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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science: Double Award 3462/2F
Specification B (Co-ordinated)

Mark Scheme

2005 examination - June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Double Award
Foundation Tier 3462/2F

3462/2F Q1

question	answers	extra information	mark
(a) **A**	nucleus electron		1 1
(b) **E**	correct number of electrons (12) 2.8.2	accept dots and circles	1 1
total			4

3462/2F Q2

question	answers	extra information	mark
(a) **G**	F	accept indium / In	1
(b) **G**	C	accept sodium / Na	1
(c) **G**	A	accept hydrogen / H / H_2	1
total			3

3462/2F Q3

question	answers	extra information	mark
(a)(i) **A**	water	accept H_2O accept correct ringed answer in box	1
(ii) **A**	neutralisation	accept underlining or any indication, eg tick	1
(b) **A**	sodium hydroxide sulphuric acid	 apply list principle	1 1
total			4

3462/2F Q4

question	answers	extra information	mark
A	electrolysis		1
	positive electrode	accept anode	1
	negative electrode	accept cathode	1
	bottom of the tank		1
total			4

3462/2F Q5

question	answers	extra information	mark
(a)(i) **E**	test tube containing liquid (limewater) tube extended to below level of liquid and connected to conical flask	accept any container do **not** accept wrongly named liquid must not be closed system, ie with bung or cork	1 1
(ii) **G**	cloudy / chalky / milky	accept white (precipitate) **not** foggy, misty	1
(b)(i) **A**	any **two** from: • sugar • yeast • water		2
(ii) **E**	produces CO_2 / gas / bubbles makes the dough / bread rise owtte	 eg makes bread light and airy / expands / puts air in	1 1
total			7

3462/2F Q6

question	answers	extra information	mark
(a)(i) **G**	melting point increases as atomic number increases	accept 'increase' / higher / bigger / larger	1
(ii) **G**	200 to 350 °C		1
	exactly on 85 ± ½ square	up to <u>their</u> value ± ½ square	1
(b)(i) **E**	chlorine **or** fluorine	accept if both chlorine and fluorine ticked, otherwise list principle	1
(ii) **E**	chlorine / fluorine are more reactive (than bromine)	accept chlorine / fluorine are higher (up group 7) accept a more reactive halogen will displace a less reactive halogen	1
(iii) **G**	500 (litres)		1
total			6

3462/2F Q7

question	answers	extra information	mark
(a) **G**	sodium hydrogen phosphorus oxygen	**2** marks for all 4 **1** mark for 2 or 3 **0** marks for 0 or 1 not symbols / formulae	2
(b)(i) **E**	gives out heat / energy	gets hot(ter) / temperature rises (1) independent mark	1 1
(ii) **E**	**Quality of written communication** take temperature of water at start take temperature after adding soup powder plus any **one** from: • using a thermometer • mix / stir / shake etc • in beaker / conical flask / test tube / plastic cup • temperature will rise (indicates an exothermic reaction)	for clearly expressed ideas owtte	1 1 1 1
total			8

3462/2F Q8

question	answers	extra information	mark
(a)(i) **E**	water <u>vapour</u> given out from volcano	accept steam not hydrogen and oxygen combining to form water	1
	condensed	accept rain / clouds formed just 'cools' is insufficient	1
(ii) **G**	plants **or** dissolves in ocean / seas / water	accept photosynthesis	1
(b) **A**	nitrogen (left) N_2	do **not** accept N	1
	oxygen (right) O_2	do **not** accept O	1
total			5

3462/2F Q9

question	answers	extra information	mark
(a) **A**	**A** ammonia	accept correctly indicated in the box	1
	B nitrogen monoxide		1
	C nitrogen dioxide		1
(b) **A**	any **two** from: • air / oxygen / O_2 • ammonia / NH_3 • water / H_2O • nitrogen / N_2		2
(c)(i) **G**	speeds up reaction (owtte)		1
(ii) **A**	platinum	accept indication, circles etc	1
total			7

3462/2F Q10

question	answers	extra information	mark
(a) **A**	6	accept 5.8 – 6	1
(b) **E**	hydrochloric acid used up / reacted / combined / **or** fewer particles (of hydrochloric acid) **or** fewer hydrogen ions owtte	accept reactants used up accept less calcium carbonate **or** smaller surface area of calcium carbonate accept lower concentration / less crowded do **not** accept atoms / molecules ignore references to energy do **not** accept references to atoms or molecules	1
	fewer collisions owtte	independent mark	1
(c) **G**	steeper curve initially	independent marks	1
	levels out at same volume	• must indicate levelling out • if line goes higher than 66 do **not** award this mark • diagonal line only = 0 marks • if steeper initially and then crosses the line and finishes correctly, then loses one	1
total			5

3462/2F Q11

question	answers	extra information	mark
(a) **G**	fractional distillation / fractionation	accept distillation accept refining do **not** accept cracking	1
(b) **E**	**Quality of written communication**	for technical words correctly used **two** from: evaporat(ion) / condensat(ion) / boiling points / gas / vapour / molecules / fraction / vaporised QoWC mark can be awarded for cracking described	1
	any **three** from:		3
	• crude oil is heated to high temperature **or** heated to 340°C or above		
	• (most of the) oil is **evaporated** / turns into **gas** / **vapour**	accept oil is boiled	
	• heavier **molecules** do not boil	accept converse accept particles instead of molecules	
	• heavier **molecules** sink to the bottom **or** lighter **molecules** rise up (the tower)	accept particles instead of molecules	
	• oil **<u>vapours</u>** / **<u>gases</u>** go up the tower		
	• vapours **condense** at different points (up the tower)	accept heavier molecules condense first / at the bottom accept lighter molecules condense last / at the top	
	• separation depends on their boiling points owtte	vapours condense at different temperatures	
	• oil separated into **fractions** which have similar numbers of carbon atoms **or** similar chain lengths **or** similar boiling points	accept in terms of similar chains	
	• temperature gradient up the tower		

total		5

3462/2F Q12

question	answers	extra information	mark
(a) **E**	(very) small percentage / amount (in the Earth's crust)	any indication that there is a small amount, eg not much (left) accept rare (elements) / rarer accept not commonly found ignore cannot find easily ignore hard to extract	1
(b)(i) **G**	oxygen / O_2 / O	do **not** accept O^2	1
(ii) **G**	any **one** from: • potassium / K • sodium / Na • calcium / Ca • magnesium / Mg	symbols must be correct write name and incorrect symbol, ignore symbol	1
(c)(i) **E**	heating (with) **or** hot air blown into furnace carbon / carbon monoxide / coke / coking coal **or:** carbon reacts with O_2 **or** carbon / coke burning (1) CO reacts with the ore (1)	accept high temperatures or (very) hot do **not** accept coal / charcoal accept balanced equation only accept balanced equation only CO / CO_2 for naming the reducing agent	1 1
(ii) **G**	cost of melting ore / electricity makes aluminium expensive (owtte) **or** (large amount of) electricity used **or** because you have to use electrolysis **or** aluminium is higher in the reactivity series **or** aluminium is harder to <u>reduce</u> **or** unable to reduce with carbon **or** the cost of purifying the bauxite	do **not** accept harder to extract / produce more energy is **not** enough	1
total			6

3462/2F Q13

question	answers	extra information	mark
(a) **G**	harmful / noxious / nocif	accept <u>less</u> dangerous than a toxic substance do **not** accept irritant	1
(b) **E**	gives oxygen	accept oxidising accept 'it oxidises' accept 'it contains oxygen'	1
	needed for burning (must be linked to oxygen)	oxidising <u>agent</u> scores **2** marks oxidising agent because it is flammable = **1** mark flammable loses a mark when both marks awarded accept oxygen makes the flame burn stronger **or** oxygen helps combustion for **2** marks	1
(c)(i) **E**	122.5 or 123	accept 39 + 35.5 + (3 × 16) for **1** mark 122 with no working scores **1** mark	2
(ii) **E**	39% (39.18…. or 39.02….)	allow ecf accept 48/122.5 × 100 for **1** mark	2
total			7

3462/2F Q14

question	answers	extra information	mark
(a)(i) **G**	(actual value 2403°C)	accept values between 2100 and 2450	1
(ii) **G**	(actual value is 5.9 g/cm^3)	accept values between 3.5 and 6.5	1
(b)(i) **E**	any **two** sensible ideas such as: • (why) put in order of mass • he left gaps **or** table not complete • no evidence for undiscovered elements **or** they believed all the elements had been discovered • he changed the order of some elements **or** there were exceptions to the rule(s) • he put metals and non-metals together • he did not explain his ideas clearly (owtte)	accept other equally valid orders, eg alphabetical accept predictions could not be backed by evidence accept why change previous ideas accept they didn't like his groupings / groups do **not** accept modern explanations, eg proton number etc	2
(ii) **E**	(the properties of gallium) fitted the predictions (owtte) **or** predictions were correct **or** (properties) would make it fit in the gap **or** (properties) would make it fit in group 3	do **not** accept gallium fitted his theory accept finding gallium proved there were new elements to be discovered	1
total			5

3462/2F Q15

question	answers	extra information	mark
(a) **E**	all electrons correct (inner shell need not be shown)	three bond pairs and two electrons anywhere else can use dots, crosses or e's in any combination	1
(b) **G**	covalent	accept phonetic spelling do **not** accept convalent	1
(c) **G**	reversible **or** any indication that reaction can go in either way	accept can go either / both ways accept equilibrium accept can be reversed accept ammonia can be turned into nitrogen and hydrogen	1
(d)(i) **E**	increase yield (owtte) **or** helps plants to grow	accept answers in terms of fast / <u>better</u> growth accept nitrogen needed for making amino acids / protein / enzymes accept replace / add nitrogen / nutrients in the soil ignore make ground more fertile **or** plants more healthy	1
(ii) **E**	any **one** from: • jobs • money • exports • increased <u>yield</u> **or** more coffee	accept increased business accept land used over again	1
(iii) **E**	washed by rain / permeated / soaked down / passed through soil / rocks etc	accept leached **or** dissolved / soluble in water ignore absorbed / picks up nitrate	1
(iv) **E**	harmful / risk to health **or** because it is drinking water **or** main supply of water **or** blue baby syndrome etc.	accept references to eutrophication / weed growth do **not** accept kills people / animals unqualified	1

cont…

3462/2F Q15 cont…

(v) **E**	use less	ignore do not use / stop using	1
	especially at end of growing season	do not use at end of growing season = **2** marks	1
	or use natural/slow release fertilisers (1) release nitrogen less quickly (1)	for alternative (nitrogen) fertiliser	
	or grow leguminous crops (1) nitrates not needed (1)	accept nitrogen obtained from air	
	or treat the water (1) to remove nitrates (1)	do **not** accept denitrifying bacteria allow marks for mixing different routes	
total			9

3462/2F Q16

question	answers	extra information	mark
(a) **G**	colour		1
(b) **G**	Fe_2O_3 or $(Fe^{3+})_2 (O^{2-})_3$	2 and 3 should be below halfway on Fe and O	1
(c)(i) **G**	4 4	or correct multiples	1
(ii) **G**	any **two** from: • high melting point • strong / tough • hard • not (very) reactive	ignore references to malleable / ductile / conductivity / stiff / boiling point / density accept can withstand high temperatures accept <u>not</u> brittle do **not** accept flexible	2
total			5