



*Rewarding Learning*

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

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**Science: Double Award (Modular)**

Using Materials and Understanding Reactions

End of Module Test

Higher Tier

[GDB02]

**MONDAY 21 MAY 2012**

**9.15 am–10.00 am**

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**MARK  
SCHEME**

1	Element	Number of protons	Number of neutrons	Number of electrons	Electronic configuration	AVAILABLE MARKS
	boron	5	6	5	2,3	
	sodium	11	12	11	2,8,1	
	phosphorous	15	16	15	2,8,5	
					[4]	4
2	(a) diffusion				[1]	
	(b) Idea of particles gaining energy <b>or</b> move faster idea that <b>more</b> particles have the energy to change from liquid to gas/leave the liquid and go into the air				[1] [1]	3
3	(a) redox not <u>radox</u>				[1]	
	(b) Hydrogen				[1]	
	(c) $\text{CuO} + \text{H}_2 \longrightarrow \text{Cu} + \text{H}_2\text{O}$ [1] [1]				[2]	4
4	(a) Some substances can be broken down into simpler substances by using <b>electricity</b> [1]. This is called electrolysis and can happen when the substance <b>is molten</b> [1]/ <b>or in solution</b> [1]. (any order) accept dissolved <b>or</b> aqueous				[3]	
	(b) The <b>negative electrode</b>				[1]	
	(c) Any suitable metal e.g. aluminium (i.e. zinc or above in electrochemical series) <b>not</b> copper				[1]	5
5	(a) Idea of the same volume of <b>water</b> sample used				[1]	
	(b) Idea that the more soap solution needed to produce a permanent lather the harder the water or the less soap solution needed to form a permanent lather the softer the water <b>not</b> idea of time				[1]	
	(c) Temporary produces scale when heated/wastes soap/may lead to blocked hot water pipes/idea that scale can form on heating elements of kettles reducing efficiency/or other suitable, e.g. formation of scum with soap				[1] [1]	4

			AVAILABLE MARKS
6	Candidate indicates by drawing, by use of electronic configurations or by statement the following points Calcium loses two electrons [1] Chlorine atoms each gain 1 electron [1] 2:1 ratio [1] Ionic bond/electrostatic attraction/attraction between oppositely charged ions [1]		4
7	(a) first two boxes ticked [2]		
	(b) 2,7 arrangement/correct sharing [1] correct number of electrons [1] [2]		4
8	(a) thermosoftening [1]		
	(b) idea of bulb heating up [1] causing thermosoftening plastic to lose shape [1] [2]		
	(c) diagram to correctly show crosslinks between strands [1]		4
9	$P_1 V_1 / T_1 = P_2 V_2 / T_2$ [1] $500 \times 2000 / 250 = 4000 \times V / 400$ second method mark for correct computation correct $400 [3] \text{ cm}^3 [1]$ [4]		4
10	(a) neutralisation [1]		
	(b) $\text{H}^+_{(aq)} + \text{OH}^-_{(aq)} \longrightarrow \text{H}_2\text{O}_{(l)}$ [1]      [1]      state symbols [1] [3]		4
11	(a) It has free moving <b>electrons</b> [1] which carry the current [1] [2]		
	(b) metal atoms/ions can slip into new positions <b>not</b> idea of layers sliding [1]		
	(c) they are not strong [1]		4

12 (a) inert/does not react with the solution [1]  
conduct electricity [1]

[2]

(b) oxygen

[1]

(c)  $2\text{H}^+ + 2\text{e}^- \longrightarrow \text{H}_2$   
LHS [1]                      RHS [1]

[2]

(d)  $\text{SO}_4^{2-}$

[1]

**Total****AVAILABLE  
MARKS**

6

**50**