

SULIT

4541/3(PP)



JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN SPM 2011
CHEMISTRY
Kertas 3
September

4541/3

SKEMA PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

AMARAN

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Peraturan pemarkahan ini mengandungi 18 halaman bercetak

Marking Scheme Paper 3

Question	Mark Scheme	Score
1(a)	<p>Able to state one inference for each experiment</p> <p><u>Sample answers:</u></p> <p>Test tube I : Iron rust/oxidised // iron atom released electron// iron(II) ions / Fe^{2+} formed // iron(II) ions present//rusting occur</p> <p>Test tube II : Iron does not rust // iron(II) ions are not present // zinc corrodes // zinc atom released electron// zinc ions formed // zinc oxidised</p> <p>Test tube III : Iron rust/oxidised // iron atom released electron// iron(II) ions / Fe^{2+} formed // rusting occur // iron(II) ions present</p>	3
	<p>Able to state any two inferences</p>	2
	<p>Able to state any one inference</p>	1
	<p>No response or wrong response</p>	0

Question	Mark Scheme	Score
1(b)	<p>Able to state the hypothesis accurately</p> <p><u>Sample answer</u></p> <p>When a more/less electropositive metal is in contact with iron/ferum/Fe, the metal inhibits/(speeds up) rusting/corrosion of iron //</p> <p>When a more/less electropositive metal is in contact with iron/ferum/Fe, rusting of iron/ferum/Fe is faster/slower //</p> <p>If the metal in contact with iron is higher/lower than iron/ferum/Fe in electrochemical series, the rusting/corrosion of iron is slower/faster //</p> <p>The higher/lower the metal in contact with iron in electrochemical series/ than iron/ferum/Fe, the rusting/corrosion of iron/ferum/Fe is slower/faster</p>	3
	<p>Able to state the hypotesis correctly</p> <p><u>Sample answer</u></p> <p>When a more/less electropositive metal, the metal inhibits/(speeds up) rusting/corrosion of iron //</p> <p>If the metal in contact with iron is higher than iron/ferum/Fe in reactivity series, the rusting/corrosion of iron is slower/faster //</p> <p>The rusting of iron/ferum/Fe is faster/slower, if a more/less electropositive metal is in contact with iron/ferum/Fe</p>	2
	<p>Able to state the idea of hypothesis</p> <p><u>Sample answer</u></p> <p>Different metal in contact with iron, will cause iron to rust //</p> <p>Metal can cause iron to rust.</p>	1
	No response or wrong response	0

Question	Mark Scheme	Score
1(c)	<p>Able to state the three variables correctly</p> <p>Sample answer:</p> <p>(i) Manipulated variables: Type/different metals // position of metal in electrochemical series</p> <p>(ii) Responding variable: Rusting / corrosion // presence of blue/pink colour</p> <p>(iii) Constant variable: Size/mass of iron nail // type of nail // clean iron nails // temperature // medium in which the iron nails are kept</p>	3
	<p>Able to state any two variables correctly.</p>	2
	<p>Able to state any one variable correctly.</p>	1
	<p>No response or wrong response</p>	0

Question	Mark Scheme	Score
1(d)	<p>Able to give the operational definition accurately</p> <p><u>Sample answer</u></p> <p>When iron is in contact with metal lower than iron in electrochemical series, blue colouration indicates rusting //</p> <p>Rusting occurs when iron nail is in contact with copper/tin /less electropositive metal and form blue colouration//</p> <p>Blue colouration is formed when iron is in contact with metal lower than iron in electrochemical series</p>	3
	<p>Able to give the operational definition correctly.</p> <p><u>Sample answer:</u></p> <p>Blue colouration indicates rusting //</p> <p>Rusting occurs when iron nail is in contact with copper/tin /less electropositive metal</p>	2
	<p>Able to give an idea of the operational definition .</p> <p><u>Sample answer:</u></p> <p>Rusting occurs when the colour of solution changes. //</p> <p>Rusting occurs</p>	1
	No response or wrong response	0

Question	Mark Scheme	Score
1(e)	<p>Able to predict any one the observations based on the laboratory experiment correctly</p> <p><u>Sample answers</u></p> <p>Blue spot/colouration //</p> <p>Iron nail becomes smaller //</p> <p>Lead strip remains unchanged</p>	3
	<p>Able to predict one observations less correctly.</p> <p><u>Sample answer:</u></p> <p>Pink spot/colouration</p>	2
	<p>Able to give an idea of observations.</p> <p><u>Sample answer:</u></p> <p>Iron rusts // Brown deposit/spot</p>	1
	<p>No response or wrong response</p>	0

Question	Mark Scheme	Score
2(a)	Able to state both two observations accurately during the experiment. <u>Sample answer:</u> 1. Pink solution turns colourless. 2. Conical flask becomes warm/hot.	3
	Able to state one observation accurately during the experiment.	2
	Able to state any idea of observation. <u>Sample answer:</u> 1. Volume increases 2. Pink 3. Colourless 4. Warm/hot	1
	No response or wrong response	0

Question	Mark Scheme	Score												
2(b)	<p>Able to record the burette readings accurately with 2 decimal points.</p> <p><u>Answer</u></p> <table border="1"> <thead> <tr> <th>Set</th> <th>Initial reading</th> <th>Final reading</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>0.00</td> <td>26.00</td> </tr> <tr> <td>II</td> <td>0.50</td> <td>24.50</td> </tr> <tr> <td>III</td> <td>5.50</td> <td>30.50</td> </tr> </tbody> </table>	Set	Initial reading	Final reading	I	0.00	26.00	II	0.50	24.50	III	5.50	30.50	3
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I	0.00	26.00												
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	<p>Able to record the burette readings correctly.</p> <p><u>Answer</u></p> <table border="1"> <thead> <tr> <th>Set</th> <th>Initial reading</th> <th>Final reading</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>0 // 0.0</td> <td>26 // 26.0</td> </tr> <tr> <td>II</td> <td>0.5</td> <td>24.5</td> </tr> <tr> <td>III</td> <td>5.5</td> <td>30.5</td> </tr> </tbody> </table>	Set	Initial reading	Final reading	I	0 // 0.0	26 // 26.0	II	0.5	24.5	III	5.5	30.5	2
Set	Initial reading	Final reading												
I	0 // 0.0	26 // 26.0												
II	0.5	24.5												
III	5.5	30.5												
	<p>Able to record any reading from the the burette completely.</p> <p><u>Sample Answer:</u></p> <table border="1"> <thead> <tr> <th>Set</th> <th>Initial reading</th> <th>Final reading</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>0</td> <td>26</td> </tr> <tr> <td>II</td> <td>1.5</td> <td>25.5</td> </tr> <tr> <td>III</td> <td>6.5</td> <td>31.5</td> </tr> </tbody> </table>	Set	Initial reading	Final reading	I	0	26	II	1.5	25.5	III	6.5	31.5	1
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	No response or wrong response	0												

Question	Mark Scheme	Score																																
2(c)	<p>Able to make a table to record the the data from three experiments accurately with units.</p> <p>Sample Answer:</p> <table border="1"> <thead> <tr> <th>Set</th> <th>Initial reading/ cm^3</th> <th>Final reading/ cm^3</th> <th>Volume HCl/ cm^3</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>0.00</td> <td>26.00</td> <td>26.00</td> </tr> <tr> <td>II</td> <td>0.50</td> <td>24.50</td> <td>24.00</td> </tr> <tr> <td>III</td> <td>5.50</td> <td>30.50</td> <td>25.00</td> </tr> </tbody> </table>	Set	Initial reading/ cm^3	Final reading/ cm^3	Volume HCl/ cm^3	I	0.00	26.00	26.00	II	0.50	24.50	24.00	III	5.50	30.50	25.00	3																
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	<p>Able to make a table to record the data from three experiments accurately without units <u>or</u> correctly with units.</p> <p>1. Sample Answer:</p> <table border="1"> <thead> <tr> <th>Set</th> <th>Initial reading</th> <th>Final reading</th> <th>Volume HCl</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>0.00</td> <td>26.00</td> <td>26.00</td> </tr> <tr> <td>II</td> <td>0.50</td> <td>24.50</td> <td>24.00</td> </tr> <tr> <td>III</td> <td>5.50</td> <td>30.50</td> <td>25.00</td> </tr> </tbody> </table> <p>2. Sample answer:</p> <table border="1"> <thead> <tr> <th>Set</th> <th>Initial reading/ cm^3</th> <th>Final reading/ cm^3</th> <th>Volume HCl/ cm^3</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>0 // 0.0</td> <td>26 // 26.0</td> <td>26 // 26.0</td> </tr> <tr> <td>II</td> <td>0.5</td> <td>24.5</td> <td>24 // 24.0</td> </tr> <tr> <td>III</td> <td>5.5</td> <td>30.5</td> <td>25 // 25.0</td> </tr> </tbody> </table>	Set	Initial reading	Final reading	Volume HCl	I	0.00	26.00	26.00	II	0.50	24.50	24.00	III	5.50	30.50	25.00	Set	Initial reading/ cm^3	Final reading/ cm^3	Volume HCl/ cm^3	I	0 // 0.0	26 // 26.0	26 // 26.0	II	0.5	24.5	24 // 24.0	III	5.5	30.5	25 // 25.0	2
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	<p>Able to make a table to record any data including the following:</p> <ul style="list-style-type: none"> - Reading from 2(b) - Heading without units - Set of experiment <p>Sample answer:</p> <table border="1"> <thead> <tr> <th>Set</th> <th>Initial reading</th> <th>Final reading</th> <th>Volume HCl</th> </tr> </thead> <tbody> <tr> <td>I</td> <td></td> <td></td> <td></td> </tr> <tr> <td>II</td> <td></td> <td></td> <td></td> </tr> <tr> <td>III</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Set	Initial reading	Final reading	Volume HCl	I				II				III				1																
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Question	Mark Scheme	Score
2(d)	<p>Able to calculate the average volume of hydrochloric acid accurately.</p> <p>Answer:</p> $\frac{26.00 + 24.00 + 25.00}{3} = 25.00 \text{ cm}^3$	3
	<p>Able to state the average volume of hydrochloric acid accurately with units.</p> <p>Answer:</p> <p>25.00 cm³</p>	2
	<p>Able to state the idea of average volume of hydrochloric acid.</p> <p>Sample answer.</p> <p>25.00 // 25.0 // 25 // (Average reading data from 2b) $\frac{x + y + z}{3}$</p>	1
	<p>No response or wrong response</p>	0

Question	Mark Scheme	Score
2(e)	<p>Able to state the relationship between the concentration of hydroxide ion, OH⁻ in sodium hydroxide, NaOH with time until the end point of titration accurately.</p> <p><u>Sample answer:</u></p> <p>The concentration of hydroxide ions/OH⁻ decreases with time. //</p> <p>The longer the time taken, the lower the concentration of hydroxide ions/ OH⁻</p>	3
	<p>Able to state the relationship between the concentration hydroxide ion, OH⁻ in sodium hydroxide, NaOH with time until the end point of titration inaccurately.</p> <p><u>Sample answer:</u></p> <p>The concentration decreases with time. //</p> <p>The longer the time taken, the lower the concentration</p>	2
	<p>Able to state an idea of the relationship between the concentration hydroxide ion, OH⁻ in sodium hydroxide, NaOH with time until the end point of titration.</p> <p><u>Sample answer:</u></p> <p>Concentration decreases // Lower concentration</p>	1
	No response or wrong response	0

Question	Mark Scheme	Score	
2(f)	Able to classify all acids into monoprotic, diprotic and triprotic acid accurately.	3	
	Answer:		
	Monoprotic, acid	Diprotic acid	Triprotic acid
	Hydrochloric acid	Sulphuric acid	Phosphoric acid
	Ethanoic acid Nitric acid		
	Able to classify any four acids into monoprotic, diprotic and triprotic acid accurately.	2	
	Able to classify any two acids into monoprotic, diprotic and triprotic acid accurately.	1	
	No response or wrong response	0	

Question	Mark Scheme	Score
3(a)	<p>Able to give statement of the problem accurately.</p> <p><u>Sample answer:</u></p> <p>Does the position/distance between two metals in electrochemical series affect the voltmeter reading/voltage/potential difference? //</p> <p>Does the position/distance between pair of metals in electrochemical series affect the voltmeter reading/voltage/potential difference? //</p> <p>Does the further the distance of two metals in electrochemical series increase the potential difference?</p>	3
	<p>Able to give statement of the problem correctly.</p> <p><u>Sample answer:</u></p> <p>Does the position/distance between metals in Electrochemical Series affect the voltmeter reading/voltage/potential difference? //</p> <p>Does pair of metals in electrochemical series affect the voltmeter reading/voltage/potential difference?</p>	2
	<p>Able to give an idea of statement of the problem correctly</p> <p><u>Sample answer:</u></p> <p>Does the position/distance between two metals in reactivity series affect the voltmeter reading/voltage/potential difference? //</p> <p>Metals produce a voltage.</p>	1
	No response or wrong response	0

Question	Mark Scheme	Score
3(b)	Able to state the three variables correctly Sample answer: Manipulated variable : Pairs of metals Responding variable : Voltage // voltmeter reading // potential difference Constant variable : Electrolyte // the metal as the positive/negative terminal // volume and concentration of electrolyte	3
	Able to state any two variables correctly	2
	Able to state any one variable correctly	1
	No response or wrong response	0

Question	Mark Scheme	Score
3(c)	<p>Able to state the relationship between the manipulated variable and the responding variable and state the direction accurately.</p> <p><u>Sample answer:</u></p> <p>The further the distance of the pair of metals in the electrochemical series, the voltage / voltmeter reading / potential difference becomes greater. //</p> <p>The further the position of two metals in electrochemical series, the higher the voltage / potential difference reading</p>	3
	<p>Able to state the relationship between the manipulated variable and the responding variable and without stating the direction.</p> <p><u>Sample answer:</u></p> <p>The distance of the pair of metals in the Electrochemical Series influences the voltage / voltmeter reading / potential difference</p>	2
	<p>Able to state the idea of hypothesis correctly</p> <p><u>Sample answer:</u></p> <p>The further the distance of electrodes in the Electrochemical Series, the voltage / voltmeter reading / potential difference becomes greater/smaller</p> <p>Different metals give different voltage / voltmeter reading / potential difference</p>	1
	No response or wrong response	0

Question	Mark Scheme	Score
3(d)	<p>Able to give adequate list of materials and apparatus that involves the following</p> <ul style="list-style-type: none"> - Three suitable metals [below calcium] - One suitable electrolyte - Voltmeter, beaker, connecting wires, sand paper <ul style="list-style-type: none"> • Only two materials and/or apparatus can list out from diagram. <p><u>Sample answer:</u></p> <p>Aluminum, zinc, copper, copper(II) solution, voltmeter, beaker, connecting wires, sand paper</p>	3
	<p>Able to give a list of materials and apparatus that involves the Following 3 items:</p> <ul style="list-style-type: none"> - Two suitable metals [below calcium] - One suitable electrolyte and container - Voltmeter <p><u>Sample answer:</u></p> <p>Silver, iron , siver nitrate solution voltmeter, basin/test tube</p>	2
	<p>Able to give a list of materials that involves the following 2 items:</p> <ul style="list-style-type: none"> - Two metals - Any named electrolyte <p><u>Sample answer:</u></p> <p>Lithium and potassium // Silver and lead Hydrochloric acid</p>	1
	No response or wrong response	0

Question	Mark Scheme	Score
3(e)	<p>Able to state the following 6 steps correctly.</p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> 1. Pour copper(II) sulphate solution / suitable electrolyte into a container/beaker 2. Clean the metal strips/aluminium and copper with sand paper 3. Dip both metal/aluminium and copper into the electrolyte 4. Connect the metals/aluminium and copper to the voltmeter // complete the circuit 5. Record the voltmeter reading 6. Repeat steps 1 to 5 by substituting one metal for another/aluminium with zinc 	3
	<p>Able to state the following steps correctly based on score 3.</p> <ul style="list-style-type: none"> - Steps 1 or 3 - Step 4 - Step 5 - Step 6 	2
	<p>Able to state the following steps correctly based on score 3.</p> <ul style="list-style-type: none"> - Step 1 or 3 	1
	<p>No response or wrong response</p>	0

Question	Mark Scheme	Score						
3(f)	<p>Able to exhibit the tabulation of data which includes the following three information</p> <ol style="list-style-type: none"> 1. Heading for the manipulated variable 2. Examples of two pairs of metals 3. Heading for the responding variable with units <p><u>Sample answer:</u></p> <table border="1"> <thead> <tr> <th>Pair of metals/Electrodes</th> <th>Voltage /V</th> </tr> </thead> <tbody> <tr> <td>Aluminium and copper</td> <td></td> </tr> <tr> <td>Zinc and copper</td> <td></td> </tr> </tbody> </table>	Pair of metals/Electrodes	Voltage /V	Aluminium and copper		Zinc and copper		2
Pair of metals/Electrodes	Voltage /V							
Aluminium and copper								
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	<p>Able to exhibit the tabulation of data which includes the following information</p> <ol style="list-style-type: none"> 1. Heading for manipulated variable/responding variable without unit 2. Examples of one pair of metals <p><u>Sample answer:</u></p> <table border="1"> <thead> <tr> <th>Metals/Electrodes</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Aluminium and copper</td> <td></td> </tr> </tbody> </table>	Metals/Electrodes	Voltage	Aluminium and copper		1		
Metals/Electrodes	Voltage							
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	No response or wrong response	0						

END OF MARKING SCHEME