side of the test tube without shaking the test tube. <i>Sedikit ferum(II) sulfat ditambahkan diikuti dengan asid sulfurik cair. Kemudian, tabung uji dicondongkan dan asid sulfurik pekat ditambahkan secara perlahan-lahan tanpa mengoncangkan tabung uji.</i>		

[6 marks]

2 (a)

6

- (b) Based on the above observations in Step 2, identify the colourless solution formed when nitric acid is added to salt P.
Berdasarkan pemerhatian di langkah 2, namakan larutan yang tak berwarna yang dihasilkan apabila asid nitrik ditambah ke dalam garam P.
-

When salt P is heated strongly, it can produce colourless gas that turns lime water to cloudy. Predict the cation and anion present in the salt P.

Apabila garam P dipanaskan dengan kuat, gas tak berwarna terbebas mengeruhkan air kapur. Ramalkan kation dan anion yang hadir dalam garam P.

Cation : Anion :

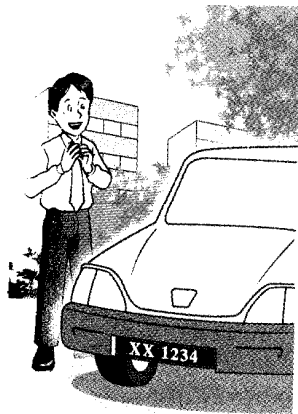
[3 marks]

2 (b)

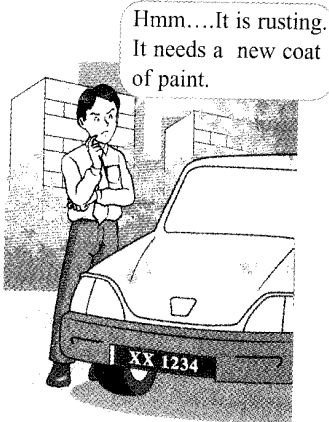
3

3

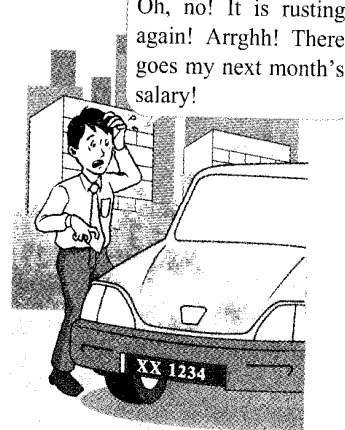
Year 2004



Year 2007



Year 2010

For
Examiner's
Use

Look at the situation above. If the body of car is made of iron, it would easily rust. This is because the iron surface is exposed to air and water.

Lihat situasi di atas. Jika badan kereta diperbuat daripada besi, ia mudah berkarat. Ini adalah kerana permukaan besi terdedah kepada udara dan air.

What is the effective ways to prevent and control rusting? One of the ways is using other metals.

Apakah langkah yang sesuai untuk mencegah pengurangan besi? Salah satu langkah ialah menggunakan logam yang lain.

Plan a laboratory experiment to investigate the effect of other metals on the rusting of iron. You are given iron nails, magnesium ribbon, zinc strip, copper strip and tin strip.

Rancang satu eksperimen untuk menyiasat kesan logam yang berlainan ke atas pengurangan besi. Anda diberi paku besi, jalur magnesium, jalur zinc, jalur kuprum dan jalur stanum.

Your planning should include the following:

- | | |
|---------------------------------------|---------------------------------------|
| (i) Problem statement | <i>[Pernyataan masalah]</i> |
| (ii) All the variables | <i>[Semua pembolehubah]</i> |
| (iii) Statement of hypothesis | <i>[Pernyataan hipotesis]</i> |
| (iv) List of substances and apparatus | <i>[Senarai bahan dan alat radas]</i> |
| (v) Procedure of the experiment | <i>[Prosedur eksperimen]</i> |
| (vi) Tabulation of data | <i>[Penjadualan data]</i> |

[17 marks]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

Prepared by:
En. Chai Teck Khiong
2012

Checked by

.....
(Mdm. Wong Lai Sieng)

SULIT
Marking Scheme
Chemistry
2012



SMK ROSLI DHOBY, SIBU

PEPERIKSAAN PERCUBAAN PERTAMA
SIJIL PELAJARAN MALAYSIA 2012

MARKING SCHEME
CHEMISTRY

Paper 1

Paper 2

Paper 3

UNTUK KEGUNAAN PEMERIKSA SAHAJA

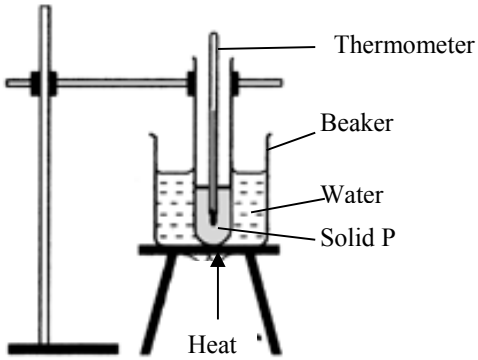
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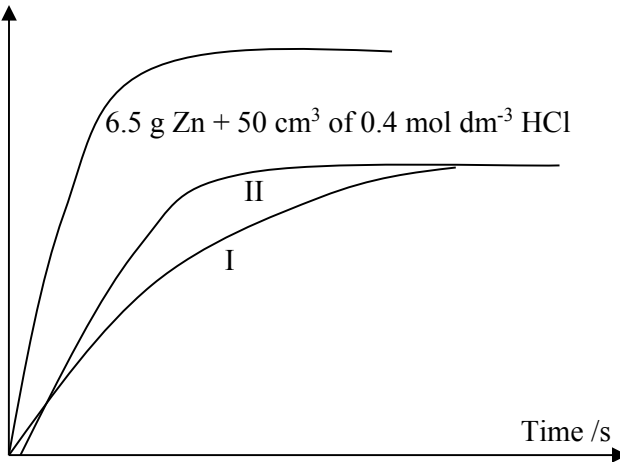
<http://edu.joshuatly.com/>
<http://fb.me/edu.joshuatly>

Paper 1

1	D	11	A	21	B	31	A	41	A
2	B	12	D	22	D	32	C	42	B
3	C	13	A	23	C	33	D	43	C
4	B	14	C	24	D	34	A	44	A
5	D	15	D	25	B	35	B	45	C
6	C	16	C	26	C	36	D	46	D
7	B	17	A	27	A	37	D	47	B
8	B	18	A	28	A	38	D	48	D
9	A	19	A	29	B	39	C	49	B
10	A	20	B	30	B	40	C	50	B

Paper 2 Section A

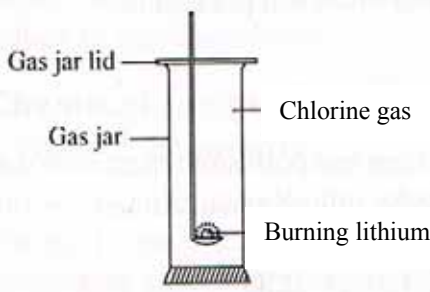
NO		MARK SCHEME	SUB-MARK	TOTAL MARK
1 (a)	(i)	Melting point is the temperature at which solid changes into a liquid at a particular pressure	1	1
	(ii)	80°C	1	1
	(iii)	solid and liquid	1	1
	(iv)	because the heat absorbed by the particles is used to overcome the forces of attraction between particles r : overcome/break down the bond	1 1	2
	(v)	1. Functional set-up of apparatus + heat 2. Labelling (solid P, water, thermometer, beaker)	1 1	2
				
(b)	(i)	Sublimation	1	1
	(ii)	1. Iodine-131 2. used in the treatment of thyroid diseases // to detect malfunction of thyroid glands	1 1	2
				10
2 (a)	(i)	1. $\frac{6 \text{ dm}^3}{24 \text{ dm}^3} = 0.25 \text{ mol}$ 2. $0.25 \times 6.02 \times 10^{23} = 1.505 \times 10^{23} \text{ molecules}$	1 1	2
	(ii)	$0.25 \text{ mol} \times 44 = 11 \text{ g}$	1	1

(b)	(i)	Formula shows the simplest ratio of atoms of each element present in the compound	1	1															
	(ii)	<table border="1"> <thead> <tr> <th>Element</th> <th>Mg</th> <th>O</th> </tr> </thead> <tbody> <tr> <td>Mass (g)</td> <td>2.4</td> <td><u>1.6</u></td> </tr> <tr> <td>Number of moles</td> <td><u>0.1</u></td> <td><u>0.1</u></td> </tr> <tr> <td>Ratio of moles of atom</td> <td>1</td> <td>1</td> </tr> <tr> <td>Empirical formula</td> <td colspan="2" style="text-align: center;">MgO</td> </tr> </tbody> </table>	Element	Mg	O	Mass (g)	2.4	<u>1.6</u>	Number of moles	<u>0.1</u>	<u>0.1</u>	Ratio of moles of atom	1	1	Empirical formula	MgO		1 1 1	3
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Ratio of moles of atom	1	1																	
Empirical formula	MgO																		
	(iii)	Allow oxygen to enter the crucible and react with magnesium // for complete burning of magnesium	1	1															
	(iv)	1. By repeating process of heating, cooling and weighing 2. until a constant mass is obtained	1 1	2															
				10															
3 (a)		1. Correct formula of reactant and product 2. Balanced equation $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$	1 1	2															
(b)	(i)	Mole of HCl = 0.01 mol Mole of H ₂ gas = $\frac{0.01}{2}$ // 0.005 mol answer with unit: (0.005 x 24)dm ³ // 0.12 dm ³ // 120 cm ³	1 1	2															
	(ii)	Answer with unit : Average rate of reaction = $\frac{120}{300} = 0.4 \text{ cm}^3 \text{ s}^{-1}$	1	1															
	(iii)	1. Zinc powder has a bigger total surface area exposed to reaction. 2. Frequency of collision between zinc atoms and H⁺ ions increases. 3. Frequency of effective collision between particles increases.	1 1 1	3															
(d)	(i)	because the number of mole of H ⁺ ions reacted in both experiments are the same // both experiments use same volume and concentration of the acid	1	1															
	(ii)	Volume of gas/ cm ³ 	1	1															
				10															
4 (a)	(i)	1. The blue colour of the solution turns colourless 2. A brown solid is deposited (a: Magnesium ribbon dissolves) r: magnesium corroded	1 1	2															

	(ii)	$\text{Mg} + \text{Cu}^{2+} \rightarrow \text{Mg}^{2+} + \text{Cu}$	1	1
(b)	(i)	+2 to +3	1	1
	(ii)	$\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + \text{e}^-$	1	1
	(iii)	acts as an oxidising agent	1	1
(c)	(i)	colourless solution change to brown	1	1
	(ii)	1. Iodine is formed. 2. Add 2 cm ³ of starch solution. 3. A dark blue solution is formed. OR Add 2 cm ³ of tetrachloromethane. A purple colour is formed at tetrachloromethane layer.	1 1 1	3
				10
5 (a)	(i)	Yeast	1	1
	(ii)	1. Correct formula of reactant and product 2. Balanced equation $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow \text{C}_2\text{H}_5\text{OH} + \text{CO}_2$	1 1	2
	(iii)	Carrying out fractional distillation	1	1
(b)		1. No. of mole of ethanol = $1.38 / 46$ = 0.03 mol 2. Heat released = $mc\theta$ = (250) (4.2) (35) = 36750 J 3. Heat of combustion, $\Delta H = -36.75 \text{ kJ} / 0.03 \text{ mol}$ = -1225 kJ/mol	1 1 1	3
(c)	(i)	Ester	1	1
	(ii)	$ \begin{array}{ccccccc} & \text{H} & \text{H} & \text{O} & & \text{H} & \text{H} \\ & & & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{O} & - \text{C} & - \text{C} & - \text{H} \\ & & & & & & \\ & \text{H} & \text{H} & & & \text{H} & \text{H} \end{array} $	1	1
	(iii)	Has a nice fruity smell / insoluble in water	1	1
				10
6 (a)	(i)	Diagram 6.1 : Duralumin Diagram 6.2 : Stainless steel	1 1	2
	(ii)	Diagram 6.1 : Light and strong // Light and high tensile strength // Light and withstand high pressure (must both) Diagram 6.2 : does not rust	1 1	2
	(iii)	1. Diagram of different sizes of atoms 2. Labelling of pure copper 3. Labelling of aluminium and magnesium	1 1 1	3

		<p>(iii)</p>		
(b)	(i)	To relieve pain without causing numbness or affecting consciousness	1	1
	(ii)	will cause internal bleeding of the stomach	1	1
	(iii)	Paracetamol (r : wrong spelling)	1	1
				10

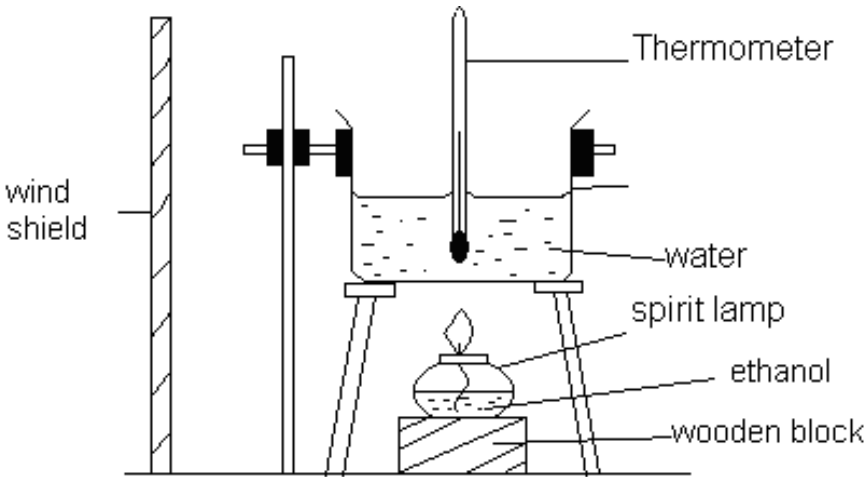
Section B

NO		MARK SCHEME	SUB-MARK	TOTAL MARK
7 (a)		1. Group 12 2. because has 2 valence electrons 3. Period 3 4. because has three shells occupied with electrons	1 1 1 1	4
(b)	(i)	1. The melting and boiling points of halogens increases down the group. 2. The molecular size of halogens increases down the group. 3. The Van der Waals force of attraction between molecules become stronger down the group. 4. Hence, more heat energy is required to overcome the stronger forces during melting or boiling.	1 1 1 1	4
	(ii)	1. Chlorine is more reactive than bromine in the reaction with water. 2. Atomic size of chlorine is smaller 3. The outermost shell in chlorine atom is nearer to the nucleus and screened by lesser number of inner occupied shells 4. The force of attraction between nucleus on the valence electrons in chlorine atom is stronger. 5. The strength of nucleus of atom chlorine to attract one more electron into the outermost shell to achieve a stable octet electron arrangement is higher than that of bromine atom.	1 1 1 1 1	5
	(iii)	Diagram 1. Functional set-up of apparatus (must closed with gas jar lid) 2. Labelling (chlorine gas, lithium, gas jar) <div style="text-align: center;">  </div> Procedure 3. A small piece of lithium is placed on a gas jar spoon. 4. The lithium carefully in air until it starts to burn. 5. The burning lithium is quickly placed into a gas jar filled with chlorine gas. Chemical equation: 6. Correct formula of reactants and products 7. Balance equation $2\text{Li} + \text{Cl}_2 \rightarrow 2\text{LiCl}$	1 1 1 1 1 1 1	7
				20

NO	MARK SCHEME	SUB-MARK	TOTAL MARK
8 (a)	1. Zinc oxide (r: formula) 2. Observation : The mixture glows brightly // A grey residue is formed 3. Correct formula of the reactant and the product 4. Balanced equation $C + 2ZnO \rightarrow 2Zn + CO_2$	1 1 1 1	4
(b)	1. X can be copper. 2. Iron is more electropositive than copper // Position of iron is above copper in the electrochemical series. 3. Iron loses its electrons more readily to form iron(II) ion. 4. Y can be zinc /aluminium/magnesium 5. Y is more electropositive than iron // Position of Y is above iron in the electrochemical series. 6. Y loses its electron readily to form ion of metal Y.	1 1 1 1 1 1	6
(c)	1. Oxidising agent : Acidified potassium manganate(VII) solution // Acidified potassium dichromate(VI) solution // Bromine water // Chlorine water 2. Iron(II) sulphate solution changes from pale green to yellow. 3. The purple acidified potassium manganate(VII) solution turns colourless. 4. Iron(II) ions undergo oxidation by releasing electrons to become iron(III) ions. 5. $Fe^{2+} \rightarrow Fe^{3+} + e^-$ 6. Manganate(VII) ions undergo reduction by accepting electrons to become manganese(II) ions. 7. Correct formula of the reactant and the product 8. Balanced equation $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$ 9. Iron(II) ion undergoes oxidation process while manganate(VII) ion undergoes reduction process. 10. Iron(III) ion is formed at the negative terminal. Add 2 cm ³ of potassium hexacyanoferrate(II) solution. 11. Dark blue precipitate is formed. (wrong method, observation – 0 m)	1 1 1 1 1 1 1 1 1 1 1	Max 10
			20

Section C

NO	MARK SCHEME	SUB-MARK	TOTAL MARK
9 (a)	1. Electrolysis is a process whereby a compound is decomposed into its constituent elements when an electric current passes through an electrolyte. 2. Electrolyte is a substance that can conduct electricity either in the molten state or in an aqueous solution .	1 1	2
(b)	1. Anode : Brown vapour is released 2. Cathode : Shiny grey solid is deposited 3. The molten lead(II) bromide contains Pb^{2+} ions and Br^- ions. 4. The Br^- ions move to the anode while Pb^{2+} ions move to the cathode. 5. At the anode, Br^- ion is discharged by donating electron to form bromine atom. [a: $2Br^- \rightarrow Br_2 + 2e^-$] 6. Two bromine atoms combine to form a bromine molecule. 7. The discharging electrons are flow to the cathode via external circuit. 8. At the cathode, each Pb^{2+} ion is discharged by accepting two electrons to form a lead atom. [a: $Pb^{2+} + 2e^- \rightarrow Pb$]	1 1 1 1 1 1 1 1 1	8
(c)	1. Functional set-up of apparatus 2. Labelling (Magnesium, copper, copper(II) sulphate solution) 3. Correct mark of positive terminal and negative terminal 4. Mark direction of electron flow ($Mg \rightarrow Cu$) <div style="text-align: center;"> <p>Magnesium Copper</p> <p>Copper(II) sulphate solution</p> </div> <p>Procedure</p> 5. A piece of magnesium ribbon and copper plate are cleaned with sandpaper. 6. 200 cm^3 of 1.0 mol dm^{-3} copper(II) sulphate solution is poured into a beaker. 7. The two pieces of metals are dipped into the copper(II) sulphate solution and connected to the voltmeter /bulb using connecting wires. <p>Discussion</p> 8. Magnesium which is more electropositive than copper donates two electrons to form Mg^{2+} ion. 9. The electrons then flow through the connecting wires towards copper plate which acts as positive terminal. 10. Cu^{2+} ions from the electrolyte accepts two electrons to form copper atoms. 11. The flow of electrons from magnesium ribbon to the copper plate results in the flow of electric current.	1 1 1 1 1 1 1 1 1 1 1	Max 10
			20

NO	MARK SCHEME	SUB-MARK	TOTAL MARK										
10 (a)	<table border="1"> <thead> <tr> <th>Reaction I</th> <th>Reaction II</th> </tr> </thead> <tbody> <tr> <td>Endothermic//heat absorbed from the surrounding</td> <td>Exothermic//heat released to the surrounding</td> </tr> <tr> <td>The total energy of content of reactant is lower than the total energy content of product</td> <td>The total energy of the content of reactants is higher than the total energy content of products</td> </tr> <tr> <td>Heat absorbed during the reaction is 66 kJ mol^{-1}</td> <td>Heat released during the reaction is 50.4 kJ mol^{-1}</td> </tr> <tr> <td>Bond breaking requires more energy than the energy that is released during bond formation</td> <td>Bond formation releases more energy than is required in the bond breaking</td> </tr> </tbody> </table>	Reaction I	Reaction II	Endothermic//heat absorbed from the surrounding	Exothermic//heat released to the surrounding	The total energy of content of reactant is lower than the total energy content of product	The total energy of the content of reactants is higher than the total energy content of products	Heat absorbed during the reaction is 66 kJ mol^{-1}	Heat released during the reaction is 50.4 kJ mol^{-1}	Bond breaking requires more energy than the energy that is released during bond formation	Bond formation releases more energy than is required in the bond breaking	1 1 1 1	4
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Bond breaking requires more energy than the energy that is released during bond formation	Bond formation releases more energy than is required in the bond breaking												
(b)	<ol style="list-style-type: none"> Heat of combustion of butanol is higher than propanol The molecular size/number of carbon atom per molecule butanol is bigger/higher than propanol Butanol produce more carbon dioxide and water molecules than propanol//released more heat energy to form more bonds 	1 1 1	3										
(c)	<ol style="list-style-type: none"> Methanol/ethanol/ propanol, Materials and Apparatus needed : As shown in the diagram  <p>Procedure :</p> <ol style="list-style-type: none"> 250 cm^3 of water is measured and poured into a copper can and the copper can is placed on a tripod stand. The initial temperature of the water is measured and recorded A spirit lamp with ethanol is weighed and its mass is recorded The lamp is then placed under the copper can and the wick of the lamp is lighted up immediately The water in the can is stirred continuously until the temperature of the water increases by about 30°C. 	1 1 1 1 1 1											

	<p>8. The flame is put off and the highest temperature reached by the water is recorded.</p> <p>9. The lamp and its content is weighed and the mass is recorded</p> <p>10. Table to collect the data</p> <p>Data :</p> <table border="1" data-bbox="338 450 1152 739"> <thead> <tr> <th>Alcohol</th> <th>Ethanol /Propan-1-ol/ Butan-1-ol</th> </tr> </thead> <tbody> <tr> <td>The initial temperature of water</td> <td>t_1</td> </tr> <tr> <td>The highest temperature of water</td> <td>t_2</td> </tr> <tr> <td>Increase in temperature</td> <td>$t_2 - t_1 = \theta$</td> </tr> <tr> <td>Mass of lamp before burning</td> <td>m_1</td> </tr> <tr> <td>Mass of lamp after burning</td> <td>m_2</td> </tr> <tr> <td>Mass of lamp ethanol burnt</td> <td>$m_1 - m_2 = m_a$</td> </tr> </tbody> </table> <p>11. Show the calculation</p> <p>12. Correct value of heat of combustion</p> <p>Calculation :</p> <p>Number of mole of ethanol, $C_2H_5OH, n = \frac{m_a}{46}$</p> <p>The heat energy given out during combustion by ethanol = the heat energy absorbed by water = $250 \times 4.2 \times \theta$ J</p> <p>Heat of combustion of ethanol = $\frac{250 \times 4.2 \times \theta}{n}$ $Jmol^{-1}$</p>	Alcohol	Ethanol /Propan-1-ol/ Butan-1-ol	The initial temperature of water	t_1	The highest temperature of water	t_2	Increase in temperature	$t_2 - t_1 = \theta$	Mass of lamp before burning	m_1	Mass of lamp after burning	m_2	Mass of lamp ethanol burnt	$m_1 - m_2 = m_a$	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>Max 10</p>
Alcohol	Ethanol /Propan-1-ol/ Butan-1-ol																
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Mass of lamp after burning	m_2																
Mass of lamp ethanol burnt	$m_1 - m_2 = m_a$																
	<p>No. of mol of silver nitrate = $100 \times 0.5 / 1000 // 0.05$</p> <p>1 mol of silver nitrate reacted to release 105 kJ heat</p> <p>Therefore, 0.05 mol silver nitrate reacted to produce $\frac{105 \times 0.05}{1}$</p> <p>= - 5.25 kJ/mol</p> <p>$5250 = 100 \times 4.2 \times \theta$ $\theta = 12.5 \text{ } ^\circ\text{C}$</p>	<p>1</p> <p>1</p> <p>1</p>	<p>3</p>														
			<p>20</p>														

Marking Scheme for Paper 3 Chemistry SPM 2011

Ques	Marking Scheme	Marks																
1(a)	<p><i>Able to write all the burette readings to two decimal places</i></p> <p><u>Sample answers</u> Experiment I : 1.50 cm³ 26.40 cm³ Experiment II : 3.35 cm³ 28.35 cm³ Experiment III : 4.50 cm³ 29.50 cm³</p>	3																
	<i>Able to write all the burette readings to one decimal places</i>	2																
	<i>Able to record at least 2 readings correctly without decimal places</i>	1																
	<i>No response or wrong response.</i>	0																
1(b)	<p><i>Able to construct a table that contains the following information.</i></p> <ol style="list-style-type: none"> 1. <i>Headings in the table</i> 2. <i>Transfer all the readings from (a) correctly</i> 3. <i>With unit</i> <p><u>Sample answer</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Titration</th> <th style="text-align: center;">1</th> <th style="text-align: center;">2</th> <th style="text-align: center;">3</th> </tr> </thead> <tbody> <tr> <td>Initial burette reading / cm³</td> <td style="text-align: center;">1.50</td> <td style="text-align: center;">3.35</td> <td style="text-align: center;">4.50</td> </tr> <tr> <td>Final burette reading / cm³</td> <td style="text-align: center;">26.40</td> <td style="text-align: center;">28.35</td> <td style="text-align: center;">29.50</td> </tr> <tr> <td>Volume of hydrochloric acid / cm³</td> <td style="text-align: center;">24.90</td> <td style="text-align: center;">25.00</td> <td style="text-align: center;">25.00</td> </tr> </tbody> </table>	Titration	1	2	3	Initial burette reading / cm ³	1.50	3.35	4.50	Final burette reading / cm ³	26.40	28.35	29.50	Volume of hydrochloric acid / cm ³	24.90	25.00	25.00	3
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	<p><i>Able to construct a table that contains the following information.</i></p> <ol style="list-style-type: none"> 1. <i>Suitable headings</i> 2. <i>Without unit</i> 	1																
	<i>No response or wrong response</i>	0																
1(c)	<p><i>Able to describe the following aspects:</i></p> <p>** pink colour of the phenolphthalein in the solution turns colourless.</p> <p>** acid(HCl) completely neutralized the alkali(NaOH)</p> <p><u>Answers</u> A point at which the colour of the solution in the conical flask changes from pink to colourless when the alkali is neutralized completely by the acid.</p>	3																

	<i>Able to state any one of the aspects</i>	2
	<u>Sample answer</u> Point at which the colour of the solution changes from pink to colourless	
	<i>Able to state an idea of operational definition of end point</i>	1
	<u>Sample answer</u> When acid is added, the solution changes colour// point at which neutralization is complete	
	<i>No response or wrong response</i>	0
1(d)	<i>Able to state the average volume of hydrochloric acid correctly and able to calculate the concentration of hydrochloric acid with unit (mol dm⁻³) correctly</i>	3
	<u>Sample answer</u> Average volume of hydrochloric acid = 24.97 cm ³ $\frac{Ma \times 24.97}{0.5 \times 20} = 1$ [a : ecf] Concentration of hydrochloric acid = 0.4 mol dm ⁻³	
	<i>Able to calculate the concentration of hydrochloric acid without unit or wrong unit</i>	2
	<u>Sample answer</u> $\frac{Ma \times 24.97}{0.5 \times 20} = 1$ [a : ecf] Concentration of hydrochloric acid = 0.4 mol dm ⁻³	
	<i>Able to write the concentration of hydrochloric acid without unit or wrong unit</i>	1
	<u>Sample answers</u> Concentration of hydrochloric acid = 0.4 mol dm ⁻³	
	<i>No response or wrong response</i>	0
1(e)	<i>Able to explain with two information.</i> 1. HCl is a monoprotic acid 2. H ₂ SO ₄ is a diprotic acid 3. two times of concentration of H ⁺ ion	3
	<u>Answers</u> Hydrochloric acid is a monoprotic acid while sulphuric acid is a diprotic acid. With the same concentration and volume, the concentration of H ⁺ ion produced by sulphuric acid is two times higher than hydrochloric acid.	

	<i>Able to state any two of the information above</i>	2									
	<i>Able to state any one of the information above</i>	1									
	<i>No response or wrong response</i>	0									
1(f)	<p><i>Able to make correct classification for the monoprotic acid, diprotic acid and triprotic acid</i></p> <p>Answer :</p> <table border="1"> <thead> <tr> <th>Monoprotic acid</th> <th>Diprotic acid</th> <th>Triprotic acid</th> </tr> </thead> <tbody> <tr> <td>Hydrochloric acid</td> <td>Sulphuric acid</td> <td>Phosphoric acid</td> </tr> <tr> <td>Ethanoic acid</td> <td></td> <td></td> </tr> </tbody> </table>	Monoprotic acid	Diprotic acid	Triprotic acid	Hydrochloric acid	Sulphuric acid	Phosphoric acid	Ethanoic acid			3
Monoprotic acid	Diprotic acid	Triprotic acid									
Hydrochloric acid	Sulphuric acid	Phosphoric acid									
Ethanoic acid											
	<i>Able to make correct classification for any three acids.</i>	2									
	<i>Able to make correct classification for any two acids.</i>	1									
	<i>No response or wrong response</i>	0									
1(g) (i)	<p><i>Able to state the three variables correctly</i></p> <p><u>Sample answers</u></p> <p>1. Manipulated variable : Concentration of hydrochloric acid</p> <p>2. Responding Variable : pH value // Reading of pH meter</p> <p>3. Constant variable : Type of acid // pH meter [Reject : Volume of acid/Type of beaker]</p>	3									
	<i>Able to state any two variables correctly</i>	2									
	<i>Able to state any one variable correctly</i>	1									
	<i>No response or wrong response</i>	0									
1(g) (ii)	<p><i>Able to state the relationship between the manipulated variable and the responding variable with direction.</i></p> <p><u>Sample answer</u></p> <p>The higher the concentration of hydrochloric acid, the lower the pH value Score 2 if reverse RV....MV</p>	3									
	<p><i>Able to state the relationship between the manipulated variable and the responding variable without stating the direction/direction less correctly.</i></p> <p><u>Sample answer</u></p> <p>When the concentration of hydrochloric acid is high, the pH value is low</p>	2									

	<i>Able to state an idea of the hypothesis</i>	1												
	<u>Sample answers</u> Concentration affects pH value //only MV//RV													
	No response or wrong response	0												
2 (a)	<p>Score 6 – able to state three observations and related inferences. Score 5 – state any 5 of the above information correctly Score 4 – state any 4 of the above information correctly Score 3 – state any 3 of the above information correctly Score 2 – state any 2 of the above information correctly Score 1 – state any 1 of the above information correctly</p> <table border="1"> <thead> <tr> <th>Method</th> <th>Observations</th> <th>Inferences</th> </tr> </thead> <tbody> <tr> <td>Add sodium hydroxide to the first portion until in excess.</td> <td>White precipitate formed, insoluble in excess NaOH.</td> <td>Presence of Mg^{2+} or Ca^{2+} ions</td> </tr> <tr> <td>Add ammonia solution into second portion until in excess.</td> <td>White precipitate formed, insoluble in excess ammonia</td> <td>Mg^{2+} ion is present.</td> </tr> <tr> <td>Add a little iron(II) sulphate followed by dilute sulphuric acid. Test tube is slanted and concentrated sulphuric acid is then added slowly along the side of the test tube without shaking the test tube.</td> <td>Brown ring is formed</td> <td>NO_3^- ion is confirmed to be present.</td> </tr> </tbody> </table>	Method	Observations	Inferences	Add sodium hydroxide to the first portion until in excess.	White precipitate formed, insoluble in excess NaOH.	Presence of Mg^{2+} or Ca^{2+} ions	Add ammonia solution into second portion until in excess.	White precipitate formed, insoluble in excess ammonia	Mg^{2+} ion is present.	Add a little iron(II) sulphate followed by dilute sulphuric acid. Test tube is slanted and concentrated sulphuric acid is then added slowly along the side of the test tube without shaking the test tube.	Brown ring is formed	NO_3^- ion is confirmed to be present.	6 5 4 3 2 1
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	No response or wrong response	0												
2(b)	<p><i>Able to identify the colourless solution formed and predict the cation and anion of salt P correctly</i></p> <p><u>Sample answer</u> Identify : Magnesium nitrate solution</p> <p>Predict : Cation : Mg^{2+} ion Anion : CO_3^{2-} ion</p>	3												
	<i>Able to state any two correctly</i>	2												
	<i>Able to state any one correctly</i>	1												
	No response or wrong response	0												

3 (a)	<i>Able to state the problem statement correctly</i> <u>Sample answer</u> What / How is the effect of other metals with different electropositivity on the rusting of iron?	3
	<i>Able to state the problem statement less correctly</i> <u>Sample answer</u> How to control rusting by using other metals?	2
	<i>Able to give an idea of the problem statement of the experiment</i> <u>Sample answer</u> To To investigate the effect of other metals on rusting // What is the effect of the metal [any statement that relate MV and RV]// *Aim	1
	No response or wrong response	0
3(b)	<i>Able to state the three variables correctly</i> <u>Sample answers</u> Manipulated variable : Different metals used to coil around the iron nails Responding variable : Rate of rusting / Rusting of iron / [Intensity] of dark blue colouration Constant variable : : Iron nails / temperature	3
	<i>Able to state any two variables correctly</i>	2
	<i>Able to state any one of the variables</i>	1
	<i>No response or wrong response</i>	0
3(c)	<i>Able to state the relationship between the manipulated variable and the responding variable and state the direction.</i> <u>Sample answers</u> When a more electropositive metal is in contact with iron, the metal inhibits rusting of iron. When a less electropositive metal is in contact with iron, the metal speed up rusting of iron. Score 2 if reverse RV....MV	3
	<i>Able to state the relationship between the manipulated variable and the responding variable less correctly.</i> <u>Sample answers</u> When a more reactive metal is in contact with iron, the metal inhibits rusting	2

	<i>Able to state an idea of the hypothesis</i>	1
	<u>Sample answers</u> Different metals that in contact with iron will affect the rusting of iron	
	No response or wrong response	0
3 (d)	<i>Able to list complete list of substances and apparatus</i>	3
	<u>Answers</u> <u>Substances (9)</u> sandpaper, five iron nails, magnesium ribbon, zinc strip, tin strip, copper strip, hot jelly solution, potassium hexacyanoferrate(III) solution and phenolphthalein indicator <u>Apparatus (2)</u> Five test tubes and test tube rack accept: from the diagram (must be labelled)	
	<i>Able to give at least five substances without concentration and one compulsory apparatus</i>	2
	<i>Able to give two substances and one suitable container</i>	1
	No response or wrong response	0
3 (e)	<i>Able to list all the steps correctly</i>	3
	<u>Sample answer</u> 1. Clean all the five iron nails and all the metals using sand paper. 2. The first clean iron nail is placed in test tube A. 3. Coil the magnesium ribbon, zinc strip, tin strip and copper strip around the iron nails tightly and then put it into test tube B, C, D and E respectively. 4. Pour same amount of hot jelly solution, potassium hexacyanoferrate(III) solution and phenolphthalein indicator to the hot jelly solution in each test tube until completely cover all the nails. 5. Put the test tubes in a test tube rack and left aside for a day. 6. Record the observations.	
	<i>Able to list down all the steps less correctly</i>	2
	<i>Able to list down steps 1 and 3</i>	1
	No response or wrong response	0

3 (f)	<p><i>Able to tabulate the data with the following aspects</i></p> <p>(1) <i>Correct titles</i> (2) <i>Complete at least 5 list of pair of metals base on the procedure</i></p> <p>Sample answer</p> <table border="1" data-bbox="341 533 1209 745"> <thead> <tr> <th>Test tube</th> <th>Pair of metals</th> <th>Intensity dark blue colouration</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Fe only</td> <td></td> </tr> <tr> <td>B</td> <td>Fe + Mg</td> <td></td> </tr> <tr> <td>C</td> <td>Fe + Zn</td> <td></td> </tr> <tr> <td>D</td> <td>Fe + Cu</td> <td></td> </tr> <tr> <td>E</td> <td>Fe + Sn</td> <td></td> </tr> </tbody> </table>	Test tube	Pair of metals	Intensity dark blue colouration	A	Fe only		B	Fe + Mg		C	Fe + Zn		D	Fe + Cu		E	Fe + Sn		2
Test tube	Pair of metals	Intensity dark blue colouration																		
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	<p><i>Able to tabulate the data with the following aspects.</i></p> <p>1. <i>One suitable title</i> 2. <i>At least 2x2 table</i> 3. <i>Must have 'test tube / pair of metals'</i></p> <table border="1" data-bbox="341 1003 951 1077"> <tr> <td>**</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table> <p>** Any MV or RV or CV which related to the experiment.</p>	**				1														
**																				
	<i>No response or wrong response (not related)</i>	0																		

~END OF MARK SCHEME~

PREPARED BY:
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