

SULIT

4541/2 (PP)  
Chemistry  
Kertas 2  
Peraturan  
Pemarkahan  
2011



MAJLIS PENGETUA SEKOLAH MENENGAH MALAYSIA  
CAWANGAN NEGERI SEMBILAN

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PEPERIKSAAN PERCUBAAN BERSAMA  
SIJIL PELAJARAN MALAYSIA 2011

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CHEMISTRY

Kertas 2

PERATURAN PEMARKAHAN

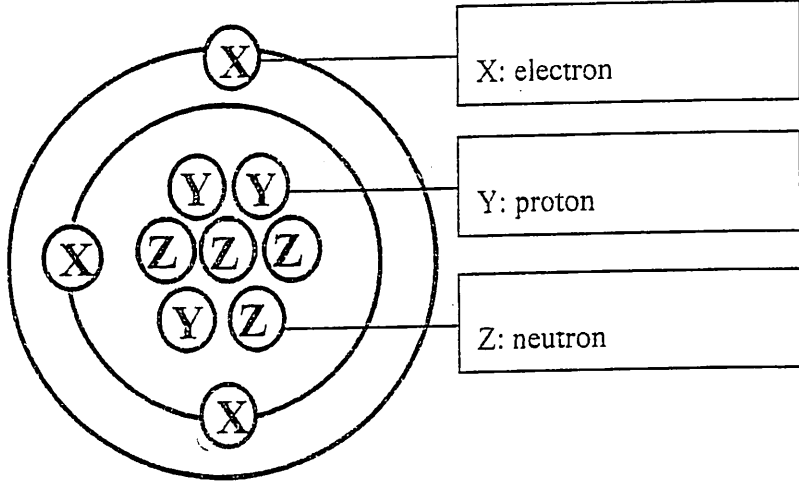
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UNTUK KEGUNAAN PEMERIKSA SAHAJA

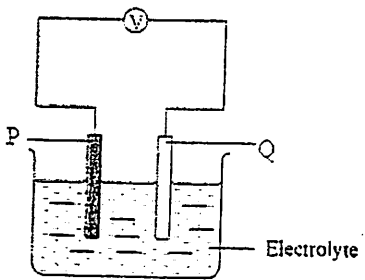
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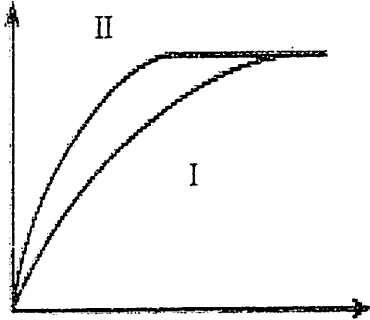
Peraturan pemarkahan ini mengandungi 16 halaman bercetak

No 1	Explanation	Mark	Σ Mark
(a)(i)	<p><i>Able to name the subatomic particles correctly.</i></p> <p><u>Answer:</u></p>  <p>(ii) <i>Able to state two subatomic particles with same mass correctly</i></p> <p><u>Answer:</u> Proton and neutron// Y and Z</p> <p>(iii) <i>Able to state the proton number and nucleon number of atom P.</i></p> <p><u>Answer:</u> Proton number: 3 Nucleon number: 7</p> <p>(iv) <i>Able to write the standard representation of P correctly.</i></p> <p><u>Sample Answer:</u> <math>{}^7_3\text{P}</math> / <math>{}^7_3\text{Li}</math></p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>3</p> <p>1</p> <p>2</p> <p>1</p>

(b)	<i>Able to state one radioactive isotope correctly.</i>		
(i)	<u>Sample Answer:</u> Cobalt-60// Carbon-14// Phosphorus-32// Iodine-131// Ceasium-137	1	1
(ii)	<i>Able to state one uses of radioactive isotope correctly.</i> <u>Sample Answer:</u> <ul style="list-style-type: none"> <li>- Cobalt-60 is used in radiotherapy for the treatment of cancer.//</li> <li>- Gamma rays of cobalt-60 are used to destroy bacteria in food without changing the quality of food.//</li> <li>- Carbon dating uses carbon -14 to estimate the age of fossils and artefacts.//</li> <li>- The metabolism of phosphorus in plants can be studied using phosphate fertilisers that contain phosphorus-32.</li> </ul> <p>Answer b(ii) must corresponding to b(i)</p>	1	1
<b>Total</b>			<b>9</b>

No 2	Explanation	Mark	$\Sigma$ Mark
(a)	<i>Able to state the meaning of acid</i>  <u>Answer:</u> A substance that ionises in water to produce hydrogen ions / $H^+$	1	1
(b)(i)	<i>Able to name the reaction</i>  <u>Answer:</u> Neutralization	1	1
(b)(ii)	<i>Able to name the substance X</i>  <u>Answer:</u> Potassium sulphate // water	1	1
(b)(iii)	<i>Able to write the balance chemical equation</i>  <u>Answer:</u> $H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$  1. Correct formulae of reactants & products 2. Balanced the equation with correct coefficient	1 1	2
(c)(i)	<i>Able to predict the pH value of hydrochloric acid</i>  <u>Answer:</u> 1	1	1
(c)(ii)	<i>Able to Explain the difference in pH value of hydrochloric acid and ethanoic acid</i>  <u>Sample Answer:</u> 1. Hydrochloric acid / HCl is a strong acid // ethanoic acid / $CH_3COOH$ is a weak acid. 2. Hydrochloric acid / HCl dissociates / ionises completely in water // ethanoic acid / $CH_3COOH$ dissociates / ionises partially in water 3. Hydrochloric acid / HCl produces higher concentration of hydrogen ions / $H^+$ // ethanoic acid produces lower concentration of hydrogen ions / $H^+$ 4. Higher concentration of $H^+$ ions, lower pH value // Lower concentration of $H^+$ ions, higher pH value	1 1 1 1	4
	Total		10

No. 3	Explanation	Mark	$\Sigma$ Mark
(a)	<i>Able to arrange the metals in the order of decreasing electropositivity.</i> <u>Answer</u> R, P, Q	1	1
(b)(i)	<i>Able to name the Q nitrate solution</i> <u>Answer</u> Silver nitrate	1	1
(ii)	<i>Able to write ionic equation.</i> <u>Answer</u> $2\text{Ag}^+ + \text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{Ag}$ 1. correct formulae of reactants and products 2. balanced equation	1 1	2
(iii)	<i>Able to write the corresponding observation</i> <u>Answer</u> Colorless solution turns blue/ light blue // brown metal/copper/P dissolve/ thinner // grey deposit formed.	1	1
(c)	<i>Able to explain why there is no reaction occurs in experiment III.</i> <u>Answer</u> 1. R is more electropositive than P // the position of R is higher than P in electrochemical series. 2. R cannot displace P from its nitrate/ salt solution	1 1	2
(d)(i)	<i>Able to draw a labelled diagram.</i>  <u>Answer</u> 1. functional apparatus 2. label: metal P, Q and any suitable electrolyte	1 1	2
(f)	<i>Able to state the positive terminal.</i> <u>Answer</u> Q	1	1
<b>Total</b>			<b>10</b>

No. 4	Explanation	Mark	
(a)	<p><i>Able to write the ionic equation</i></p> <p><u>Answer:</u>  <math>\text{Mg} + 2\text{H}^+ \rightarrow \text{Mg}^{2+} + \text{H}_2</math></p> <p>1 correct formulae of reactants and products            2 balanced equation</p>	1 1	2
(b)	<p><i>Able to Calculate the average rate of the reaction</i></p> <p><u>Answer:</u></p> <p>Experiment I :            Rate of reaction = <math>\frac{22}{2 \times 60} = 0.183 \text{ cm}^3 \text{ s}^{-1}</math></p> <p>Experiment II :            Rate of reaction = <math>\frac{37}{2 \times 60} = 0.308 \text{ cm}^3 \text{ s}^{-1}</math></p>	1 1	2
(c)	<p><i>Able to Calculate the maximum volume of gas produced</i></p> <p><u>Answer:</u></p> <p>Number of moles of <math>\text{H}_2\text{SO}_4 = \frac{0.1 \times 20}{1000} = 0.002 \text{ mol}</math></p> <p>1 mol of <math>\text{H}_2\text{SO}_4</math> produce 1 mol of <math>\text{H}_2</math> //</p> <p>0.002 mol of <math>\text{H}_2\text{SO}_4</math> produce 0.002 mol of <math>\text{H}_2</math></p> <p>Maximum volume of <math>\text{H}_2 = 0.002 \times 24\,000 // 48 \text{ cm}^3</math></p>	1 1	2
(d)	<p><i>Able to Sketch the graphs</i></p> <p>Volume of <math>\text{H}_2 / \text{cm}^3</math></p>  <p>Time/s</p> <p>1. Axes are labelled correctly and have correct unit            2. Correct curves and curves are labelled</p>	1 1	2

(e)	<i>Able to Compare the rate of reaction</i> <u>Answer:</u> 1. The rate of reaction in experiment II is higher 2. Experiment II has higher temperature 3. Frequency of effective collisions between hydrogen ions and magnesium higher in experiment II.	1 1 1	3
	<b>Total</b>		<b>11</b>

No.5	Explanation	Mark	$\Sigma$ Mark									
(a)	<i>Able to state two changes.</i> <u>Answer</u> 1. Green solid change to black 2. Lime water turns chalky/milky/cloudy	1 1	2									
(b)	<i>Able to write a balanced chemical equation.</i> <u>Answer</u> $\text{CuCO}_3 \longrightarrow \text{CuO} + \text{CO}_2$	1	1									
(c)	<i>Able to name substance X.</i> <u>Answer</u> Sulphuric acid	1	1									
(d)(i)	<i>Able to state all the ions present in copper(II) sulphate solution</i> <u>Answer</u> $\text{Cu}^{2+}$ , $\text{SO}_4^{2-}$ , $\text{H}^+$ , $\text{OH}^-$ // Copper (II) ion, sulphate ion, hydrogen ion, hydroxide ion.	1	1									
(ii)	<i>Able to state the products formed at anode in both cells and state the factors affecting the products formed</i> <u>Answer</u> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Cell</th> <th>Product formed at anode</th> <th>Factor affecting the product formed at anode</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>Oxygen gas//<math>\text{O}_2</math></td> <td>Position of ion in electrochemical series</td> </tr> <tr> <td>II</td> <td>Copper (II) ion// <math>\text{Cu}^{2+}</math></td> <td>Type of electrode</td> </tr> </tbody> </table>	Cell	Product formed at anode	Factor affecting the product formed at anode	I	Oxygen gas// $\text{O}_2$	Position of ion in electrochemical series	II	Copper (II) ion// $\text{Cu}^{2+}$	Type of electrode	1+1 1+1	4
Cell	Product formed at anode	Factor affecting the product formed at anode										
I	Oxygen gas// $\text{O}_2$	Position of ion in electrochemical series										
II	Copper (II) ion// $\text{Cu}^{2+}$	Type of electrode										
(iii)	<i>Able to explain the intensity of blue solution remains unchanged.</i> <u>Answer</u> 1. The rate of copper (ii) ion discharge at cathode same as the rate of copper atom dissolves at anode. 2. The concentration of copper (ii) ion remain unchanged.	1 1	2									
<b>Total</b>			<b>11</b>									



No 6	Explanation	Mark	$\Sigma$ Mark												
(a)	<p><i>Able to state the function of</i></p> <p>(i) potassium manganate(VII) (ii) glass wool</p> <p><u>Answer:</u> (i) To provide/supply oxygen (ii) To separate <math>\text{KMnO}_4</math> and metal // <math>\text{KMnO}_4</math> and metal do not mix</p>	1 1	2												
(b)(i)	<p><i>Able to balance chemical equation.</i></p> <p><u>Answer</u> <math>2 \text{Zn} + \text{O}_2 \rightarrow 2 \text{ZnO}</math></p>	1													
(ii)	<p><i>Able to state the change in oxidation number.</i></p> <p><u>Answer:</u> 0 to +2</p>	1	2												
(c)	<p><i>Able to arrange the elements correctly</i></p> <p><u>Answer:</u> W , Zn, Y, X</p>	1	1												
(d)	<p><i>Able to tick the correct elements</i></p> <p><u>Answer:</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="4">Metal</th> </tr> <tr> <th>W</th> <th>X</th> <th>Y</th> <th>Zinc Zink</th> </tr> </thead> <tbody> <tr> <td></td> <td>√</td> <td>√</td> <td>√</td> </tr> </tbody> </table>	Metal				W	X	Y	Zinc Zink		√	√	√	1	1
Metal															
W	X	Y	Zinc Zink												
	√	√	√												
(e)(i)	<p><i>Able to name substance R correctly.</i></p> <p><u>Sample answer:</u> Carbon// Coke</p>	1													
(ii)	<p><i>Able to state why substance R is choose.</i></p> <p><u>Sample answer:</u> Cheap// widely available// produced non-poisonous gas, carbon dioxide</p>	1													
(iii)	<p><i>Able to state the uses of slag</i></p> <p><u>Sample answer:</u> Building material// manufacture of cement</p>	1	3												
	<b>Total</b>		<b>9</b>												

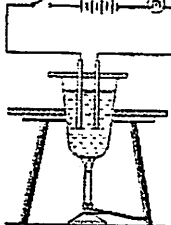
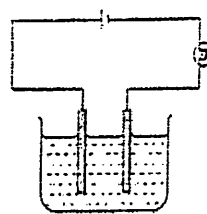
No 7	Explanation	Mark	$\Sigma$ Mark
(a)(i)	<p><i>Able to name the process and Able to write correct formula for reactant, product and balance balanced equation correctly</i></p> <p><u>Sample answer:</u> Haber  <math display="block">\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3</math>  [a: <math>\longrightarrow</math> ]</p>	1 2	3
(ii)	<p><i>Able to state all the conditions correctly</i></p> <p><u>Answer</u>            1. Pressure at 200 atm            2. Temperature at (450 -500)<math>^{\circ}\text{C}</math>            3. Catalyst : iron</p>	1 1 1	3
(b)(i)	<p><i>Able to describe the preparation correctly.</i></p> <p><u>Sample answer</u>            1. Pour <math>\text{H}_2\text{SO}_4</math> into a beaker            2. Add <math>\text{NH}_4\text{OH}</math> into <math>\text{H}_2\text{SO}_4</math>            3. Until <math>\text{NH}_3</math> can be smelt            4. Heat the solution/mixture remains one third of its original volume               /saturated            5. The solution/mixture is cooled            6. Filter the solution/mixture            7. Crystal formed is dried by pressing with dry filter paper.</p>	1 1 1 1 1 1 1 1	7
(b)(ii)	<p><i>Able to</i>            1.calculate % of nitrogen in <math>(\text{NH}_4)_2\text{SO}_4</math> and <math>(\text{NH}_2)_2\text{CO}</math> correctly            2.state which fertilizer has higher % of nitrogen            3.explain why the fertilizer is picked.</p> <p><u>Answer:</u>            1. Urea is better fertilizer            2. % of N in <math>(\text{NH}_4)_2\text{SO}_4 = 28/132 \times 100\%</math>              // 21.2%               % of N in <math>(\text{NH}_2)_2\text{CO} = 28/60 \times 100\%</math>              // 46.6%            3. Urea has higher percentage of nitrogen</p>	1 1 1 1	4

(c)(i)	<p><i>Able to draw the structure formula of monomer</i></p> <p><u>Answer :</u></p> $\begin{array}{c} \text{CH}_3 \text{ H} \\   \quad   \\ \text{C} = \text{C} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$	1	1
(c)(ii)	<p><i>Able to name the monomer</i></p> <p><u>Answer :</u></p> <p>Propene</p>	1	1
(c)(iii)	<p><i>Able to state the uses of the polymer</i></p> <p><u>Sample answer :</u> To manufacture piping / bottle crates / carpets / car batteries / ropes</p>	1	1
Total			20

No 8	Explanation	Mark	$\Sigma$ Mark
(a)(i)	<i>Able to explain why and the uses of stabilisers as food additives.</i>  <u>Sample answer:</u>  1. Example of stabilisers are lecithin/ mono- and – di- glycerides of fatty acid. 2 stabilisers prevent an emulsion from separating out.	1  1	2
(ii)	<i>Able to give the name of MSG</i> <i>Able to state the functions and uses of MSG.</i>  <u>Sample answer</u> 1 MSG is monosodium glutamate, The function of MSG: 2 To improve the taste of food. 3 To restore loss because of processing.	1  1 1	3
(b)(i)	<i>Able to state the function of salt.</i>  <u>Answer</u> Preservative	1	1
(ii)	<i>Able to explain how the salt works as preservative.</i>  <u>Answer</u> 1 salts draws the water out the cells of microorganisms. 2 it retards the growth of microorganisms.	1 1	2
(iii)	<i>Able to name another substance that has the same function as salt.</i>  <u>Sample answer</u> Sugar/ sodium benzoate/ sodium nitrate/ vinegar.	1	1
(c)(i)	<i>Able to explain the cleansing action of soap on the stained cloth.</i>  <u>Sample answer</u> 1 Soap molecules consist of hydrophilic and hydrophobic parts. 2 Soap decreases the water surface tension. 3 Increase the wetting ability of water. 4 Hydrophilic part is soluble in water. 5 Hydrophobic part is soluble in grease. 6 Scrubbing breaks the grease into small droplets. 7 Droplets suspended in water to form an emulsion. 8 Rinsing washes away the droplets.	1 1 1 1 1 1 1 1	8

d (i)	<i>Able to name the modern medicines that can used to treat the child.</i>		
	<u>Sample answer</u> Paracetamol	1	1
(ii)	<i>Able to state two correct usage of the medicine.</i>		
	<u>Sample answer</u> 1 Proper dosage 2 Take after food 3 Taken with doctor's prescription	1  1	  2
	<b>Total</b>		<b>20</b>

No 9	Explanation	Mark	$\Sigma$ Mark
(a)(i)	<b>Determine the concentration of acid Y solution</b> <u>Answer</u> 1 No of mole = $38.4 / 192 = 0.2 \text{ mol}$ 2 Molarity = $0.2 / 0.1 = 2.0 \text{ mol dm}^{-3}$	1 1	2
(ii)	<b>Describe two methods to verify a solution is an acid</b> <u>Sample answer</u> 1 Pour hydrochloric acid/ [named acid] in a test tube. Add zinc/ [any suitable metal] in the test tube 2 Near/place a lighted splinter at the mouth of the test tube, 'pop' sound produced.  Equation: $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$ 3 correct formulae of reactants & products 4 balanced equation 5 Put acid in another test tube. Add calcium carbonate in the acid. 6 Pass through the gas released into lime water. Turn chalky/ cloudy Equation: $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$ 7 correct formulae of reactants & products 8 balanced equation	1  1  1 1 1 1 1 1	8
(b)	<b>Able to describe the confirmatory test for cation and anion in the solution</b> <u>Sample answer</u> <b>Cation test : <math>\text{Zn}^{2+}</math></b> 1 Pour the solution in the test tube 2 Add NaOH solution little by little until excess. 3 Observation : White precipitate formed and dissolve in excess of NaOH. Shows the presence of $\text{Zn}^{2+}$ <i>Note: point 3 – observation + conclusion</i> <b>Anion Test : <math>\text{NO}_3^-</math></b> 4 Add sulphuric acid 5 Add $\text{FeSO}_4$ solution 6 Add slowly / drop <u>concentrated</u> $\text{H}_2\text{SO}_4$ 7 Brown ring formed , shows $\text{NO}_3^-$ present. <b>Anion Test : <math>\text{Cl}^-</math></b> 8 Add $\text{HNO}_3$ 9 Add $\text{AgNO}_3$ / $\text{Pb}(\text{NO}_3)_2$ solution 10 White precipitate, shows the presence of $\text{Cl}^-$ ions.	1 1 1  1 1 1 1 1 1 1	Max= 10
	<b>Total</b>		<b>20</b>

No 10	Explanation	Marks	
(a) (i)	<p><i>Able to name three chemical bonds</i></p> <p><u>Answer:</u>            P- metallic            Q- ionic            R- covalent</p>	1 1 1	3
(ii)	<p><i>Able to explain the idea of high melting point with the forces between particles</i></p> <p><u>Answer:</u></p> <ol style="list-style-type: none"> <li>1 Q is an ionic compound has positive ions and negative ions held together by strong electrostatic forces.</li> <li>2 Higher heat energy is needed to overcome the forces.</li> <li>3 R is a simple covalent molecule has weak van der Waals / intermolecular forces between molecules.</li> <li>4 Lower heat energy is needed to overcome the forces.</li> </ol>	1 1 1 1	4
(iii)	<p><i>Able to describe the experiment</i></p> <div style="display: flex; justify-content: space-around; align-items: center;">  <p style="margin: 0 20px;">OR</p>  </div> <ol style="list-style-type: none"> <li>1 Functional diagram : battery, complete circuit and bulb/ammeter/voltmeter</li> <li>2 Label : heat , molten ionic compound / aqueous ionic compound</li> <li>3 Heat substance Q // dissolve substance Q</li> <li>4 Dipped / immerse carbon electrodes into the solution</li> <li>5 Complete the circuit / turn on the switch</li> <li>6 Record the observation</li> <li>7 Repeat by replace substance Q with R</li> <li>8 Molten Q / solution Q can conduct electricity because has free moving ions</li> <li>9 Molten R / solution R can not conduct electricity because exist as Molecule</li> </ol>	1 1 1 1 1 1 1 1 1	9

(b)	[Able to state one physical properties and explain the changes when going down the Group 1 ]			
	<u>Sample Answer :</u>			
	<b>Physical Property</b>	<b>Description (when going down the group)</b>	<b>Explanation</b>	
	1 melting / boiling point	Decreases	1 The forces of attraction decreases 2 Less heat energy needed to overcome the forces	1+1 +2
	2 Atomic size	Increases	1 Number of electrons Increases 2 Number of shell filled electrons increases	1+1 +2
	3 Density	Decreases	1 Mass and atomic size / volume of element increases when going down the group 2. The atomic size/ volume increase more than mass	1+1 +2
	<b>Total</b>			<b>4</b>
				<b>20</b>

END OF MARK SCHEME