Structure {Paper02}

[SPM06-02]

(a) (i) The mole concept
(ii) H_2O
(iii) Carbon -12 / carbon – 13 / carbon -14
Reject – 12-carbon

(b) (i) No of mole = 6.0 / 24 = 0.25 mol – with unit. No unit – O [1]
Mass = 11 g [2]

If used molar volume = 22.4
No of mole = 6.0 / 22.4 = 0.268 mol
Mass = 11.79 g [2]

(ii) $0.25 \times 6.02 \times 10^{23} = 1.505 \times 10^{23}$

(iii) 6.0 dm^3 of carbon dioxide with the mass of 11 g contains of 1.505×10^{23} molecules is equal to 0.25//0.268 mol carbon dioxide

[SPM08-03b]

(b) (i) 0.5 mol x 32 g/mol = 16g
(ii) 0.5 mol x 24 dm^3/mol = 12 dm^3
(iii) same
because the numbers of moles is the same.

[SBPmidyearF407-02]

(a) 1. Volume = $\frac{60}{1000}$ = 0.06 dm^3
2. Number of moles = $\frac{0.06}{24}$ = 0.0025 mol

(b) (i)Number of molecules = $0.0025 \times 6.02 \times 10^{23}$
= 1.505×10^{21} molecules

(ii) Number of atoms = $1.505 \times 10^{21} \times 3$
= 4.515×10^{21} atoms

(c) (i) RFM of $CaCO_3$ = 40 + 12 + 3(16) = 100

(ii) Number of moles = $\frac{25}{100}$ = 0.25 mol

(iii) Percentage of oxygen = $\frac{48}{100} \times 100\%$ = 48%

(d) 1. $(CH_2)_n = 84$
2. $n = \frac{84}{14} = 6$
3. Molecular formula $(CH_2)_6 = C_6H_{12}$

[SBPmidyearF406-03]

(a) (i) 46
(ii) 189

(b) (i) 2.408×10^{24} molecules
(ii) 4.816×10^{24} atoms

(c) 0.0015 mol

(d) 434 g

(e) 1. $\frac{8.28}{276} = 0.03$ mol Ag_2CO_3

2. 2 mol of Ag_2CO_3 produce 2 mol of CO_2
0.03 mol of Ag_2CO_3 produce 0.03 mol of CO_2

3. $0.03 \times 24\ dm^3 = 0.72\ dm^3$

[SPM03-01]

(a) Chemical formula that show the simplest ratio of atom of elements in the compound

(b) (i) Mass of Mg = 26.4 -24.0 = 2.4g
Mass of O = 28.0 – 26.4 = 1.6g

(ii)

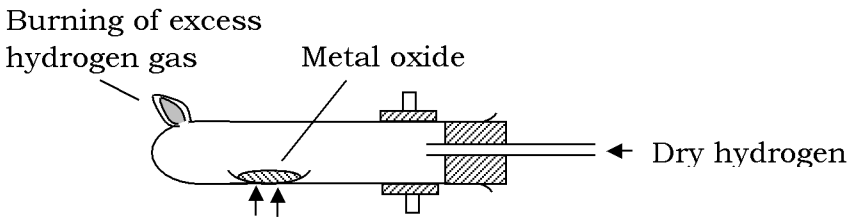
Elements	Mg	O
mol	2.4/24 = 0.1	1.6/16 = 0.1
Ratio	0.1	0.1
Simplest ratio	1	1

(iii)MgO

(iv) $2Mg + O_2 \text{ -- > } 2MgO$

(c) To allow oxygen gas enter, to continue the burning process and complete the reaction

(d) (i)



(ii) 1. collect the gas used test tube
2. put the burning/ light-up wooden splinter into the test tube [method]
3. no pop sound produce [result]

[SBPtrial11-04]

(a) A chemical formula that shows the simplest ratio of atom of element in a compound.

(b) Number of mole = __**mass**___
Relative atomic mass

(c)

(i) =2.56 / 0.04 = 64	(ii) = 0.64 / 16 = 0.04

(d) CuO

(e) (i) Magnesium and hydrochloric acid / Zinc and sulphuric acid

(ii) $CuO + H_2 \rightarrow Cu + H_2O$

(iii) Black powder change to brown

(iv) Water

[SPM07-03]

(a) a chemical formula that shows the simplest ratio of atom of element in a compound
a : it shows the simplest ratio of atom of element in compound.
r : it the simple ratio of ...

(b) number or mole

(c) (i) method I

(ii) magnesium is a reactive metal // magnesium is an active metal // magnesium reacts burns with oxygen readily.
a : hydrogen cannot reduce MgO // magnesium is more reactive than hydrogen/ higher than hydrogen in reactivity series.

(iii) to allow oxygen/ air to enter the crucible // to ensure magnesium / substance reacts / burns completely.
a : to unsure the reaction completed

(d) (i) 49.68 , mesti 2 decimal
(ii) 0.24
(iii) 3.84
(iv) 0.24
(v) PbO

[SBPmidyearF507-02]

(a) The formula that gives **the simplest** whole number **ratio of atoms** of each element in a compound.

(b) H_2SO_4/HCl + Zn/ Mg/ Al/ Fe → $ZnSO_4$ + H_2
/any suitable reaction between an acid and a metal

(c) (i) mass of copper = 47.70 – 25.30 / 22.40 1
mass of oxygen = 53.30 – 47.70/ 5.60 1

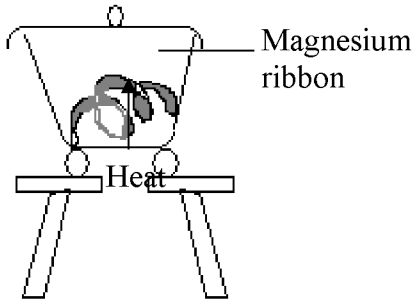
(ii) 1. $\frac{22.40}{64} : \frac{5.60}{16}$ 1

2. 0.35 : 0.35
1 : 1 1

(iii) CuO 1

(iv) H_2 + CuO → Cu + H_2O 1

(d)



1. Set up of apparatus complete and functional [1]

2. Labels correct [1]

[MRSM05-01]

(a) Anhydrous calcium chloride

(b) to avoid water vapour condensation [will take more time for heating of oxide metal]

(c) [Assumption : compound is Copper(II) oxide]
1. black solid turns to brown
2. Colourless liquid formed at the end of combustion tube
[pembentukan air di hujung tube pembakaran]

(d) (i) Mass Y = 110.6 - 105.8 = 4.8 g
Mol Y = mass / mm = 4.8 /64 = 0.075 mol

(ii) Mass Oxygen = 111.2 – 110.6 = 0.6 g
Mol Oxygen = mass / mm = 0.6/16 = 0.0375 mol

(iii)

Elements	Y	O
ratio	0.075 / 0.0375 =2	0.0375 / 0.0375 =1
Simplest ratio	2	1

Empirical formula Y_2O

[SPM09-03]

(a)(i) A Chemical formula that shows the simplest ration of atom of element in the molecule/ compound

(ii) To dry the hydrogen gas

(b)(i) Copper : 8.00 g Oxygen : 2.00 g
(ii)

elements	Cu	O
Mass	8.00	2.00
Mol	8.00/64 =0.125	2.00/16=0.125
Ratio	1	1

(iii) CuO

(c)(i) **To avoid oxygen gas/air enter the combustion tube** and oxidised the product back to oxide.

(ii) Repeated heating, cooling and weighing until constant reading

(d)(i) Magnesium metal more electropositive (top – weak answer) than hydrogen in Electrochemical Series

(ii) Iron//Stanum//Lead//silver

[SBPmidyearF407-03]

a W – sulphuric acid / hydrochloric acid 1
Y – zinc / magnesium 1
Z – anhydrous calcium chloride 1

b Gas that exists from the combustion tube is collected in a small test tube. 1
Put a burning wooden splinter in the test tube.

If the gas burns without any "pop" sound, then all the air had been removed. 1

c

Element	X	O
Mass of element (g)	17.98 – 16.82 = 1.16	18.27 – 17.98 = 0.29
Number of moles	$\frac{1.16}{64}$ = 0.018	$\frac{0.29}{16}$ = 0.018
Simplest ratio of moles	1	1

1

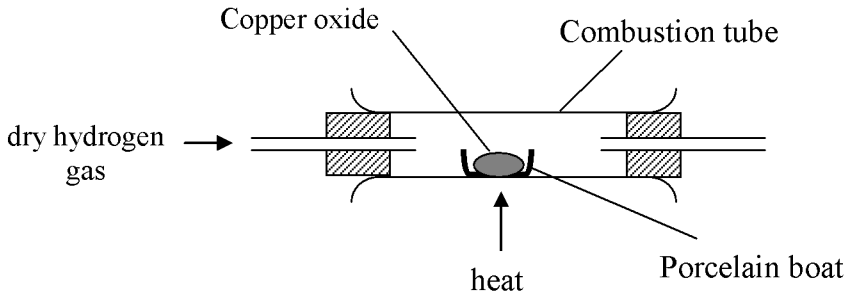
1

Empirical formula is XO 1

d No 1
Magnesium is more reactive than hydrogen gas 1

[SBPmidyearF406-02]

(a)



2

(b) To prevent the hot copper from being oxidized again. 1

(c) Heating, cooling and weighing procedures are repeated until a constant mass is obtained. 1

(d)(i) Black to brown 1

(d)(ii) Mol of Cu = 12.8/64 @ 0.2 mol 1

(d)(iii) Mass of oxygen 16.13 – 12.88 = 3.21 g 1
Mol of oxygen atom = 3.21/ 16 = 0.20 mol 1

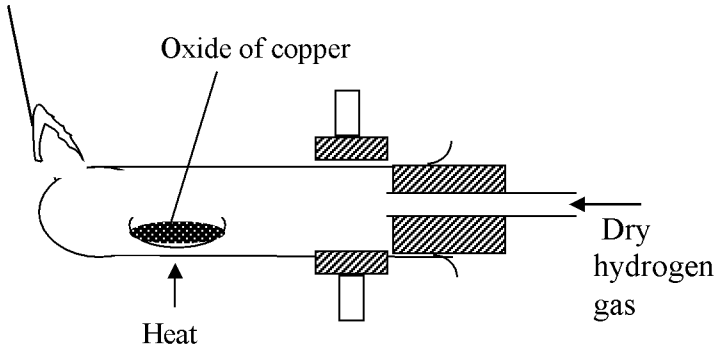
(d)(iv) The simplest ratio number of moles of Cu : O atom is 1:1 1
Empirical formula: CuO 1

(d)(v) $CuO + H_2 \rightarrow Cu + H_2O$ 1

[SBPdiag08-02]

(a) A chemical formula that gives the **simplest whole number ratio of atoms of each element in the compound**. 1

(b) Burning excess hydrogen



- functional 1
- label(oxide of copper, dry hydrogen gas and heat) 1

(c) •**<u>Remove all the air</u>** from the apparatus before the oxide of copper is heated
•The **<u>flow of hydrogen gas is continued</u>** throughout the cooling of the product 1

Any **one** answer correct

d(i) mass of copper : 38.76 – 36.20 = **2.56g**
mass of oxygen : 39.40 – 38.76 = **0.64g**

d(ii)

Calculation + mass including unit 1

Cu	:	O
2.56/64	:	0.64/16
0.04	:	0.04
1	:	1

1

d(iii) CuO 1

2(e) $CuO + H_2 \rightarrow Cu + H_2O$ 1

2(f) No. 1
Magnesium is more reactive than hydrogen.// Magnesium is above hydrogen in the Reactivity Series. 1

[SBPdiag05-01]

2(a) Anhydrous calcium chloride, $CaCl_2$ //Sulphuric acid 1

2(b) Repeat the heating process, cooling and measure until get one constant reading 1

2(c) To avoid the air to oxide back the hot metal L to oxide L 1

2(d)

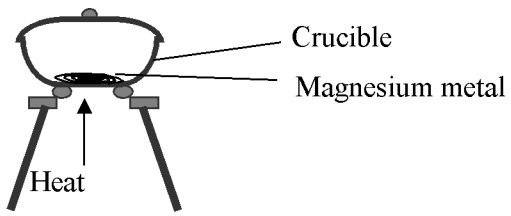
	Metal L	Oxygen
Mass	102.13 – 52.45 = 49.68	105.97 – 102.13 = 3.84 1
Number of moles	49.68/207 = 0.24	3.84/16 = 0.24 1
ratio	1	1

empirical formula : LO 1

2(e) H_2 + LO → L + H_2O 1

2(f) Because magnesium is more electropositive than hydrogen 1

2(g)



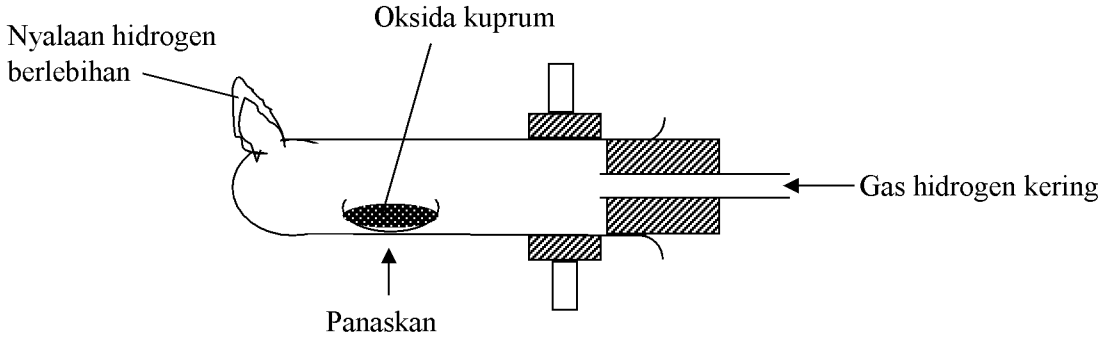
1

1

[SBPtrial06-02] {Translate}

(a) Formula kimia yang menunjukkan nisbah teringkas bilangan setiap atom unsur dalam suatu sebatian

(b)



- gambar rajah berfungsi 1
- berlabel (oksida kuprum, gas hidrogen kering dan panaskan) 1

(c) -Pastikan semua udara dikeluarkan sebelum oksida logam dipanaskan
- Aliran gas hidrogen di teruskan semasa penyejukan kuprum

Mana-mana satu 1

(d)(i) - jisim kuprum : 38.76 – 36.20 = 2.56g
- jisim oksigen : 39.40 – 38.76 = 0.64g

Perhitungan + jisim berunit 1

(ii)

Cu	:	O
2.56/64	:	0.64/16
0.04	:	0.04
1	:	1

1

(iii) CuO 1

(e) $CuO + H_2 \longrightarrow H_2O + Cu$ 1

(f) Tidak boleh. 1
Magnesium lebih reaktif daripada hidrogen.// Magnesium berada di atas Hidrogen dalam Siri Kereaktifan 1

[SBPtrial09-03]

(a) (i) Zinc 1
hydrochloric acid / suphuric acid 1

(ii) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ 1

(b) The air in the combustion tube must be displaced before lighting the hydrogen gas// The heating, cooling and weighing is repeated until a constant mass is obtained 1

(c) (i)

Element	M	O
Mass	0.64	0.16
Number of mole	$\frac{0.64}{64} = 0.01$	$\frac{0.16}{16} = 0.01$
Simplest ratio	1	1

1

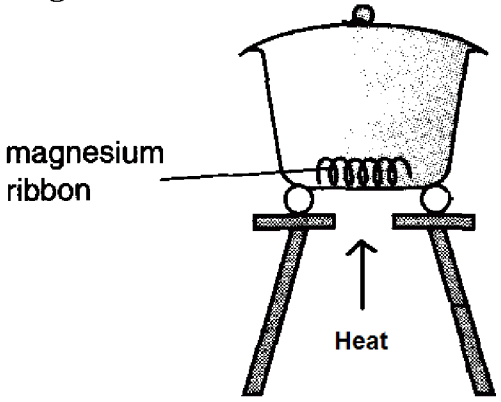
1

Empirical formula is MO 1

(ii) $MO + H_2 \rightarrow M + H_2O$ 1

(d) (i) Magnesium is more reactive than hydrogen. 1

(ii)



1

[MRSM06-02]

(a) A Chemical formula that shows the simplest ration of atom of element in the molecule/ compound

(b) anhydrous calcium chloride

(c) To remove all the air in the combustion tube, to avoid the explosion

(d) 1. Collect the gas by using the test tube
2. Put the burning splinter into the test tube.
3. no pop sound produce, blue flame produce

(e) (i) Mol Cu = 1.6 / 64 = 0.025 mol
Mass O = 2.00 – 1.6 = 0.4
Mol O = 0.4/16 = 0.025 mol

(ii)

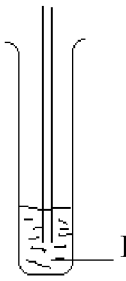
Elements	Cu	O
Ratio	0.025/ 0.025 = 1	0.025/ 0.025 = 1
Simplest ration	1	1

(iii)CuO

(f) Magnesium more electropositive than hydrogen

[SBPdiag07-02]

a) 1. delivery tube is immersed in lime water 1
2. test-tube containing lime water is not stoppered 1
sample answer:



b) (i) $CuCO_3$ 1
(ii) copper (II) oxide r: formula 1
(iii) carbon dioxide 1
(iv) $CuCO_3 \rightarrow CuO + CO_2$ 1

c) (i) 11.89 – 11.45 = 0.44 g 1

(ii) 1. moles of gas = $\frac{0.44}{44}$ / 0.01 1

2. Volume of gas = (0.01)(24) / 0.24 dm^3 1

d) moles of XSO_4 = Moles of XO
= $\frac{8.1}{81}$ / 0.1 1

[SBPdiag06-02]

(a) Formula that gives **the actual number of atoms** of each element that are **present** in one molecule of the compound 1

(b) $C_6H_{12}O_6$ 1

(c) 1. No/ cannot 1
2. Exits as molecules / no free moving ion 1

(d)(i)

	C	H	O	
1. Mole	**52.2/ 12**	**13.0 /1**	**34.8/16**	1
	4.35	13.0	2.175	
2. **Ratio**	**2**	**6**	**1**	1

3. **Empirical formula = C_2H_6O** 1

(ii) $[2(12) + 6(1) + (16)]n = 46$
n = 1 1
Molecular formula = C_2H_6O 1

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