



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark scheme

June 2003

GCSE

Science: Double Award Co-ordinated

3462

Paper 2F

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INFORMATION FOR EXAMINERS

1. General

The mark scheme for each question shows:

- the marks available for each part of the question;
- the total marks available for the question;
- the typical answer or answers which are expected;
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example:
where consequential marking needs to be considered in a calculation;
or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

- 2.1** In a list of acceptable answers where more than one mark is available ‘any **two** from’ is used, with the number of marks emboldened. Each of the following lines is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; e.g. allow smooth / free movement.)

3. Marking points

3.1 Marking of Quality of Written Communication

Examiners are reminded of the need to assess QoWC by the following statement appearing in the appropriate parts of the mark scheme:

The answer to this question requires ideas in good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.

The maximum marks available to a candidate whose answer is not well expressed will be (the number of marks available –1).

3.2 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that ‘right + wrong = wrong’.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.3 Use of chemical symbols/formulae

If a candidate writes a chemical symbol/formula instead of a required chemical name, full credit can be given if the symbol/formula is correct and if, in the context of the question, such action is appropriate.

3.4 The marking of quantitative relationships

Full credit can be given for a correct quantitative relationship expressed in:

- named units;
- physical quantities;
- standard symbols;
- a combination of physical quantities and units.

No credit can be given for any quantitative relationship expressed in terms of:

- a combination of physical quantities, units and symbols;
- a diagram, e.g. the ohm’s law triangle, unless the rest of the answer shows clearly that the candidate understands the relationships involved.

3.5 Marking procedure for calculations

3.5.1 Full marks can be given for a correct numerical answer, as shown in the column ‘answers’, without any working shown. However, if the answer is incorrect, mark(s) can be gained by correct substitution/working and this is shown in the ‘extra information’ column.

3.5.2 Where calculations are based on incorrectly recalled relationships, neither the incorrectly recalled relationship, nor the resulting calculation based on the incorrect relationship, will be credited.

3.6 Interpretation of ‘it’

Answers using the word ‘it’ should be given credit only if it is clear that the ‘it’ refers to the correct subject.

3.7 Errors carried forward

There should be no error carried forward from a previous answer which has been based on wrong science. Any error in the answers to a structured question should be penalised once only.

Examples

- (a) A candidate who calculates average speed using $\text{speed} = \text{time}/\text{distance}$ **and** then proceeds to use this incorrect answer to calculate an acceleration based on the correct quantitative relationship should be given credit for the use of the correct acceleration relationship but none for either numerical answer.
- (b) A candidate who incorrectly calculates average speed using $\text{speed} = \text{distance}/\text{time}$ and then proceeds to use this incorrect value to calculate an acceleration based on the correct quantitative relationship, should be given credit for the use of both correct quantitative relationships **and** for the correct substitution and use of the incorrect value in the calculation of the rate of acceleration.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.8 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.9 Brackets

(.....) is used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.10 Unexpected Correct Answers not in the Mark Scheme

The Examiner should use professional judgement to award credit where a candidate has given an unexpected correct answer which is not covered by the mark scheme. The Examiner should consult with the Team Leader to confirm the judgement. The Team Leader should pass this answer on to the Principal Examiner with a view to informing all examiners.



**Double Award
Foundation Tier 3462/2F**

3462/2F Q1

question	answers	extra information	mark
(a)	D		1
(b)	B		1
(c)	F		1
(d)	G		1
(e)	H		1
total			5

3462/2F Q2

question	answers	extra information	mark
(a)	Sensible method of collection such as: over water downward delivery gas syringe	do not accept sealed collection tube or balloon tube half-way or more down and empty container no lid needed labelled or graduations	1
(b)(i)	limewater or calcium hydroxide / Ca(OH) ₂ (solution)		1
(ii)	turns cloudy/milky/chalky / white precipitate		1
total			3

3462/2F Q3

question	answers	extra information	mark
(a)	oxygen or air or O ₂		1
(b)(i)	platinum		1
(ii)	oxidation		1
(c)(i)	potassium hydroxide	accept correct formulae	1
	water		1
(ii)	fertiliser		1
(iii)	H ⁺	accept hydrogen but not H	1
total			7

3462/2F Q4

question	answers	extra information	mark
(a)	hydrocarbons		1
(b)	evaporation		1
	condensation		1
	distillation	allow fractional distillation	1
(c)	lower and more		1
(d)(i)	any sensible answer e.g. bags, bottles etc		1
(ii)	broken down / decomposed by microorganisms	accept rots / decays	1
(iii)	any two from: litter / dumping / eyesore animals eating / trapped / tangled / suffocating etc. burning causes pollution / toxic fumes etc. buried waste takes up valuable land	allow other sensible environmental problems do not accept harmful / damage	2
total			9

3462/2F Q5

question	answers	extra information	mark
	clay		1
	limestone		1
	water		1
total			3

3462/2F Q6

question	answers	extra information	mark
(a)	(good) conductor of electricity	conductor of electricity and heat (+/-) = 0 accept can be drawn into wires or ductile ignore flexible	1
(b)	strong	accept tough or hard or high tensile strength	1
(c)	reference to <u>colour</u>		1
total			3

3462/2F Q7

question	answers	extra information	mark
(a)	<p>Quality of written communication <i>The answer to this question requires ideas in good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.</i></p> <p>any three from:</p> <p>floats</p> <p>fizzes / bubbles or produces a gas</p> <p>indicator goes blue / purple / violet (alkaline colour)</p> <p>water level in test tube goes down or gas fills the test tube</p> <p>lithium ‘dissolves’ (owtte)</p> <p>moves around (on surface of water)</p> <p>steam</p>	<p>maximum 2 marks if ideas not well expressed</p> <p>do not accept flames</p> <p>ignore reference to heat</p>	3
(b)	<p>lithium <u>hydroxide</u></p> <p>hydrogen</p>		1 1
(c)	more violent / reactive	accept a description of the reaction which indicates greater violence	1
(d)(i)	decreases		1
	and then slows down or levels off		1
(ii)	26(°C)		1
total			9

3462/2F Q8

question	answers	extra information	mark
(a)	any two from: could explode (owtte) <u>reacts</u> with oxygen (air) ignites easily or flammable or fire risk (owtte)	accept 'pop'	2
(b)(i)	lighter / less dense than air	accept each has a <u>very</u> low density	1
(ii)	any two from: noble gas so (very) unreactive or inert will not burn / explode / react	accept group 0, 8 or 18 or has full shells accept 'not reactive'	2
total			5

3462/2F Q9

question	answers	extra information	mark
(a)	endothermic and because it takes in heat / energy	both for one mark	1
(b)(i)	reversible reaction (or explanation)		1
(ii)	add water	do not accept cooling or reverse the reaction	1
total			3

3462/2F Q10

question	answers	extra information	mark
(a)	water (molecules) contain two hydrogen atoms and one oxygen atom	all water molecules have the formula H ₂ O for 2 marks water molecules contain hydrogen and oxygen (atoms) for 1 mark water is H ₂ O for 1 mark	2
(b)(i)	atom A has no <u>neutrons</u> / atom B has one <u>neutron</u>	allow different numbers of <u>neutrons</u>	1
(ii)	isotopes		1
total			4

3462/2F Q11

question	answers	extra information	mark
(a)(i)	5(%)		1
(ii)	0.35	$\frac{5}{100} \times 7$ for 1 mark	2
(b)(i)	reduction	accept (it's) reduced do not accept redox / deoxidation	1
(ii)	heat with / reduce / react with or (chemical) reaction with a metal / element / substance higher in reactivity or electrolysis: molten (1) electrolysis (1)	ignore displace accept higher <u>named</u> elements or symbol accept carbon monoxide / coal / coke correct word equation for 2 marks correct formulas for 1 mark correct <u>balanced</u> symbol equation for 2 marks	1 1
total			6

3462/2F Q12

question	answers	extra information	mark
(a)(i)	accurate plotting of points ($\pm \frac{1}{2}$ square)	2 marks for all points 1 mark for 3 or 4 points	2
	sensible smooth curve	reasonable attempt do not accept double lines or dot to dot	1
(ii)	accurately read from <u>their</u> graph to $\pm \frac{1}{2}$ square		1
(b)(i)	(as temperature increases) rate <u>increases</u>	accept speeds up, gets faster, gets quicker accept higher speed do not accept gets bigger / higher unqualified do not accept answers about time on its own	1
(ii)	Quality of written communication <i>The answer to this question requires ideas in good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.</i>	<i>maximum 2 marks if ideas not expressed well</i>	3
	any three from: particles have more energy particles move faster more collisions more energetic / successful / harder collisions	for converse maximum 2 marks higher kinetic energy do not accept move more or vibrate more accept greater rate of collisions more particles have activation energy	
(c)	concentration (of solutions) or volume (of solutions)	accept 'how much of' accept references to intensity of colour accept same endpoint accept rate of stirring / shaking do not accept reference to solids or catalysts etc ignore containers do not accept pH	1
total			9

3462/2F Q13

question	answers	extra information	mark
(a)	magnesium is <u>higher</u> in reactivity (than iron) or Mg is <u>more</u> reactive (than Fe)	must be a comparison do not accept Mg corrodes <u>faster</u> (than Fe)	1
	magnesium corrodes / reacts / loses electrons instead (of iron)	sacrificial idea do not accept magnesium ‘rusts’ instead of iron	1
(b)	sensible answers such as: difficult to repair / paint or replace a long underground pipe or easier to replace magnesium or easier to carry out inspections	accept to stop pipes corroding causing <u>leaks</u> accept idea of cost of replacing pipe accept damage to pipe do not accept pollution do not accept corrosion unqualified	1
total			3

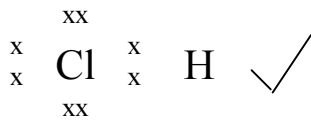
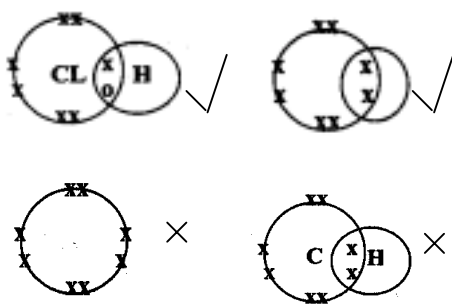
3462/2F Q14

question	answers	extra information	mark
(a)	<p>any three from:</p> <p><u>less</u> / little / not much carbon dioxide or give a %age < 1%</p> <p>more / a lot of nitrogen or give 78-80%</p> <p>(more) / (some) oxygen or give a %age 20-21%</p> <p>references to pollutant gases in general or named examples</p> <p>more / some water (vapour)</p> <p>some / 1% argon</p> <p>ozone (layer) on earth</p>	<p>accept reverse answers if unambiguous</p> <p>do not accept just different throughout</p> <p>do not accept more “other gases”</p> <p>e.g. CO, SO₂, NO, NOX etc.</p> <p>ignore other noble gases</p>	3
(b)	<p>any two from:</p> <p>removed carbon dioxide</p> <p>released oxygen</p> <p>caused carbon from carbon dioxide to become locked in sedimentary rocks</p> <p>the oxygen they produced reacted with methane and ammonia</p> <p>produced nitrogen (must be linked to fourth point)</p>	<p>ignore reference to respiration / photosynthesis unless qualified</p> <p>accept correct word / symbol equation for photosynthesis for 2 marks</p> <p>converted / changed CO₂ to oxygen for 2 marks</p>	2
total			5

3462/2F Q15

question	answers	extra information	mark
(a)	coke / carbon / C	do not accept coal	1
	<u>hot</u> air	do not accept oxygen	1
	slag / calcium silicate / CaSiO ₃		1
(b)(i)	2 3	accept <u>correct</u> multiples do not accept any added different chemicals	1
(ii)	iron oxide or Fe ₂ O ₃ / iron (III) oxide	ignore iron ore / haematite do not accept iron (II) oxide do not accept Fe ³⁺	1
(c)(i)	160	ignore units (2 × 56) + (3 × 16) for 1 mark	2
(ii)	70	$\frac{2 \times 56}{160} (\times 100)$ for 1 mark allow ecf from part (i)	2
(iii)	700	allow ecf from part (ii)	1
total			10

3462/2F Q16

question	answers	extra information	mark
(a)	<p>bonding pair in the overlap and 6 other electrons arranged around the chlorine</p> 	<p>must have either circles or symbols</p> <p>need not be pairs but must not be in the overlap region</p> <p>accept without H and Cl if clear</p> <p>accept all x's or all o's</p> 	1
(b)	$\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$	<p>accept multiples or fractions</p> <p>accept correct formulae but not balanced for 1 mark</p> <p>correctly balanced equation containing 'correct' lower / upper case symbols gets 1 mark</p> <p>e.g. $\text{h}_2 + \text{cl}_2 \rightarrow 2\text{HCL}$</p>	2
(c)	MgCl_2	accept $\text{Mg}^{2+}(\text{Cl}^-)_2$	1
(d)	<p>because magnesium chloride is made of ions or is ionic</p> <p>hydrogen chloride is made of molecules or is covalent</p>	<p>accept there are strong forces of attraction between the ions / particles in MgCl_2 or strong electrostatic attractions</p> <p>accept more energy to separate particles in MgCl_2</p> <p>do not accept MgCl_2 molecules</p> <p>do not accept reference to breaking bonds</p> <p>accept there are only weak forces of attraction (between the particles / molecules) in HCl</p> <p>do not accept weak covalent bonds</p> <p>do not accept reference to breaking bonds</p> <p>do not accept MgCl_2 is a solid and HCl is a gas</p>	1 1
total			6