MARKING SCHEME
OTI 1 2012 TINGKATAN 4
4541/3 CHEMISTRY
***Paper* 3**

Question	Rubric	Score
1 (a)(i)	Able to state the observation correctly. Sample answer: Yellow solid changed to grey solid.	3
	Able to state any observation less accurately. Sample answer: Grey solid formed // Yellow solid changed	2
	Able to give an idea of observation. Sample answer: Lead oxide changed to lead // Lead is formed.	1
	No response given / wrong response	0

Question	Rubric	Score
1 (a)(ii)	Able to give the inference correctly. Sample answer: Lead oxide changed to lead // Lead oxide is reduced.	3
	Able to give inference less accurately. Sample answer: Metal oxide changed to metal.	2
	Able to give an idea of inference. Sample answer: Lead oxide changes.	1
	No response given / wrong response	0

<table>
<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td rowspan="4">1(b)</td><td>Able to complete the table and record the mass correctly containing:
1. Correct description
2. Readings (2 decimal places)

<u>Sample answer:</u>
<table><tr><th>Step</th><th>Description</th><th>Mass (g)</th></tr><tr><td>1</td><td>Combustion tube + asbestos paper</td><td>64.00</td></tr><tr><td>2</td><td>Combustion tube + asbestos paper + lead oxide/yellow solid</td><td>117.52</td></tr><tr><td>3</td><td>Combustion tube + asbestos paper + lead/ grey solid</td><td>113.68</td></tr></table></td><td>3</td></tr>
<tr><td>Able to complete the table less accurately that contain :
3. Correct description
4. Readings (4 decimal places)

<u>Sample answer:</u>
<table><tr><th>Step</th><th>Description</th><th>Mass (g)</th></tr><tr><td>1</td><td>Combustion tube + asbestos paper</td><td>64.0025</td></tr><tr><td>2</td><td>Combustion tube + asbestos paper + lead oxide/yellow solid</td><td>117.5193</td></tr><tr><td>3</td><td>Combustion tube + asbestos paper + lead/ grey solid</td><td>113.6768</td></tr></table></td><td>2</td></tr>
<tr><td>Able to complete the table with at least one description / readings.</td><td>1</td></tr>
<tr><td>No response given / wrong response</td><td>0</td></tr>
</table>

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<tr><th>Question</th><th>Rubric</th><th>Score</th></tr>
<tr><td rowspan="4">1(c)</td><td>Able to calculate the empirical formula of lead oxide correctly.

<u>Sample answer:</u>
<table><tr><td>Element</td><td>Pb</td><td>O</td></tr><tr><td>Mass (g)</td><td>113.68-64.00 // 49.68</td><td>117.52 – 113.68 // 3.84</td></tr><tr><td>Number of moles (mol)</td><td>49.68÷207 // 0.24</td><td>3.84 ÷16// 0.24</td></tr><tr><td>Ratio of moles</td><td>0.24/0.24// 1</td><td>0.24/0.24// 1</td></tr><tr><td colspan="3">Empirical formula : PbO</td></tr></table></td><td>3</td></tr>
<tr><td>Able to calculate the empirical formula of lead oxide less accurately.

<u>Sample answer:</u>
<table><tr><td>Element</td><td>Pb</td><td>O</td></tr><tr><td>Mass (g)</td><td>113.68-64.00 // 49.68</td><td>117.52 – 113.68 // 3.84</td></tr><tr><td>Number of moles (mol)</td><td>49.68÷207 // 0.24</td><td>3.84 ÷32// 0.12</td></tr><tr><td>Ratio of moles</td><td>0.24/0.12// 2</td><td>0.12/0.12// 1</td></tr><tr><td colspan="3">Empirical formula : Pb_2O</td></tr></table></td><td>2</td></tr>
<tr><td>Able to give an idea of calculating the empirical formula of lead oxide.

<u>Sample answer:</u>
Mass of Pb and O // number of moles of Pb and O</td><td>1</td></tr>
<tr><td>No response given / wrong response</td><td>0</td></tr>
</table>

Question	Rubric	Score
1(d)	Able to write the chemical equation correctly. Sample answer: $PbO + H_2 \rightarrow Pb + H_2O$	3
	Able to write the chemical equation less correctly. Sample answer: $PbO + H_2$ // $Pb + H_2O$	2
	Able to state an idea of writing chemical equation. Sample answer: Lead oxide + hydrogen → Lead + water	1
	No response given / wrong response	0

Question	Rubric	Score
1(e)	Able to classify of the all metal oxides correctly Sample answer : **Method I**: Aluminium oxide, Zinc oxide **Method II**: Copper(II) oxide, Tin(IV) oxide	3
	Able to classify **three** metal oxides correctly	2
	Able to classify any **two** metal oxides correctly or give opposite answers. Sample answer: **Method I**: Copper(II) oxide, Tin(IV) oxide **Method II**: Aluminium oxide, Zinc oxide	1
	[No response or wrong response]	0

Question	Rubric	Score
2(a)	Able to state the three variables correctly Sample answer: **Manipulated variable:** Type of medium// Gel and water **Responding variable:** Rate of diffusion **Constant variable:** Potassium manganate (VII) // Temperature	3
	Able to state **any two** variables correctly	2
	Able to state **any one** variable correctly	1
	No response given / wrong response	0

Question	Rubric	Score
2(b)	Able to give the hypothesis correctly Sample answer : In gel, rate of diffusion is lower than in water or vice versa	3
	Able to give the hypothesis almost correct Sample answer : Different medium, different rate of diffusion	2
	Able to state an idea of t the hypothesis Sample answer : Medium/ Substance affects the rate of reaction	1
	No response or wrong response	0

Question	Rubric	Score
2(c)	Able to give the meaning of the diffusion correctly. Sample answer: The purple colour spreads when potassium manganate (VII) is put into water	3
	Able to give the meaning of the diffusion less accurately. Sample answer: The purple colour formed when potassium manganate (VII) put into water	2
	Able to give an idea of the diffusion. Sample answer: Purple	1
	No response or wrong response	0

Question	Rubric	Score
2(d)	Able to explain **all** the following aspects 1. Arrangement particles of solid 2. Arrangement particles of liquid 3. Movement of particles in medium <u>Sample answer:</u> (i) The particles of gel/solid are packed closely together (ii) The particles of water/ liquid are packed slightly loose (iii) (Manganate ion)/ Particles move faster into the spaces in between the water molecules // (Manganate ion)/ Particles move slower into the spaces in between the gel molecules	3
	Able to state any **one** of the aspects	2
	Able to give an idea <u>Sample answer:</u> Arrangement of particles	1
	No response or wrong response	0

Question	Rubric	Score
2(e)	Able to predict the time taken correctly <u>Sample answer:</u> Less / Shorter than one hour	3
	Able to predict the time taken less accurately <u>Sample answer:</u> 30 minute < Time < 1 hour	2
	Able to state an idea of time taken <u>Sample answer:</u> Time < 30 minute	1
	No response given / wrong response	0

Question Number	Rubric	Score
3(a)	Able to state the problem statement correctly Sample answer: Does the different type of (alkali metals)/ (Group 1)/(lithium, sodium and potassium) affect the reactivity with water?	3
	Able to state the problem statement less accurately Sample answer: Does the different type of (alkali metals)/ (Group 1)/(lithium, sodium and potassium) affect the reactivity? // To investigate/ compare/ study the reactivity of Group 1 elements/ lithium, sodium and potassium with water	2
	Able to give an idea of the problem statement. Sample answer: To investigate/ compare/ study the reaction of Group 1 elements/ lithium, sodium and potassium	1
	No response or wrong response	0

Question Number	Rubric	Score
3(b)	Able to state the three variables correctly Sample answer: **Manipulated variable:** Elements of Group 1// Lithium, sodium, potassium// alkali metal **Responding variable:** Reactivity// vigorous reaction// speed of movement// intensity of sound/ flame// rate of reaction// time taken to complete the reaction **Constant variable:** Temperature// size of alkali metal// water	3
	Able to state **any two** variables correctly	2
	Able to state **any one** variable correctly	1
	No response or wrong response	0

Question Number	Rubric	Score
3(c)	Able to state the relationship correctly between the manipulated variable and the responding variable with direction Sample answer: (The lower/ higher the position of metal in)/ (going down/ up) Group 1, the more/ less reactive is the metal in reaction with water	3

	Able to state the relationship between the manipulated variable and the responding variable with direction
	
	Sample answer:
	The more/ less reactive is the metal in reaction with water , (the lower/ higher the position of metal in)/ (going down/ up) Group 1 //
	(The lower/ higher the position of metal in)/ (going down/ up) Group 1, the more/ less reactive is the metal// vice versa
	//Potassium more reactive when react with water, followed bt sodium and lithium
	// Reactivity increases when going down/ up the Group 1
		2

	Able to state the idea of hypothesis Sample answer: Alkali metals have different reactivity	1
	No response or wrong response	0

Question Number	Rubric	Score
3(d)	Able to give complete list of substances and apparatus Sample answer: **Substances** Lithium, sodium, potassium, water **Apparatus** Water trough/ basin/ pail/ tray/ tank, knife, forceps/ tongs/ scissors, filter paper	3
	Able to give at least **two substances** and at least **two apparatus**	2
	Able to give at least **one substance** and at least **one apparatus**	1
	No response or wrong response	0

<table>
<tr><th>Question Number</th><th>Rubric</th><th>Score</th></tr>
<tr><td rowspan="4">3(e)</td><td>Able to list all the steps correctly

<u>Sample answer:</u>

1. Fill the water trough/ basin/ pail/ tray/ tank with water

2. Cut a piece of lithium

3. Dry the lithium using filter paper

4. Place/ put the lithium on the surface of the water

5. Record all the changes/ observation

6. Repeat (steps 1 – 5)/(experiment) using sodium and potassium</td><td>3</td></tr>
<tr><td>Able to list down steps 2, 4, 6</td><td>2</td></tr>
<tr><td>Able to give an idea for step 4</td><td>1</td></tr>
<tr><td>No response or wrong response</td><td>0</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Rubric</th><th>Score</th></tr>
<tr><td rowspan="3">3(f)</td><td>Able to tabulate the data with the following aspects

1. Correct tittles
2. Complete list of elements

<u>Sample answer:</u>

<table><tr><th>Elements/ metals/ Group 1</th><th>Observation/ Reactivity</th></tr><tr><td>Lithium</td><td></td></tr><tr><td>Sodium</td><td></td></tr><tr><td>Potassium</td><td></td></tr></table></td><td>2</td></tr>
<tr><td>Able to construct a table with

1. At least one tittle
2. Incomplete list of elements

<u>Sample answer:</u>

<table><tr><th>Element</th><th>Observation</th></tr><tr><td>Lithium</td><td></td></tr></table></td><td>1</td></tr>
<tr><td>No response or wrong response</td><td>0</td></tr>
</table>

END OF MARKING SCHEME