



Rewarding Learning

**General Certificate of Secondary Education
2011–2012**

Science: Single Award (Modular)

Chemical Patterns and our Environment

Module 3

Higher Tier

[GSC32]

WEDNESDAY 9 NOVEMBER 2011

9.15 am–10.00 am

**MARK
SCHEME**

			AVAILABLE MARKS
1	(a) chromatography	[1]	4
	(b) blue	[1]	
	(c) black colouring is made of 3 dyes [1] The green dye in black colouring is not the same as the green dye tested [1]	[2]	
2	(a) because one metal has replaced another metal from a solution	[1]	10
	(b) copper	[1]	
	(c) all the copper had left the solution	[1]	
	(d) No chemical reaction took place because copper is less reactive or unable to displace the lead	[2]	
	(e) copper nitrate and silver	[2]	
	(f) silver	[1]	
	(g) Sodium is too reactive [1] It would react violently with the water [1]	[2]	
3	(a) 2, 8, 3 arrangement [1] for 3 shells [1] for correct electron arrangement	[2]	8
	(b) Electron charge -1 [1] Neutron mass 1 [1] Proton [1]	[3]	
	(c) (i) Calcium carbonate [1]		
	(ii) Potassium hydroxide [1]		
	(iii) Sodium sulphate [1]	[3]	

			AVAILABLE MARKS
4	<p>(a) Sodium hydrogen carbonate NaHCO_3 [2]</p> <p>(b) Sodium hydrogen carbonate [1] + Citric acid \longrightarrow Sodium citrate [1] + water [1] + carbon dioxide [1] [4]</p> <p>(c) Baking soda decomposes or breaks down [1] in the heat [1] to produce CO_2 [1] [3]</p> <p>(d) Any two from: vinegar is an acid [1], it reacts with the baking soda [1] to produce more CO_2 [1] [2]</p>	<p>[2]</p> <p>[4]</p> <p>[3]</p> <p>[2]</p>	11
5	<p>(a) (i) Archbishop Ussher [1]</p> <p>(ii) 4000 \longrightarrow 6000 years [1]</p> <p>(b) Any three from: Radioactive isotopes/uses radio isotopes: Uranium/Potassium: Half life/daughter elements/rocks [3]</p>	<p>[1]</p> <p>[1]</p> <p>[3]</p>	5
6	<p>(a) 3 [1]</p> <p>(b) neutralisation [1]</p> <p>(c) $\text{Mg}(\text{OH})_2 + 2\text{HCl} \longrightarrow \text{MgCl}_2 + 2\text{H}_2\text{O}$ [1] for each product [1] for balancing [3]</p> <p>$\text{CaCO}_3 + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$ [1] for each product [2]</p>	<p>[1]</p> <p>[1]</p> <p>[3]</p> <p>[2]</p>	7
			45