GCSE MARKING SCHEME

SCIENCE – CHEMISTRY
SPEC A (NEW)

JANUARY 2012

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2012 examination in GCSE SCIENCE - CHEMISTRY SPEC A (NEW). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

SCIENCE –CHEMISTRY 1 – SPEC A (NEW)

Foundation only questions – January 2012

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
1		(a)			1	aluminium and oxygen (both needed)		Al and O	
		(b)	(i)		1	galena	PbS lead sulfide		
			(ii)		1	cassiterite	SnO_2 tin oxide		
		(c)			1	found uncombined / on its own	native / found as element		
		(d)	(i)		1	2			
			(ii)		1	5			
		(e)	(i)		1	iron oxide	Fe_2O_3	the oxide	
			(ii)		1	losing / removal of oxygen	gain of electrons		

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
2		(a)			1	helium	He		
		(b)			1	oxygen	O_2	O	
		(c)			1	carbon dioxide	CO_2		CO
		(d)			2	carbon dioxide (1) water vapour (1)	CO_2 H_2O		CO
		(e)			1	oxygen	O_2	O	

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
3		(a)	(i)		1	4			
			(ii)		1	3			
		(b)			1	fewer decayed / filled / missing teeth in Town B / fluoridated area	converse		
		(c)			2	only two areas studied / insufficient evidence (1) unaware of other factors that may differ between two areas (1) only 5 year age range studied (1) - any 2 for (1) each	only looked at children		

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
4		(a)	(i)		1	millions			
			(ii)		1	hydrocarbons			
		(b)	(i)		2	2.9 + 21.0 + 8.6 + 0.6 + 3.7 + 1.2 = 38 (1) 42 – 38 = 4(.0) (1) correct answer only (2)	consequential for second mark		
			(ii)		2	21.0 ÷ 42.0 (1) ×100 = 50% (1) correct answer only (2)	0.5% (1)		

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
5		(a)	(i)		1	☐ ☐ ✓ ☐ tick in third box	any method of identifying correct order		
			(ii)		1	zinc can displace iron (from its oxide) but copper can't	correct reason based on prior knowledge		
		(b)			1	copper oxide + carbon → carbon dioxide + copper (1)	carbon monoxide		carbon oxide
		(c)	(i)		2	does not react (with water) (1) malleable (1) non toxic (1) - any 2 for (1) each	does not corrode can be bent	does not rust ductile	
			(ii)		1	electrical wiring / coins / jewellery / ornaments / saucepans			

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
6		(a)			1	continents have moved / drifted (apart)	continents were once joined	plate tectonics	
		(b)	(i)		3	fit together like jigsaw / complimentary (1) similar rocks (1) similar fossils (1)		shapes are the same	similar plants / animals
			(ii)		1	couldn't explain how continents moved		not enough evidence	

SCIENCE –CHEMISTRY 1 – SPEC A (NEW)

Common questions – January 2012

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
7	1	(a)	(i)		1	metals – A, C **and** F non-metals – D **and** E **all** must be correct		B (either as metal or non metal)	
			(ii)	I	1	B			
				II	1	Group = 4 Period = 3 **both** needed, consequential to answer in I			
		(b)	(i)		2	bromine – liquid (1) iodine – solid (1)			
			(ii)		2	melting point above 114 (1) boiling point above 184 (1) very slow (or no) reaction with sodium (1) - any 2 for (1) each	higher melting point / boiling point than iodine		

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
8	2	(a)	(i)	I	1	1			
				II	1	25 (cm^3)	range 24-26		
			(ii)	I	1	green			blue green
				II	1	more precise / continuous measurements / graph produced automatically		more accurate	
		(b)	(i)		3	(add excess) copper oxide to (dilute) sulfuric acid (1) filter to remove excess (1) heat until half volume remains / leave to crystallise (1)	excess could be implied by second marking point		evaporate / boil to dryness

Question Number		
FT	**HT**	
9	3	**Indicative content**: elements originally arranged according to atomic masses, now arranged according to atomic number; **differences** such as gaps in original table, more than one element in some boxes, no noble gases, no transition metal block; **similarities** such as still arranged in groups and periods, 8 groups, certain elements in same group as today. **5 – 6 marks**: The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks**: The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks**: The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks**: The candidate does not make any attempt or give a relevant answer worthy of credit.

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
10	4	(a)			3	A = hydrogen B = oxygen **both** needed (1) oxygen relights glowing splint (1) hydrogen ‘pop’ with lighted splint (1)	H_2 O_2 could be consequential if A/B incorrectly identified	H O	
		(b)			1	does not contribute to greenhouse effect / global warming / does not produce carbon dioxide / water is only product of combustion / does not cause acid rain	renewable	more environmentally friendly	

SCIENCE –CHEMISTRY 1 – SPEC A (NEW)

Higher questions – January 2012

Question Number								
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
	4	(a)			3	A = hydrogen B = oxygen **both** needed (1) oxygen relights glowing splint (1) hydrogen 'pop' with lighted splint (1)	H_2 O_2 could be consequential if A/B incorrectly identified	H O	
		(b)			2	*Advantage* does not contribute to greenhouse effect / global warming / does not produce carbon dioxide / water is only product of combustion / does not cause acid rain (1) *Disadvantage* produces less energy per gram / storage problems / explosive gas / difficult to re-fuel hydrogen cars (1)	renewable	more environmentally friendly	
		(c)			1	$CH_4 + \boxed{2}\ O_2 \longrightarrow \boxed{2}\ H_2O + CO_2$			

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
	5	(a)	(i)	I	1	any of 3/4/5 - any of 7/8/9			
				II	1	260 - 310			
		(b)			2	important source of fuels (1) (some fractions can be cracked) to produce raw materials needed for plastic production(1)			
		(c)			2	fractions are a mixture of different hydrocarbons / are not pure substances (1) each substance within the fraction has a different boiling point (1)			

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
	6				3	Ca^{2+} **and** F^- (1) - **both** needed Na_2CO_3 (1) $Mg(OH)_2$ (1)			

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
	7	(a)			3	iron ore is the raw material from which iron is obtained (1) coke is the reducing agent / forms carbon monoxide / is the fuel (1) limestone reacts with impurities / produces slag (1)	provides iron removes impurities		
		(b)	(i)		2	carbon monoxide / CO is oxidised iron oxide / Fe_2O_3 is reduced carbon monoxide / CO gains oxygen iron oxide / Fe_2O_3 loses oxygen - any 2/3 for (1) - all for (2)			
			(ii)		1	$Fe_2O_3 + \boxed{3}\ CO \longrightarrow \boxed{2}\ Fe + \boxed{3}\ CO_2$			
		(c)			1	a mixture of (different) metals		reference to carbon	

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
	8	(a)			1	the higher the concentration the higher the current			
		(b)			1	the evidence for this conclusion is strong **because** each group has very similar results / results are reproducible each increase of 0.1M increases current by similar amount (any group) - or any reference to proportionality / linear relationship		results are repeatable / reliable / fair test	
		(c)	(i)		1	0.34 (A)			
			(ii)		2	0.01 (1) 3% (1) - ignore sig figs i.e. accept 2.9, 2.94 etc. correct answer only (2)	-3%		
			(iii)		1	variation in depth of electrode immersion / distance between electrodes / (surface) area of electrodes variation in voltage of power supply variation in concentration of solution e.g. volume of water added to each is slightly different, not all solid dissolved			

Question Number									
FT	**HT**	**Sub-section**			**Mark**	**Answer**	**Accept**	**Neutral answer**	**Do not accept**
	9	(a)			3	add (hydrochloric) acid (1) bubbles produced (and temperature rise) with carbonate temperature rise with hydroxide no reaction if chloride - any 2 for (1) - all for (2) [accept universal indicator test and appropriate colours allocating marks as above]	other named acid		
		(b)	(i)		1	copper + silver nitrate → silver + copper nitrate $Cu + AgNO_3 \rightarrow Ag + Cu(NO_3)_2$ - ignore balancing	symbol equation		
			(ii)		2	copper is more reactive than silver (1) **displaces** silver from silver nitrate (1)			

Question Number		
FT	**HT**	**Answer**
	10	**Indicative content**: Early atmosphere formed from volcanic outgassing; description / composition of present day atmosphere and explanation of changes i.e. water vapour cooled and condensed to form oceans, carbon dioxide dissolved in oceans and incorporated into carbonate rocks. Evolution of simple plants which photosynthesized using up carbon dioxide and producing oxygen. **5 – 6 marks**: The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks**: The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks**: The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks**: The candidate does not make any attempt or give a relevant answer worthy of credit.

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