

**SULIT**  
4541/1 dan 2  
Chemistry  
Mark Scheme  
Paper 1 and 2

4541/1 dan 2



**PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA  
SEKOLAH MENENGAH MALAYSIA (PKPSM) CAWANGAN MELAKA  
DENGAN KERJASAMA  
JABATAN PELAJARAN MELAKA**

---

**PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA 2010**

---

---

**CHEMISTRY**  
Mark Scheme  
Paper 1 and Paper 2  
SET 1

---

---

---

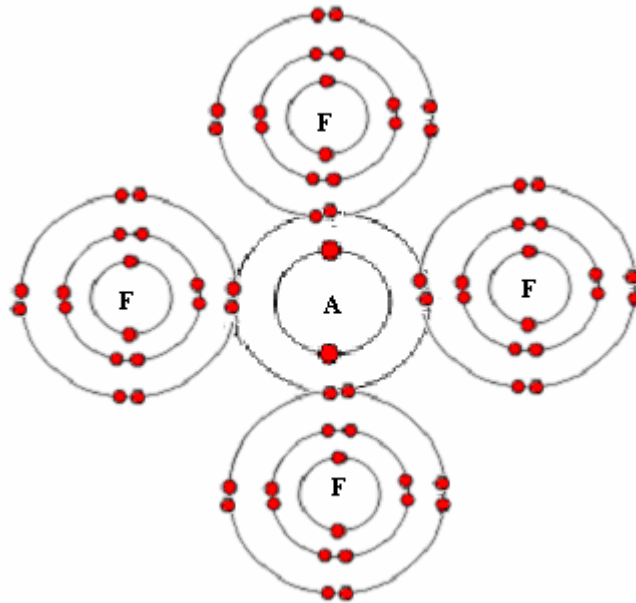
Skema Pemarkahan ini mengandungi 11 halaman bercetak.

**ANSWERS FOR CHEMISTRY PAPER 1  
(SET 1)**

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

## SECTION A

<b>1</b>	(a)	Number of proton in an atom		1
	(b)	Atom		1
	(c)	(i) 2.8.6		1
		(ii) 6		1
	(d)	(i) Atoms of the same element with different numbers of neutrons// Atoms of the same element with different nucleon number // Atoms that has the same number of proton but different number of neutron		1
		(ii) Estimate the age of fossils/artefacts		1
	(e)	(i) 1. Functional diagram	1	
		2. Labeled CaCO <sub>3</sub>	1	2
		(ii) 1. Correct formula of reactant		
		2. Correct formula of products		
		3. Balance the equation		
		$\text{CuCO}_3 \rightarrow \text{CuO} + \text{CO}_2$		2
			<b>Total</b>	<b>10</b>
<b>2</b>	(a)	(i) F ,H		1
		(ii) They have same valence electron		1
	(b)	E/Aluminium		1
	(c)	(i) C		1
		(ii) Achieved stable /octate electron arrangement		1
	(d)	C, B, A, F ,E ,D		1
	(e)	(i) Low boiling point // insoluble in water// soluble in inorganic solvent// cannot conduct electricity ( any other acceptable physical properties		1
		(ii) [1. correct number of occupied electron shells and correct electrons in each shells for all the atoms, nuclei shown ]		1
		[2. four atoms of F combine covalently (sharing a pair of electrons)with one atom of A ]		1



(iii) Covalent bond

**Total**

1  
**10**

- |          |     |      |   |   |           |
|----------|-----|------|---|---|-----------|
| <b>3</b> | (a) | (i)  | Molecule  | 1 |           |
|          |     | (ii) | Ions  | 1 |           |
|          | (b) |      | Water   | 1 |           |
|          | (c) | 1.   | In solvent X hydrogen chloride exists as molecules// in solvent Y hydrogen chloride ionize to produce hydrogen ions | 1 |           |
|          |     | 2.   | Hydrogen ions react with marble chips to produce carbon dioxide gas   | 1 | 2         |
|          | (d) | (i)  | Zinc oxide  | 1 |           |
|          |     | (ii) | 1. Correct formula for reactants and products   | 1 |           |
|          |     |      | 2. Balance the equation   | 1 | 2         |
|          |     |      | $2\text{Zn}(\text{NO}_3)_2 \rightarrow 2\text{ZnO} + 4\text{NO}_2 + \text{O}_2$                                     |   |           |
|          | (e) |      | -add sodium hydroxide/ ammonia solution to solution Z until excess  | 1 |           |
|          |     |      | -white precipitate soluble in excess sodium hydroxide/ soluble in excess ammonia solution                           | 1 | 2         |
|          |     |      |   |   | <b>10</b> |

- 4 (a) Cell 1 : Chemical cell /Voltaic cell      Cell 2 : Electrolytic Cell      2
- (b) Electrical energy to Chemical energy      1
- (c) (i) zinc ions      1
- (ii)  $\text{Zn} \longrightarrow \text{Zn}^{2+} + 2\text{e}^-$       1
- (d) [arrow from the zinc electrode to the silver electrode through the external circuit]      1
- (e)  $\text{Cu}^{2+}$ ,  $\text{SO}_4^{2-}$ ,  $\text{H}^+$ ,  $\text{OH}^-$       1
- (f) (i) Brown solid deposited at the cathode      1
- (ii)  $\text{Cu}^{2+}$  in the electrolyte accepts electron and forms copper atoms      1
- (g)      1

Cell 1	Cell 2
No dry cells	Has dry cells
Electrodes are made up of different metals	Electrodes are made up of carbon
Has two different electrolytes	Only one electrolyte
Presence of salt bridge	No salt bridge
	[ any 1 pair ]

**Total      10**

- 5 (a) (i) Contact Process      1
- (ii) 1. Correct formula of reactants      1
2. Balance the equation      1      2
- $2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3$
- (iii) Vanadium(V) oxide/ Vanadium pentoxide      1
- (iv) Any suitable correct uses      1
- Manufacture of paint/electrolyte
- (b) (i) Saponification      1
- (ii) Soap      1
- (iii) Reduce solubility of soap in mixture      1
- (iv) J : Soap      1
- K : Detergent      1      2

**Total      10**

6	(a)	Propanol	1
	(b)	$C_3H_6 + H_2O \rightarrow C_3H_7OH$	1
	(c)	(i) Dehydration	1
		(ii) -functional apparatus	1
		-labeled diagram : glass wool soaked with alcohol P/ propanol, Porcelain chips, delivery tube, a test tube invert in a basin of water to collect propene.	1
	(d)	(i) Oxidizing agent	1
		(ii) Oxidation	1
		(iii) Orange to green	1
	(e)	(i) Esterification	1
		(ii) $CH_3COOC_3H_7OH$	1
			<b>10</b>

## SECTION B

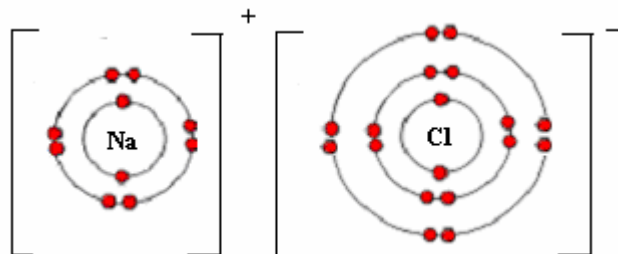
- 7 (a) (i) Fixed mass of sulphur produced per time 1  
(ii) Sulphur 1  
(iii)  $S_2O_3^{2-} + 2H^+ \longrightarrow S + SO_2 + H_2O$  1 3
- (b) (i) 1. Axis labelled and with units 1  
2. Scales appropriate (size: min  $\frac{3}{4}$  of graph paper) and consistent 1 3  
3. Points correctly plotted and smooth curve drawn 1
- (ii) 1. As concentration of sodium thiosulphate increases, the time taken for the reaction decreases 1  
2. Increase in concentration of sodium thiosulphate will increase the number of thiosulphate ions/ions per unit volume 1  
3. Frequency of collision between thiosulphate ions and hydrogen ions increases 1  
4. Frequency of effective collision increases 1 5  
5. Increase in concentration of sodium thiosulphate increases the rate of reaction
- (c) (i) 1. Only a small amount of catalyst is needed to increase the rate of reaction.  
2. Catalyst remained chemically unchanged  
3. Catalyst undergoes physical changes during a chemical reaction.  
4. Catalyst changes only the rate of reaction but not the amount of product.  
5. Catalyst is specific in its reaction  
6. Increase the catalyst will increase the rate of reaction  
[ Any 3 ] 3
- (ii)
- | Catalyst           | Reaction   |
|--------------------|--|
| Nickel             | -Manufacture of margarine<br>-Hydrogenation of alkene to form alkane   |
| Vanadium (V) oxide | -Contact Process / sulphur dioxide reacts with oxygen to form sulphur trioxide<br><br>[ or any correct examples of catalysts and their responding reactions] |
- 2+2
- (iii) 1. Y-axis labelled energy , X-axis labelled progress of reaction . 1  
2. Activation energy with catalyst is drawn lower than the activation energy without catalyst for an exothermic reaction 1 9

- Total** **20**
- 8 (a) (i)
1. Electronegativity decreases down the group 1
  2. atomic radius /size becomes larger down the group 1
  3. the force of attraction between nucleus and electrons become weaker 1
  4. Melting points and boiling points increases down the group because 1
  5. molecular size increases down the group, 1
  6. attraction forces between molecules become stronger // intermolecular forces become stronger 1
  7. more heat is needed to overcome this force of attraction 1
  8. The density of halogens increases down the group because 1
  9. even though both atomic mass and volume(size) of halogens increases down the group 1
  - 10 The increase in atomic mass is bigger than volume (size). 1 10

- (ii) 1. Reaction of chlorine , bromine and iodine with iron :  
Reactivity of chlorine > bromine > iodine 1

Halogen	Observation
Chlorine	Iron (wool) ignites rapidly with bright flame, brown solid formed. <span style="float: right;">1</span>
Bromine	Iron (wool) glows brightly , brown solid formed <span style="float: right;">1</span>
Iodine	Iron (wool) glows dimly, brown solid formed. <span style="float: right;">1</span> <span style="float: right; margin-right: 20px;">4</span>

- (b) (i) 1. Ionic bond 1 1
- (ii) 1. [correct number of occupied electron shells, correct electrons in each shell and nuclei shown for both ions] 1
2. [one sodium ions combine with one chloride ions, charges of ions shown] 1



3. can conduct electricity in the molten state 1
4. cannot conduct in the solid state 1
5. in molten state the ions are free to move 1
- 6 in solid state ions are not free to move but held fixed in lattice 1 Max 5

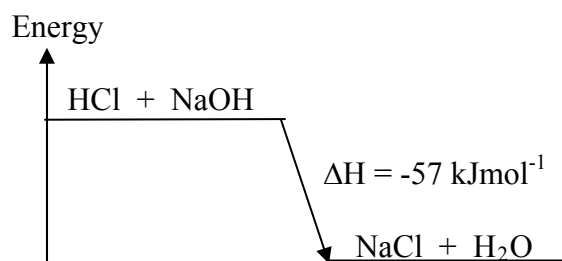
**Total** **20**



## SECTION C

9	(a)	(i)	Compound formed when hydrogen ion from an acid is replaced by metal ions or ammonium ions	1	
		(ii)	Lead(II) chloride	1	
			Double decomposition	1	
	(b)	(iii)	1.	Pour [50-100 cm <sup>3</sup> ] [0.5-2.0 mol dm <sup>-3</sup> ] lead(II) nitrate solution in a beaker	1
			2.	Add [50-100 cm <sup>3</sup> ] [0.5-2.0 mol dm <sup>-3</sup> ] sodium chloride / any soluble salts solution contain chloride ions into the beaker	1
			3.	Stir the mixture	1
			4.	filter the mixture	1
			5.	Rinse the residue with distilled water	1
			6.	dry the salt with filter paper	1
			7.	Equation:	1
			$\text{Pb}^{2+} + \text{Cl}^{-} \rightarrow \text{PbCl}_2$		
			[Calculate the molar mass of KCl required]	1	
			1. Molar mass of KCl = 39 + 35.5 = 74.5 g mol <sup>-1</sup>		
		[Calculate number of mole of KCl require]	1		
		2. No. of mole = (MV)/1000 = (0.5 x 250)/1000 = 0.125 mol			
		[Calculate mass of KCl required]	1		
		3. Mass = 0.125 x 74.5 = 9.3125 g			
		4. Weigh out 9.3125 g of KCl	1		
		5. Dissolve the solid KCl with a little distilled water in a beaker	1		
		6. Transfer the solution into 250 cm <sup>3</sup> volumetric flask using filter funnel.	1		
		7. Rinse the beaker and filter funnel with distilled water and add the washing to the flask	1		
		8. Add distilled water into the flask slowly until the graduation mark.	1		
		9. Closed the flask with stopper	1		
		10. Shake well//invert several time until the solution mixed well	1		
			<b>10</b>		
		<b>Total</b>	<b>20</b>		

- 10 (a) Heat change/release when 1 mol of water formed from the reaction between an acid and alkali. 1
- (b)(i) 1. Correct formula of reactants  
2. Correct formula of product  
 $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$  2
- (ii) 1. No. of mole =  $(2.0 \times 25.0)/1000 = 0.05$  1  
2. Heat change =  $0.05 \times 57 = 2.85 \text{ kJ} / 2,850 \text{ J}$  1 2
- (iii) 1. Vertical axes labeled energy with two energy level 1  
2. Energy level of reactants is higher than products and  $\Delta H = -57 \text{ kJmol}^{-1}$  1 2



- (iv) 1. Ethanoic acid is weak acid// Ethanoic acid ionize partially in water 1  
2. Heat absorbed to ionized ethanoic acid 1 2
- (c) 1. Materials: sodium hydroxide, hydrochloric acid 1  
2.  $50 \text{ cm}^3$  of  $2 \text{ mol dm}^{-3}$  sodium hydroxide solution is measured using a measuring cylinder and poured into a plastic cup. 1  
3.  $50 \text{ cm}^3$  of  $2 \text{ mol dm}^{-3}$  hydrochloric acid is measured using another measuring cylinder and poured into a plastic cup. 1  
4. The initial temperature of the solutions are measured after a few minutes. 1  
5. The hydrochloric acid is then poured quickly and carefully into the sodium hydroxide solution 1  
6. The mixture is stirred using a thermometer and the highest temperature reached is recorded. 1  
7. Results: 1  
Initial temperature of sodium hydroxide solution =  $T_1 \text{ } ^\circ\text{C}$ .  
Initial temperature of hydrochloric acid =  $T_2 \text{ } ^\circ\text{C}$   
Highest temperature =  $T_3 \text{ } ^\circ\text{C}$

Calculations

8. Average temperature of acid and alkali	$= \frac{T_1 + T_2}{2}$	1
	$= T_x \text{ } ^\circ\text{C}$	
9. Increase in temperature	$= (T_3 - T_x) = \theta \text{ } ^\circ\text{C}$	1
10. Heat released in the reaction	$= (50 + 50) (C) \theta$	
	$= P \text{ Joule}$	1
11. Number of mole of sodium hydroxide and hydrochloric acid		
	$= \frac{50 \times 2}{1000}$	
	$= 0.1 \text{ mol}$	1
12. Heat of neutralisation, $\Delta H = P / (0.1 \times 1000)$	$\text{kJmol}^{-1}$	1
		Max <b>10</b>
		<b>Total 20</b>

**SKEMA PEMARKAHAN TAMAT**

4541/3  
Chemistry 3  
September  
2010



**PERSIDANGAN KEBANGSAAN PENGETUA-PENGETUA  
SEKOLAH MENENGAH MALAYSIA (PKPSM) CAWANGAN MELAKA  
DENGAN KERJASAMA  
JABATAN PELAJARAN MELAKA**

---

**PEPERIKSAAN PERCUBAAN  
SIJIL PELAJARAN MALAYSIA 2010**

---

---

**CHEMISTRY 3**

---

---

**PERATURAN PEMARKAHAN**

---

Skema Pemarkahan ini mengandungi 15 halaman bercetak

Question		Details	Score								
1.	(a)	<p><i>Able to state all the three variables and all the three actions correctly.</i></p> <p><u>Sample answer:</u></p> <table border="1"> <thead> <tr> <th>Name of variable</th> <th>Action to be taken</th> </tr> </thead> <tbody> <tr> <td>(i) <b>Manipulated variable:</b> Concentration of acid</td> <td>(i) <b>Method to manipulate variable:</b> Use different concentration of acid / dilute the acid</td> </tr> <tr> <td>(ii) <b>Responding variable:</b> pH value</td> <td>(ii) <b>What to observe in the responding variable:</b> pH meter reading</td> </tr> <tr> <td>(iii) <b>Controlled variable:</b> Type of acid / Nitric acid</td> <td>(iii) <b>Method to maintain constant variable:</b> Use same type of acid</td> </tr> </tbody> </table>	Name of variable	Action to be taken	(i) <b>Manipulated variable:</b> Concentration of acid	(i) <b>Method to manipulate variable:</b> Use different concentration of acid / dilute the acid	(ii) <b>Responding variable:</b> pH value	(ii) <b>What to observe in the responding variable:</b> pH meter reading	(iii) <b>Controlled variable:</b> Type of acid / Nitric acid	(iii) <b>Method to maintain constant variable:</b> Use same type of acid	3 + 3
		Name of variable	Action to be taken								
		(i) <b>Manipulated variable:</b> Concentration of acid	(i) <b>Method to manipulate variable:</b> Use different concentration of acid / dilute the acid								
		(ii) <b>Responding variable:</b> pH value	(ii) <b>What to observe in the responding variable:</b> pH meter reading								
(iii) <b>Controlled variable:</b> Type of acid / Nitric acid	(iii) <b>Method to maintain constant variable:</b> Use same type of acid										
	Able to state any two variables and any two actions correctly.	2 + 2									
	Able to state any one variable and any one action correctly.	1 + 1									
	No response or wrong response	0									
	(b)	<p><i>Able to state the relationship <b>correctly</b> between the manipulated variable and the responding variable with direction.</i></p> <p><u>Sample answer:</u> The higher the concentration of nitric acid, the lower the pH value.</p>	3								
		<p><i>Able to state the relationship between the manipulated variable and the responding variable without direction.</i></p> <p><u>Sample answer:</u> Concentration of acid affect the pH value.</p>	2								

Question	Details	Score
	<p><i>Able to state the idea of hypothesis</i></p> <p><u>Sample answer:</u> Acid have pH value</p>	1
	No response or wrong response	0
(c)	<p><i>Able to predict the concentration correctly with unit.</i></p> <p><u>Sample answer:</u> <math>0.000001 \text{ mol dm}^{-3} / 1.0 \times 10^{-6} \text{ mol dm}^{-3}</math></p>	3
	<p><i>Able to predict the concentration correctly without unit.</i></p> <p><u>Sample answer:</u> <math>0.000001 / 1.0 \times 10^{-6}</math></p>	2
	<p><i>Able to predict the concentration in range form.</i></p> <p><u>Sample answer:</u> Lower than 0.000001</p>	1
	No response or wrong response	0
(d)	<p><i>Able to show how to calculate the volume correctly and answer with unit.</i></p> <p><u>Sample answer:</u>  <math>M_1 V_1 = M_2 V_2</math>  <math>(0.1) V_1 = (0.001) (250)</math>  <math>V_1 = 0.250 / 0.1</math>  <math>= 2.5 \text{ cm}^3</math></p>	3
	<p><i>Able to give the volume correctly with unit.</i></p> <p><u>Sample answer:</u> <math>2.5 \text{ cm}^3</math></p>	2

Question	Details	Score																								
	<p><i>Able to give the volume correctly without unit.</i></p> <p><i>Sample answer:</i> 2.5</p>	1																								
	No response or wrong response	0																								
(e)	<p><i>Able to record all readings <b>accurately</b> to two decimal point <b>with unit</b>.</i></p> <p><u>Sample answer:</u></p> <table border="1" data-bbox="451 793 1193 982"> <thead> <tr> <th></th> <th>Initial burette readings</th> <th>Final burette readings</th> </tr> </thead> <tbody> <tr> <td>First titration</td> <td>1.20 cm<sup>3</sup></td> <td>25.30 cm<sup>3</sup></td> </tr> <tr> <td>Second titration</td> <td>0.55 cm<sup>3</sup></td> <td>24.60 cm<sup>3</sup></td> </tr> <tr> <td>Third titration</td> <td>3.00 cm<sup>3</sup></td> <td>27.20 cm<sup>3</sup></td> </tr> </tbody> </table>		Initial burette readings	Final burette readings	First titration	1.20 cm <sup>3</sup>	25.30 cm <sup>3</sup>	Second titration	0.55 cm <sup>3</sup>	24.60 cm <sup>3</sup>	Third titration	3.00 cm <sup>3</sup>	27.20 cm <sup>3</sup>	3												
	Initial burette readings	Final burette readings																								
First titration	1.20 cm <sup>3</sup>	25.30 cm <sup>3</sup>																								
Second titration	0.55 cm <sup>3</sup>	24.60 cm <sup>3</sup>																								
Third titration	3.00 cm <sup>3</sup>	27.20 cm <sup>3</sup>																								
	<p><i>Able to record all readings <b>correctly</b>.</i></p> <p># readings to one decimal point with unit # readings to two decimal point without unit</p> <p><u>Sample answer:</u></p> <table border="1" data-bbox="451 1276 1193 1465"> <thead> <tr> <th></th> <th>Initial burette readings</th> <th>Final burette readings</th> </tr> </thead> <tbody> <tr> <td>First titration</td> <td>1.2 cm<sup>3</sup></td> <td>25.3 cm<sup>3</sup></td> </tr> <tr> <td>Second titration</td> <td>0.5 / 0.6 cm<sup>3</sup></td> <td>24.6 cm<sup>3</sup></td> </tr> <tr> <td>Third titration</td> <td>3.0 cm<sup>3</sup></td> <td>27.2 cm<sup>3</sup></td> </tr> </tbody> </table> <p style="text-align: center;">Or</p> <table border="1" data-bbox="451 1575 1193 1764"> <thead> <tr> <th></th> <th>Initial burette readings</th> <th>Final burette readings</th> </tr> </thead> <tbody> <tr> <td>First titration</td> <td>1.20</td> <td>25.30</td> </tr> <tr> <td>Second titration</td> <td>0.55</td> <td>24.60</td> </tr> <tr> <td>Third titration</td> <td>3.00</td> <td>27.20</td> </tr> </tbody> </table>		Initial burette readings	Final burette readings	First titration	1.2 cm <sup>3</sup>	25.3 cm <sup>3</sup>	Second titration	0.5 / 0.6 cm <sup>3</sup>	24.6 cm <sup>3</sup>	Third titration	3.0 cm <sup>3</sup>	27.2 cm <sup>3</sup>		Initial burette readings	Final burette readings	First titration	1.20	25.30	Second titration	0.55	24.60	Third titration	3.00	27.20	2
	Initial burette readings	Final burette readings																								
First titration	1.2 cm <sup>3</sup>	25.3 cm <sup>3</sup>																								
Second titration	0.5 / 0.6 cm <sup>3</sup>	24.6 cm <sup>3</sup>																								
Third titration	3.0 cm <sup>3</sup>	27.2 cm <sup>3</sup>																								
	Initial burette readings	Final burette readings																								
First titration	1.20	25.30																								
Second titration	0.55	24.60																								
Third titration	3.00	27.20																								

Question	Details	Score																
	<i>Able to record <b>three to five readings</b> correctly.</i>	1																
	<i>No response or wrong response</i>	0																
(f)	<p><i>Able to construct a table that contains:</i></p> <ol style="list-style-type: none"> <li><i>1. Correct titles</i></li> <li><i>2. Readings and unit</i></li> </ol> <p><u>Sample answer:</u></p> <table border="1" data-bbox="418 751 1269 907"> <thead> <tr> <th>Titration number</th> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>Final burette reading / cm<sup>3</sup></td> <td>25.30</td> <td>24.60</td> <td>27.20</td> </tr> <tr> <td>Initial burette reading / cm<sup>3</sup></td> <td>1.20</td> <td>0.55</td> <td>3.00</td> </tr> <tr> <td>Volume of nitric acid / cm<sup>3</sup></td> <td>24.10</td> <td>24.05</td> <td>24.20</td> </tr> </tbody> </table>	Titration number	1	2	3	Final burette reading / cm <sup>3</sup>	25.30	24.60	27.20	Initial burette reading / cm <sup>3</sup>	1.20	0.55	3.00	Volume of nitric acid / cm <sup>3</sup>	24.10	24.05	24.20	3
Titration number	1	2	3															
Final burette reading / cm <sup>3</sup>	25.30	24.60	27.20															
Initial burette reading / cm <sup>3</sup>	1.20	0.55	3.00															
Volume of nitric acid / cm <sup>3</sup>	24.10	24.05	24.20															
	<p><i>Able to construct a less accurate table that contains the following:</i></p> <ol style="list-style-type: none"> <li><i>1. Titles</i></li> <li><i>2. Readings</i></li> </ol> <p><u>Sample answer:</u></p> <table border="1" data-bbox="418 1201 1269 1390"> <thead> <tr> <th>Titration number</th> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <td>Final burette reading</td> <td>25.30</td> <td>24.60</td> <td>27.20</td> </tr> <tr> <td>Initial burette reading</td> <td>1.20</td> <td>0.55 / 0.60</td> <td>3.00</td> </tr> <tr> <td>Volume of nitric acid</td> <td>24.10</td> <td>24.05</td> <td>24.20</td> </tr> </tbody> </table>	Titration number	1	2	3	Final burette reading	25.30	24.60	27.20	Initial burette reading	1.20	0.55 / 0.60	3.00	Volume of nitric acid	24.10	24.05	24.20	2
Titration number	1	2	3															
Final burette reading	25.30	24.60	27.20															
Initial burette reading	1.20	0.55 / 0.60	3.00															
Volume of nitric acid	24.10	24.05	24.20															
	<p><i>Able to construct a table with at least one title / reading.</i></p> <p><u>Sample answer:</u></p> <table border="1" data-bbox="418 1612 1269 1690"> <tbody> <tr> <td>Final burette readings</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Initial burette readings</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Final burette readings				Initial burette readings				1								
Final burette readings																		
Initial burette readings																		
	<i>No response or wrong response</i>	0																



Question	Details	Score
(g)	<p><i>Able to state the colour change accurately.</i></p> <p><u>Sample answer:</u> The colour of phenolphthalein change from pink to colourless.</p>	3
	<p><i>Able to state the the colour change inaccurately.</i></p> <p><u>Sample answer:</u> Change to colourless.</p>	2
	<p><i>Able to state an idea about the observation.</i></p> <p><u>Sample answer:</u> The colour changes // pink</p>	1
	<p><i>No response or wrong response</i></p>	0
(h)	<p><i>Able to give the operational definition <b>accurately</b> by stating the following <b>three</b> information.</i></p> <ol style="list-style-type: none"> <li>1. Volume of sulphuric acid added</li> <li>2. Neutralize sodium hydroxide solution completely</li> <li>3. Phenolphthalein change from pink to colourless</li> </ol> <p><u>Sample answer:</u> Volume of sulphuric acid added to neutralize the sodium hydroxide solution completely and the colour of phenolphthalein change from pink to colourless.</p>	3
	<p><i>Able to give the operational definition <b>correctly</b> by stating any <b>two</b> of the information above.</i></p> <p><u>Sample answer:</u> The end point of neutralization is the volume of sulphuric acid added to neutralize the sodium hydroxide solution completely.</p> <p style="text-align: center;">Or</p> <p>The end point of neutralization is the volume of sulphuric acid added and the phenolphthalein colour change from pink to colourless.</p>	2



Question		Details	Score						
		<p><i>Able to classify any <b>two acids correctly</b>.</i></p> <p><u>Sample answer:</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Monoprotic acid</th> <th>Diprotic acid</th> </tr> </thead> <tbody> <tr> <td>Nitric acid</td> <td>Sulphuric acid</td> </tr> <tr> <td></td> <td>Hydrochloric acid</td> </tr> </tbody> </table>	Monoprotic acid	Diprotic acid	Nitric acid	Sulphuric acid		Hydrochloric acid	2
Monoprotic acid	Diprotic acid								
Nitric acid	Sulphuric acid								
	Hydrochloric acid								
		<p><i>Able to classify any <b>one acid correctly</b>.</i></p> <p><u>Sample answer:</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Monoprotic acid</th> <th>Diprotic acid</th> </tr> </thead> <tbody> <tr> <td>Hydrochloric acid</td> <td>Nitric acid</td> </tr> <tr> <td>Sulphuric acid</td> <td></td> </tr> </tbody> </table>	Monoprotic acid	Diprotic acid	Hydrochloric acid	Nitric acid	Sulphuric acid		1
Monoprotic acid	Diprotic acid								
Hydrochloric acid	Nitric acid								
Sulphuric acid									
		<i>No response or wrong response</i>	0						
2(A)	(a)	<p><i>Able to give the statement of the problem accurately and response is in question form.</i></p> <p><u>Sample answer:</u> What is the difference in electrical conductivity between ionic compound and covalent compound?</p>	3						
		<p><i>Able to give the statement of the problem correctly.</i></p> <p><u>Sample answer:</u> How does type of compound affect electrical conductivity?</p>	2						
		<p><i>Able to give an idea of statement of the problem correctly.</i></p> <p><u>Sample answer:</u> To investigate the difference in electrical conductivity between ionic compound and covalent compound.</p>	1						
		<i>No response or wrong response</i>	0						

Question	Details	Score
(b)	<p><i>Able to state <b>the three</b> variables correctly.</i></p> <p><u>Sample answer:</u>            Manipulated variable: Ionic compound and covalent compound / lead(II) bromide and sulphur.</p> <p>Responding variable: Ammeter reading / electrical conductivity</p> <p>Constant variable: mass of lead(II) bromide and mass of sulphur / state of ionic compound and covalent compound.</p>	3
	<i>Able to state <b>any two</b> variables correctly</i>	2
	<i>Able to state <b>any one</b> variables correctly</i>	1
	<i>No response or wrong response</i>	0
(c)	<p><i>Able to state the relationship between the manipulated variable and the responding variable correctly with direction.</i></p> <p><u>Sample answer:</u>            Molten ionic compound can conduct electricity while molten covalent compound cannot conduct electricity. / Molten lead(II) bromide can conduct electricity while molten sulphur cannot conduct electricity.</p>	3
	<p><i>Able to state the relationship between the manipulated variable and the responding variable with direction.</i></p> <p><u>Sample answer:</u>            Ionic compound can / cannot conduct electricity // Covalent compound cannot / can conduct electricity.</p>	2
	<p><i>Able to state the idea of hypothesis.</i></p> <p><u>Sample answer:</u>            Different compound have different properties in electrical conductivity.</p>	1
	<i>No response or wrong response</i>	0

Question	Details	Score
(d)	<p><i>Able to give adequate list of materials and apparatus.</i></p> <p><u>Sample answer:</u></p> <p><u>Materials</u></p> <ol style="list-style-type: none"> <li>1. Lead(II) bromide</li> <li>2. Sulphur</li> </ol> <p><u>Apparatus</u></p> <ol style="list-style-type: none"> <li>1. Crucible</li> <li>2. Batteries</li> <li>3. Ammeter</li> <li>4. Carbon electrodes</li> <li>5. Tripod stand</li> <li>6. Bunsen burner</li> <li>7. wire gauze</li> <li>8. connecting wire</li> </ol>	3
	<p><i>Able to give a list of materials and apparatus.</i></p> <p><u>Sample answer:</u></p> <p><u>Materials</u></p> <ol style="list-style-type: none"> <li>1. Lead(II) bromide / any ionic compound</li> <li>2. Sulphur / any covalent compound</li> </ol> <p><u>Apparatus</u></p> <ol style="list-style-type: none"> <li>1. Any container</li> <li>2. Batteries</li> <li>3. Ammeter / bulb / voltmeter</li> <li>4. Electrodes</li> <li>5. Bunsen burner</li> <li>6. connecting wire</li> </ol>	2
	<p><i>Able to give an idea of materials and apparatus.</i></p> <p><u>Sample answer:</u></p> <p><u>Material</u></p> <p>Any ionic <b>or</b> covalent compound</p> <p><u>Apparatus</u></p> <ol style="list-style-type: none"> <li>1. Ammeter / bulb / voltmeter</li> <li>2. Electrodes</li> </ol>	1

Question	Details	Score						
	<i>No response or wrong response</i>	0						
(e)	<p><i>Able to state the following six steps:</i></p> <p><u>Sample answer:</u></p> <ol style="list-style-type: none"> <li>1. Fill a crucible with solid lead(II) bromide until it is half full.</li> <li>2. Connect the circuit.</li> <li>3. Heat the solid lead(II) bromide until it melts.</li> <li>4. Observe whether the needle of ammeter deflect or not / observe the ammeter reading.</li> <li>5. Record the observation.</li> <li>6. Repeat steps 1 to 5 using solid sulphur.</li> </ol>	3						
	<i>Steps 1, 2, 3, and 6</i>	2						
	<i>Step 2 and 3</i>	1						
	<i>No response or wrong response</i>	0						
(f)	<p><i>Able to tabulate the data completely</i></p> <p><u>Sample answer:</u></p> <table border="1" data-bbox="418 1318 1271 1436"> <thead> <tr> <th>Type of compound</th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td>Ionic compound</td> <td></td> </tr> <tr> <td>Covalent compound</td> <td></td> </tr> </tbody> </table>	Type of compound	Observation	Ionic compound		Covalent compound		2
Type of compound	Observation							
Ionic compound								
Covalent compound								
	<p><i>Able to tabulate the data incompletely</i></p> <p><u>Sample answer:</u></p> <table border="1" data-bbox="418 1692 1271 1810"> <thead> <tr> <th>Compound</th> <th>Observation</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Compound	Observation					1
Compound	Observation							

Question		Details	Score
		<i>No response or wrong response</i>	0
2(B)	(a)	<p><i>Able to give the statement of the problem accurately and response is in question form.</i></p> <p><u>Sample answer:</u> How do different types of metals in contact with iron affect rusting?</p>	3
		<p><i>Able to give the statement of the problem correctly.</i></p> <p><u>Sample answer:</u> How do different types of metals affect rusting?</p>	2
		<p><i>Able to give an idea of statement of the problem correctly.</i></p> <p><u>Sample answer:</u> Do metal affect rusting// To investigate/study the effect of other metal on the corrosion of iron.</p>	1
		<i>No response or wrong response</i>	0
	(b)	<p><i>Able to state <b>the three</b> variables correctly.</i></p> <p><u>Sample answer:</u> Manipulated variable: Different metal in contact with iron Responding variable: Rusting of iron // Rate of rusting Controlled variable: Iron nails// medium in which the iron nails are kept // temperature</p>	3
		<i>Able to state <b>any two</b> variables correctly</i>	2
		<i>Able to state <b>any one</b> variables correctly</i>	1
		<i>No response or wrong response</i>	0

Question	Details	Score
	<p><i>Able to state the relationship between the manipulated variable and the responding variable correctly with direction.</i></p> <p>(c) <u>Sample answer:</u> When a more/less electropositive metal is in contact with iron, the metal inhibits/speeds up rusting.</p>	3
	<p><i>Able to state the relationship between the manipulated variable and the responding variable with direction.</i></p> <p><u>Sample answer:</u> The metal inhibits/speeds up rusting when a more / less electropositive metal is in contact with iron.</p>	2
	<p><i>Able to state the idea of hypothesis.</i></p> <p><u>Sample answer:</u> Different types of metals speeds up / inhibits rusting</p>	1
	<p><i>No response or wrong response</i></p>	0
	<p><i>Able to give adequate list of materials and apparatus.</i></p> <p><u>Sample answer:</u></p> <p><u>Materials</u></p> <ol style="list-style-type: none"> <li>1 Iron nails</li> <li>2 Magnesium ribbon, copper strip</li> <li>3 Hot jelly solution with a little potassium hexacyanoferrate(III) and phenolphthalein</li> <li>4 Sand paper</li> </ol> <p><u>Apparatus</u></p> <ol style="list-style-type: none"> <li>1 Test tubes</li> <li>2 Test tube rack</li> </ol>	3



Question	Details	Score
	<p><i>Able to give a list of materials and apparatus.</i></p> <p><u>Sample answer:</u>  <u>Materials</u>            1 Iron nails            2 Magnesium/ copper strip            3 Hot jelly solution with a little potassium hexacyanoferrate(III) and phenolphthalein</p> <p><u>Apparatus</u>            Test tube/beaker/any container</p>	2
	<p><i>Able to give an idea of materials and apparatus.</i></p> <p><u>Sample answer:</u>  <u>Material</u>            Any metal</p> <p><u>Apparatus</u>            Test tube/beaker/ any container</p>	1
	<p><i>No response or wrong response</i></p>	0
(e)	<p><i>Able to state the following six steps:</i></p> <p><u>Sample answer:</u>            1 Clean all the three iron nails, magnesium ribbon and copper strip with sand paper            2 Coil two iron nails tightly with magnesium ribbon and copper strip respectively            3 Place all the iron nails in the different test tubes.            4 Pour hot jelly solution containing potassium hexacyanoferrate(III) and phenolphthalein indicator into the test tubes until completely cover the nails.            5 Keep the test tubes in a test tube rack and leave them aside for a day.            6 Record the observations.</p>	3
	<p><i>Steps 2,3,4 and 6</i></p>	2
	<p><i>Step 3</i></p>	1
	<p><i>No response or wrong response</i></p>	0

Question	Details	Score								
(f)	<p><i>Able to tabulate the data that includes the following information :</i></p> <ol style="list-style-type: none"> <li><i>1. Correct titles</i></li> <li><i>2. Complete list of iron and the metals in contact with iron.</i></li> </ol> <p><u>Sample answer :</u></p> <table border="1" data-bbox="418 489 1206 678"> <thead> <tr> <th>Test tube</th> <th>Observation // Intensity of blue colouration // presence of pink colouration</th> </tr> </thead> <tbody> <tr> <td>Fe</td> <td></td> </tr> <tr> <td>Fe + Mg</td> <td></td> </tr> <tr> <td>Fe + Cu</td> <td></td> </tr> </tbody> </table>	Test tube	Observation // Intensity of blue colouration // presence of pink colouration	Fe		Fe + Mg		Fe + Cu		2
Test tube	Observation // Intensity of blue colouration // presence of pink colouration									
Fe										
Fe + Mg										
Fe + Cu										
	<p><i>Able to construct a table with:</i></p> <ol style="list-style-type: none"> <li><i>1. At least one title</i></li> <li><i>2. Incomplete list of iron and the metals in contact with iron.</i></li> </ol> <p><u>Sample answer :</u></p> <table border="1" data-bbox="418 936 1206 1125"> <thead> <tr> <th>Test tube/ metal</th> <th>Observation // Intensity of blue colouration // presence of pink colouration</th> </tr> </thead> <tbody> <tr> <td>Fe only</td> <td></td> </tr> <tr> <td>Fe + Mg / Cu</td> <td></td> </tr> </tbody> </table>	Test tube/ metal	Observation // Intensity of blue colouration // presence of pink colouration	Fe only		Fe + Mg / Cu		1		
Test tube/ metal	Observation // Intensity of blue colouration // presence of pink colouration									
Fe only										
Fe + Mg / Cu										
	<i>No response or wrong response</i>	0								

***END OF MARK SCHEME***