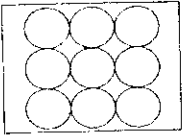


PEPERIKSAAN AKHIR TAHUN 2008
Tingkatan 4
4541/2 CHEMISTRY Paper 2

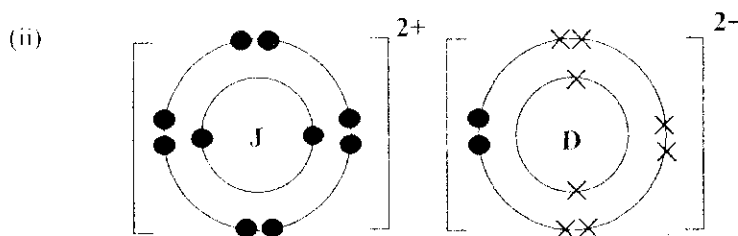
SECTION A

- | | | | |
|-----------|---|---|-----------|
| 1 (a) | Temperature at which solid changes into liquid | 1 | |
| (b) | Molecule | 1 | |
| (c) | Naphthalene is flammable | 1 | |
| (d) | To ensure that the naphthalene is heated evenly/uniformly | 1 | |
| (e) | Cannot
Boiling point of water 100 °C | 1 | ...2 |
| (f) (i) | 80 °C | 1 | 1 |
| (ii) | heat energy loss to surrounding
exactly balanced by the heat energy liberated as the particles /
molecules attract one another to form solid | 1 | ...2 |
| (iii) |  | 1 | |
| | | <hr style="border-top: 1px solid black; border-bottom: 1px solid black; height: 3px;"/> | 10 |
| 2 (a) (i) | ZnCl ₂ | 1 | |
| (ii) | Zn(NO ₃) ₂ | 1 | ...2 |
| (b) (i) | Silver nitrate and zinc chloride | 1 | |
| (ii) | Silver chloride and zinc nitrate | 1 | |
| (iii) | $2\text{AgNO}_3 + \text{ZnCl}_2 \longrightarrow 2\text{AgCl} + \text{Zn(NO}_3)_2$ | 1 | ...3 |
| (c) (i) | From the chemical equation.
2 mol of AgNO ₃ produces 2 mol of Ag and 1 mol of O ₂
Hence,
1 mol of AgNO ₃ will produce 1 mol of Ag and 0.5 mol of O ₂ | 1 | 2 |
| (ii) | $\begin{aligned} \text{No. of mol of AgNO}_3 &= \frac{18}{108 + 14 + 3(16)} \\ &= \frac{85}{170} \\ &= 0.5 \text{ mol} \end{aligned}$ | 1 | |
| | From the chemical equation.
2 mol of AgNO ₃ produces 2 mol of NO ₂
Hence,
0.5 mol of AgNO ₃ will produce 0.5 mol of NO ₂ | 1 | |

Volume of NO₂ = 0.5 × 24
= 12 dm³

1 ...3
10

- 3 (a) G, J and M 1
 (b) M 1
 (c) (i) 2G + 2H₂O → 2GOH + H₂ // 2Na + 2H₂O → 2NaOH + H₂ 1
 (ii) Use small piece // use forceps // use goggles 1
 (d) To fill a light bulb //
 To provide an inert atmosphere for welding at high temperature 1
 (e) (i) JD // MgO 1



[Correct number of shells and electrons] 1
 [Labels of nucleus and number of charges] 1 ...2

- (f) (i) Covalent 1
 (ii) Low melting and boiling point // insoluble in water // soluble in organic solvent // volatile 1
10

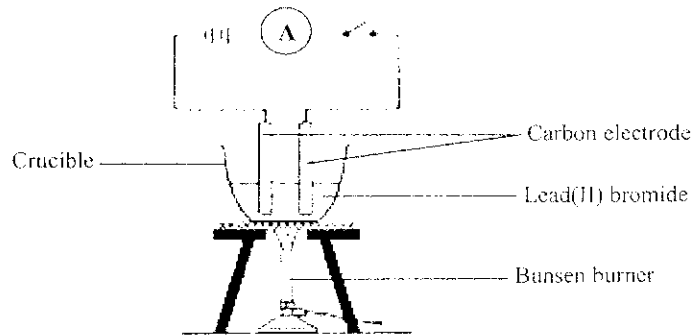
- 4 (a) Chemical to electrical 1
 (b) Cu²⁺, SO₄²⁻, H⁺, OH⁻ 1
 (c) (i) Zinc plate 1
 (ii) Zinc is more electropositive than copper //
 The position of zinc is higher than copper in the Electrochemical Series 1
 (d) (i) Becomes thicker // Brown solid is deposited 1
 (ii) Cu²⁺ + 2e → Cu 1
 (e) Blue to colourless // Blue becomes paler // Intensity of the blue colour decreased. 1
 The number/concentration of Cu²⁺ ion decreased. 1 ...2
 (f) (i) Cu, R, P, Q 1
 (ii) 1.5 V 1
10

5 (a)	(i)	Neutralisation	1
	(ii)	As an indicator// to show the end point of titration	1
	(b)	pipette // burette	1
	(c)	Colour of the solution changes from pink to colourless	1
	(d)	$2\text{KOH} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + 2\text{H}_2\text{O}$	
		[<i>Formula of reactants and products are correct</i>]	1
		[<i>Balanced</i>]	1 ...2
(e)	(i)	$\frac{M_a V_a}{M_b V_b} = \frac{1}{2}$	1
		$M_b = \frac{2}{1} \times \frac{1.0 \times 20.0}{25}$	1
		$= 1.6 \text{ mol dm}^{-3}$	1 ...3
	(ii)	7	1
			<hr/> 10 <hr/>
6 (a)	(i)	Oxygen	1
	(ii)	Nitrogen dioxide	1
	(iii)	Lead(II) oxide	1 ...3
	(b)	Put a glowing wooden splinter into the test tube.	1
		The glowing wooden splinter is lighted up.	1 ...2
	(c)	(i) Lead(II) ion	1
		(ii) $\text{Pb}^{2+} + 2\text{OH}^- \rightarrow \text{Pb}(\text{OH})_2$	1
		(iii) Lead(II) hydroxide	1
	(d)	(i) Yellow precipitate is formed	1
		(ii) Double decomposition reaction/precipitation	1
			<hr/> 10 <hr/>

SECTION B

- 7 (a) Chemical substances that can conduct electricity in molten state or aqueous solution. 1
- (b) Lead(II) bromide contains Pb^{2+} and Br^- ions 1
 In solid state, Pb^{2+} and Br^- ions cannot move freely 1
 In molten state, Pb^{2+} and Br^- ions can move freely 1.....3

(c) (i)

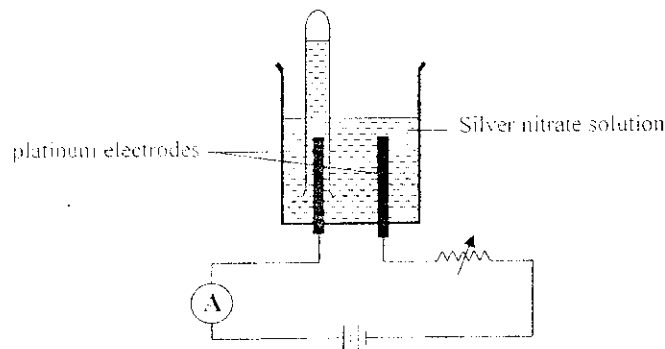


[*Functional diagram*] 1
 [*Labels* : Carbon electrodes, crucible, heat/ Bunsen burner, lead(II) bromide in crucible] 1 2

- (ii) Anode : $2Br^- \rightarrow Br_2 + 2e^-$ 1
 Cathode : $Pb^{2+} + 2e^- \rightarrow Pb$ 1 2

Anode : Brown gas is released. 1
 Cathode : A shiny grey metal is deposited. 1 2.....6

(d) (i)



[*Functional diagram* : Battery, connecting wires, Ammeter, test tube to collect gas at anode] 1
 [*Labels* : Platinum electrodes, silver nitrate solution] 1 2

(ii) Experiment I

	Anode	Cathode
Ions move to	NO_3^- and OH^-	Ag^+ and H^+
Half equation	$4\text{OH}^- \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$	$\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$
Observation	Colourless gas is released	Silvery solid is deposited

Experiment II

	Anode	Cathode
Ions move to	NO_3^- and OH^-	Ag^+ and H^+
Half equation	$\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^-$	$\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$
Observation	Becomes thinner	Silvery solid is deposited // Becomes thicker

6

(iii) The position of ions in the Electrochemical Series	1	
The concentration of ion / electrolyte	1	2.....10
		<u>20</u>

8 (a)	[Labelled diagram for heating of substance Q]	2
	[Diagram for testing of gas R]	1
	[Limewater is labelled]	1.....4
(b) (i)	Copper(II) ion	1
(ii)	1. Add ammonia solution drop by drop until excess.	1
	2. Blue precipitate is formed. The precipitate is soluble in excess ammonia solution produces a dark blue solution.	1.....2
(c)	1. Heat the solution V until a saturated solution is produced.	1
	2. Cool it to room temperature.	1
	3. Filter the crystal formed.	1
	4. Dry the crystal with filter paper.	1.....4
(d)	Magnesium / aluminium / zinc	1
	<u>Observation</u> :	
	Blue solution turns pale / colourless // brown solid deposited	1.....2
(e)	1. Excess zinc oxide is added into dilute sulphuric acid	1
	2. Filter the mixture	1
	3. Add sodium carbonate solution into the filtrate	1
	4. White precipitate produced.	1
	5. Filter and dry the zinc carbonate with filter paper.	1
	<u>Equation</u> :	
	$\text{ZnO} + 2\text{HNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{H}_2\text{O}$	1
	$\text{Zn}(\text{NO}_3)_2 + \text{Na}_2\text{CO}_3 \rightarrow \text{ZnCO}_3 + 2\text{NaNO}_3$	1.....7
		<u>20</u>

SECTION C

- 9 (a) (i) Solution Q : sodium hydroxide 1
 Gas W : Hydrogen gas 1..... 2
 (ii) $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$ 1
 1. high melting/boiling point 1
 2. conduct electricity in molten state 1
 3. soluble in water 1
 4. insoluble in organic solvent [*any three*]4
- (b) (i) Iron // Copper // Titanium // Nickel // Chromium // Manganese//
 Cobalt // Vanadium
 [*any one*] 1
- (ii) 1. Forms coloured ion or compound. 1
 2. Forms complex ions. 1
 3. Exhibit different oxidation numbers. 1
 4. Act as catalysts. 1..... 5
- (c) 1. Correct electron arrangement 3
 2. Correct the Group 3
 3. Correct the Period 3

Element	Electron arrangement	Group	Period
X	2,4	14	2
Y	2,8,3	13	3
Z	2,8,8,2	2	4

.....9
20

- 10 (a) Urea is better fertilizer. 1
 Urea has a higher percentage of nitrogen by mass. 1

Percentage of nitrogen :

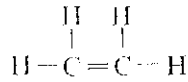
Urea, $(\text{NH}_2)_2\text{CO}$ $= \frac{2 \times 14}{12 + 16 + 2(16)} \times 100$
 $= 46.7\%$ 1

ammonium nitrate, NH_4NO_3 $= \frac{2 \times 14}{14 + 4 + 14 + 3(16)} \times 100$
 $= 35.5\%$ 1.....4

(b) (i) Example :

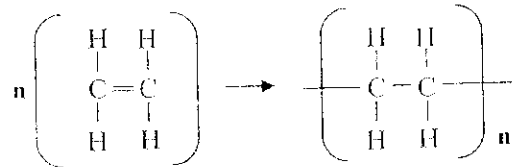
[*Monomer*] : **Ethene**

[*Structural formula of ethene*] :



Polythene can be formed by addition polymerization process of ethene gas using high pressure and a catalyst

[*equation for the polymerization*]



(b) (ii) Uses :

- Plastic bags
- Plastic containers
- Plastic cups
- Toys
- Insulation for electrical wiring
- Wrappers

[*Any two*]

1 + 1

2

Ways to prevent environmental pollution :

- reuse the polymer
- recycle the polymer

1 + 1

2

.....8

(c) (i)

[*Example of a composite material*] : **Fiber glass**

[*The components of the composite material*] :

Fibre glass : **plastic and glass fibres**

Fiber glass is produced when glass fibres are embedded in plastic resins.

(c) (ii) Properties of the composite material :

- high tensile strength
- easily mould
- inert to chemicals
- low in density

[*Any two*]

[1 + 1]

2

(c) (iii) Uses of composite material :
to make :

- water storage tank
- helmet
- heat insulator

[Any one]

1

Use of its original components :

- Glass : lenses
- Plastic : containers

[1 + 1]

2

.....10

20

END OF MARKING SCHEME