



*Rewarding Learning*

**General Certificate of Secondary Education**

**2012**

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**Science: Chemistry**

Paper 2  
Foundation Tier

**[G1402]**

**FRIDAY 22 JUNE, AFTERNOON**

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**MARK  
SCHEME**

			AVAILABLE MARKS	
<b>1</b>	<b>(a)</b>	<b>(i)</b> iron	[1]	20
		<b>(ii)</b> oxygen	[1]	
		<b>(iii)</b> water	[1]	
		<b>(iv)</b> gain of oxygen	[1]	
		<b>(v)</b> red-brown [1] flaky [1] solid [1]	maximum [2]	
	<b>(b)</b>	<b>(i)</b> $H_2 + Cl_2 \rightarrow 2HCl$	[3]	
		<b>(ii)</b> chlorine gains hydrogen [1] gain of hydrogen is reduction [1]	[2]	
		<b>(iii)</b> chlorine: yellow-green [1] hydrogen: colourless [1]	[2]	
		<b>(iv)</b> gives out heat	[1]	
	<b>(c)</b>	<b>(i)</b> thermal [1] decomposition [1]	[2]	
		<b>(ii)</b> $CuCO_3 \rightarrow CuO + CO_2$	[2]	
		<b>(iii)</b> green [1] to black [1]	[2]	

2 (a) [1] for each of the following in the order given:

4

12

nucleus

electrons

[4]

(b) (i) four/4

[1]

(ii) 117

[1]

(iii)  $\frac{60}{117} \times 100 = 51.28$  (allow 51)

[1]

(c) (i)  $12 + 3 \times 16 = 60$

[1]

(ii)  $74 - 60 = 14$

[1]

(iii)  $\frac{14}{2} = 7$

[1]

(iv) lithium/Li/Li<sub>2</sub>CO<sub>3</sub>

[1]

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MARKS

11

3 (a) (i)

Substance	acid	base	alkali	salt
magnesium chloride				✓ [1]
magnesium hydroxide		✓ [1]		
sodium hydroxide		✓	✓	
	accept either tick for sodium hydroxide [1]			
zinc sulphate				✓ [1]

[4]

(ii)  $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$  [3]

(iii) magnesium nitrate [1]

(iv) contains water [1]  
contains water of crystallisation [2] [2](b) (i)  $\text{NH}_3$  [1]

(ii) 9–11 [1]

(iii)  $\text{NH}_3 + \text{HNO}_3 \rightarrow \text{NH}_4\text{NO}_3$  [2]

(iv) hydroxide [1]

(c) (i) pipette [1]

(ii) remove the indicator [1]

(iii) Individual marks are awarded for correctly labelled and recognisable drawings of assembled apparatus.  
No labels = no marks.evaporating basin [1]  
tripod and gauze [1]  
heat/Bunsen burner [1] [3]

(iv) solubility decreases/solution becomes saturated [1]

(v) Any **two** from:  
dry between two sheets of filter paper [1]  
dry in a low temperature oven [1]  
dry in a desiccator [1] [2]AVAILABLE  
MARKS

23

- 4 (a) decomposition/breaking down [1]  
of a substance using electricity [1] [2]
- (b) bauxite [1]
- (c) (i) A is anode [1]  
B is cathode [1]  
C is casing [1]  
D is (molten) aluminium [1] [4]
- (ii) ions are free to move [1]  
idea that ions are the charge carriers [1] [2]
- (iii) 900–1000 °C [1]
- (iv) lower melting point of aluminium oxide/increase conductivity [1]
- (v) Positive electrode: oxide [1]  
Negative electrode: aluminium [1] [2]
- (vi) electrode: anode [1]  
equation:  $C + O_2 \rightarrow CO_2$  [2]
- (vii) aluminium is tapped off [1] at the bottom of the cell [1]

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17

5 (a)

Gas	Formula	Use	Physical properties	
carbon dioxide	CO <sub>2</sub> [1]	dry ice/carbonated drinks/fire extinguishers [1]	Any <b>two</b> from: colourless odourless acidic denser than air slightly soluble in water	[4]
hydrogen	H <sub>2</sub> [1]	weather balloons/rocket fuel [1]	Any <b>two</b> from: colourless odourless neutral less dense than air insoluble in water	[4]

(b)

Gas	Test	Result of positive test	
carbon dioxide	bubble into <b>limewater</b> [1]	milky [1]	[2]
hydrogen	apply a lit splint [1]	pop [1]	[2]
hydrogen chloride	glass rod dipped in <b>concentrated</b> [1] <b>ammonia</b> [1]	white [1] smoke [1]	[4]
water	<b>anhydrous copper sulphate</b> [1] <b>or</b> cobalt chloride paper [1]	white [1] to blue [1] <b>or</b> pale blue [1] to pink [1]	[3]

(c) (i)  $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$  [2]

(ii) Any **two** from:  
corrodes statues/buildings [1]  
kills fish [1]  
kills trees/vegetation [1] [2]

(d) (i) brittle [1]  
yellow [1]  
solid [1] maximum [2]

(ii)  $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$  [2]

(iii) melts/forms a liquid [1]  
dark red/brown [1]  
blue flame [1]  
colourless/misty [1]  
pungent/bad smell [1] gas [1] maximum [3]

Quality of written communication [2]

(iv) fungicide/bleach/preservative [1]

AVAILABLE MARKS

33

		AVAILABLE MARKS
6	<p><b>(a)</b> solid – regular close packed arrangement [1]  gas – few particles well spaced out [1]</p>	[2]
	<b>(b) (i)</b> oxygen	[1]
	<b>(ii)</b> sulphur	[1]
	<b>(iii)</b> H <sub>2</sub> O	[1]
	<b>(iv)</b> carbon	[1]
	<b>(v)</b> liquid	[1]
	<b>(vi)</b> 114 (°C)	[1]
	<b>(c) (i)</b> dry ice	[1]
	<b>(ii)</b> from solid to gas [1] on heating [1] <b>or</b> from gas to solid [1] on cooling [1]	[2]
	<b>(iii)</b> iodine	[1]
	<b>(d) (i)</b> 17 (°C) ± 1	[1]
	<b>(ii)</b> A – solid [1] B – liquid [1]	[2]
	<b>(iii)</b> boiling	[1]
<b>Total</b>		16
		<b>120</b>