

# Mark Scheme (Results) Summer 2010

IGCSE

## IGCSE Chemistry (4335) Paper 1F

Edexcel is one of the leading examining and awarding bodies in the UK and throughout the world. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers.

Through a network of UK and overseas offices, Edexcel's centres receive the support they need to help them deliver their education and training programmes to learners.

For further information, please call our GCE line on 0844 576 0025, our GCSE team on 0844 576 0027, or visit our website at [www.edexcel.com](http://www.edexcel.com).

If you have any subject specific questions about the content of this Mark Scheme that require the help of a subject specialist, you may find our **Ask The Expert** email service helpful.

Ask The Expert can be accessed online at the following link:

<http://www.edexcel.com/Aboutus/contact-us/>

Alternately, you can speak directly to a subject specialist at Edexcel on our dedicated Science telephone line: 0844 576 0037

(If you are calling from outside the UK please dial + 44 1204 770 696 and state that you would like to speak to the **Science** subject specialist).

Summer 2010

Publications Code UG024203

All the material in this publication is copyright

© Edexcel Ltd 2010

## SECTION A

| Question |    |    | Mark | Acceptable answers  | Notes   | Total |
|----------|----|----|------|---|---|-------|
| 1        | a  | i  | M1   | neutron   |   | 1     |
|          |    |    | M2   | proton  |   | 1     |
|          |    |    | M3   | electron  |   | 1     |
|          |    | ii | M1   | nucleus   |   | 1     |
|          |    |    | M1   | 12  |   | 1     |
|          | iv | M1 | 5    |   | 1   |       |
|          |    | M1 | 2.3  | Accept any punctuation (eg , / - ) or none  | 1   |       |
|          | b  | i  | M1   | helium / beryllium / magnesium / calcium / strontium / barium / radium / He / Be / Mg / Ca / Sr / Ba / Ra |   | 1     |
|          |    |    |      | hydrogen / helium / H / He  | Accept H <sub>2</sub>                           | 1     |
|          | c  |    |      | it has isotopes / atoms have different numbers of neutrons / it is an average                             | Reject different numbers of protons / electrons | 1     |

| Question |   |     | Mark | Acceptable answers  | Notes  | Total |
|----------|---|-----|------|---|--|-------|
| 2        | a | i   | M1   | air / atmosphere  | Ignore any reference to method                             | 1     |
|          |   | ii  | M1   | natural gas / North Sea gas / hydrocarbons / named fraction / water / steam | Ignore methane   | 1     |
|          | b | i   | M3   | iron / Fe   | Ignore reference to oxide(s) / oxidation states II and III | 1     |
|          |   | ii  | M1   | 350 - 500   |  | 1     |
|          |   |     | M2   | 100 - 350   |  | 1     |
|          |   | iii | M1   | cross in box 3  |  | 1     |
|          |   |     | M2   | cross in box 4  |  | 1     |
|          |   |     | M3   | cross in box 5  |  | 1     |

| Question |   | Mark | Acceptable answers         | Notes  | Total |
|----------|---|------|----------------------------|--|-------|
| 3        | a | M1   | phosphorus                 | Accept answers in either order<br>Ignore symbols | 1     |
|          |   | M2   | potassium                  |  | 1     |
|          | b | i    | cross in box 1             | Consequential marking from bi                    | 1     |
|          |   | ii   | cross in same box as in bi |  | 1     |

| Question |   | Mark | Acceptable answers   | Notes  | Total |
|----------|---|------|--|--|-------|
| 4        | a | M1   | denser than air / greater molar mass than air or nitrogen or oxygen  | Accept heavier than air/nitrogen/oxygen                              | 1     |
|          | b | M1   | limewater / aqueous calcium hydroxide / $\text{Ca(OH)}_2(\text{aq})$ | Accept (aq) / solution / dissolved in water as equivalent to aqueous | 1     |
|          |   | M2   | milky / cloudy / chalky / white precipitate / white solid            | Ignore bubbles   | 1     |
|          | c | M1   | copper(II) carbonate $\rightarrow$ copper(II) oxide + carbon dioxide | Both (II) needed<br>Reject any other substances<br>Ignore heat       | 1     |
|          | d | M1   | green  | Ignore qualifiers such as light / dark                               | 1     |
|          |   | M2   | black  | Reject all other colours   | 1     |

| Question |   | Mark | Acceptable answers  | Notes  | Total |
|----------|---|------|---|--|-------|
| 5        | a | M1   | cross in box 1  |  | 1     |
|          |   | M2   | cross in box 4  |  | 1     |
|          | b | M1   | filter or filtration / centrifuge and decant  | Accept description of process<br>Reject any wrong method                                     | 1     |
|          | c | M1   | wash (with water) / add water and filter  | Accept description of process  | 1     |
|          |   | M2   | dry / heat / warm / evaporate / leave in warm place / spread onto filter paper / place in (warm) oven | Accept description of process<br>Ignore wrong consequence (eg heat to remove sodium nitrate) | 1     |
|          |   |      |   | If M1 and M2 in wrong order, award 1/2<br>Reject any wrong method in both M1 and M2          |       |

| Question |   | Mark | Acceptable answers   | Notes   | Total  |   |
|----------|---|------|--|---|--|---|
| 6        | a | M1   | covalent   |   | 1  |   |
|          | b | M1   | low  |   | 1  |   |
|          |   | M2   | weak   | If high given for M1, then accept strong                                | 1  |   |
|          |   | M3   | molecules  |   | 1  |   |
|          | c |      |  |   | Mark b independently except that if high given for M1, then accept strong for M2 |   |
|          |   | M1   | shared pairs of electrons between O and both H atoms   | Electrons can be shown as dots / crosses / e / any combination of these | 1  |   |
|          |   | M2   | two electrons in O inner shell<br>AND four more electrons in O outer shell<br>AND no extra electrons in H            | Accept these electrons paired or unpaired                               | 1  |   |
|          | d | i    |  |   | M2 dependent on M1   |   |
|          |   |      | M1   | blue  | Ignore qualifiers such as light / dark<br>Reject all other colours               | 1 |
|          |   |      | M2   | white / grey / pale(r) blue   | Accept all combinations of these<br>Reject all other colours                     | 1 |
| ii       |   | M1   | anhydrous copper(II) sulphate  | (II) not needed   | 1  |   |
| iii      |   | M1   | becomes blue / heat produced / temperature rises / forms hydrated copper(II) sulphate / goes back to original colour | If different colour given in di(M1), accept this colour here            | 1  |   |



| Question |   |     | Mark                                | Acceptable answers  | Notes   | Total |
|----------|---|-----|-------------------------------------|---|---|-------|
| 7        | a | i   | M1                                  | propene / propylene   | Accept prop-1-ene   | 1     |
|          |   | ii  | M1                                  | yellow / orange / brown   | Accept any combination of these colours<br>Reject red   | 1     |
|          |   |     | M2                                  | (goes) colourless / decolourised  | Ignore clear<br>Ignore discoloured  | 1     |
|          |   |     |                                     |   | Do not award mark for single colour if not clear whether start or finish  |       |
|          | b | i   | M1                                  | (contains) hydrogen and carbon / H and C (atoms)  | Reject molecules / ions   | 1     |
|          |   |     | M2                                  | only  | Accept other words with equivalent meaning, such as purely / solely / entirely<br>Award M2 only if correct elements mentioned in M1 | 1     |
|          |   | ii  | M1                                  | only single bonds / no double bonds / no multiple bonds   |   | 1     |
|          |   | iii | M1                                  | double bond between two carbon atoms  |   | 1     |
|          |   |     | M2                                  | each carbon bonded to two hydrogen atoms  | M2 dependent on M1  | 1     |
|          | c |     | M1                                  | cross in box 1  |   | 1     |
|          |   | M2  | cross in box 5                      |   | 1   |       |
| d        |   | M1  | $C_2H_4$ / $CH_2CH_2$ / $CH_2=CH_2$ | Accept in either order<br>Ignore state symbols<br>Award 1 mark for both correct formulae but incorrect coefficients<br>Accept $H_4C_2$ and $OH_2$ | 1   |       |
|          |   | M2  | $H_2O$                              |   | 1   |       |

SECTION A TOTAL: 55 MARKS

## SECTION B

| Question |   |    | Mark | Acceptable answers   | Notes  | Total |
|----------|---|----|------|--|--|-------|
| 8        | a | i  | M1   | bubbles / fizzing / effervescence / metal gets smaller / white trail | Ignore metal dissolves / gas produced<br>Reject all answers in a(ii)   | 1     |
|          |   | ii | M1   | melts / forms a ball / darts / moves (on surface) / floats           | Ignore reference to flames<br>Reject all answers in a(i)   | 1     |
|          | b | i  | M1   | calcium hydroxide  |  | 1     |
|          |   | ii | M1   | NaOH   |  | 1     |
|          | c |    | M1   | hydrogen / H <sub>2</sub>  | Ignore H   | 1     |
|          |   |    | M2   | (squeaky) pop with burning splint / burns with a (squeaky) pop       | Accept other words such as explosion / lighted spill or taper<br>Reject glowing splint<br>Ignore references to air/splint extinguished<br>No CONSEQ from wrong gas | 1     |
|          | d | i  | M1   | blue / purple  | Ignore qualifiers such as light / dark / bright  | 1     |
|          |   |    | M2   | OH <sup>-</sup> / hydroxide  | Ignore hydroxyl  | 1     |
|          |   | ii | M1   | yellow / orange  | Ignore qualifiers such as light / dark / golden / bright<br>Reject all other colours   | 1     |

| Question |   | Mark | Acceptable answers  | Notes   | Total   |  |   |
|----------|---|------|---|---|---|--|---|
| 9        | a | M1   | hydrogen peroxide   |   | 1   |  |   |
|          |   | M2   | manganese(IV) oxide / manganese dioxide                       |   | 1   |  |   |
|          | b | M1   | (gas) syringe   |   | 1   |  |   |
|          | c | M1   | catalyst / to speed up the reaction / lower activation energy |   | 1   |  |   |
|          | d | i    | M1  | (s) for both PbS and PbSO <sub>4</sub>  |   | 1  |   |
|          |   |      | M2  | (aq) for H <sub>2</sub> O <sub>2</sub> and (l) for H <sub>2</sub> O             |   | 1  |   |
|          |   | ii   | M1  | PbS / lead sulphide / sulphide ion / S <sup>2-</sup> / sulphur in lead sulphide | Ignore oxidation numbers if given   | 1  |   |
|          |   |      | M2  | gains oxygen/O/O <sub>2</sub><br>increase in oxidation state                    | only award if M1 correct or sulphur<br>ignore loss of electrons               | 1  |   |
|          | e | i    | M1  | S + O <sub>2</sub> → SO <sub>2</sub>  | Ignore state symbols<br>Accept S <sub>2</sub> or S <sub>8</sub>               | 1  |   |
|          |   |      | ii  | M1  | acidic / (forms) H <sup>+</sup> (ions) / sulphurous acid / sulphuric(IV) acid | Reject sulphuric acid / sulphuric(VI) acid | 1 |
|          |   |      | iii   | M1  | orange  |  | 1 |
|          |   |      | M2  | green   | Accept blue-green   | 1  |   |

| Question |   | Mark | Acceptable answers  | Notes  | Total |
|----------|---|------|---|--|-------|
| 10       | a | M1   | electron transfer   | All marks can be scored from suitably annotated diagrams<br>Award 0/3 if any reference to sharing electrons<br>Ignore covalent<br>M3 dependent on M2   | 1     |
|          |   | M2   | from magnesium/Mg to chlorine/Cl  |  | 1     |
|          |   | M3   | Mg loses two electrons and (each) Cl gains one electron                           |  | 1     |
|          | b | M1   | magnesium / Mg  |  | 1     |
|          |   | M2   | loss of electrons / increase in oxidation state                                   | Ignore number of electrons<br>M2 independent of M1   | 1     |
|          | c | M1   | + and - ions / oppositely charged ions / $Mg^{2+}$ and $Cl^{-}$                   | Need idea of + and - charge  | 1     |
|          |   | M2   | strong (electrostatic) attractions (within lattice)                               | accept strong (ionic) bonds<br>reject covalent bonds / molecular attraction  | 1     |
|          |   | M3   | <u>lot of</u> energy needed to overcome attractions / break bonds / separate ions | Do not accept "loosening bonds"<br>Ignore "hard to break"  | 1     |
|          |   |      |   | any mention of "intermolecular" or "intramolecular" loses M1 and M2<br><br>So "strong intermolecular forces need lots of energy to overcome" scores M3 |       |

| Question |   |     | Mark | Acceptable answers   | Notes   | Total |
|----------|---|-----|------|--|---|-------|
| 11       | a | i   | M1   | fractional distillation / fractionation  |   | 1     |
|          |   | ii  | M1   | crude oil heated   | M1 given even if describe laboratory process. Only M1 possible if describe lab process or mention cracking/breaking bonds | 1     |
|          |   |     | M2   | (vapour) passed into column/tower  | If crude oil heated in fractionating column, then give only 1 mark for M1 and M2  | 1     |
|          |   |     | M3   | fractions collected at different heights   |   | 1     |
|          |   |     | M4   | correct reference to boiling point / molecular size / temperature gradient/hot at bottom cooler at top | Do not award if specified temperature gradient is wrong way round   | 1     |
|          |   |     |      |  | All marks can be gained from suitable diagram   |       |
|          | b | i   | M1   | bitumen  |   | 1     |
|          |   | ii  | M1   | gasoline   |   | 1     |
|          |   | iii | M1   | bitumen  |   | 1     |
|          |   | iv  | M1   | refinery gases   | Accept answers in either order  | 1     |
|          |   |     | M2   | fuel oil   | Accept naphtha in place of either   | 1     |
|          | c |     | M1   | oxygen   | Ignore air  | 1     |
|          |   |     | M2   | carbon dioxide   | Accept answers in either order  | 1     |
|          |   |     | M3   | water  | Accept steam in place of water  | 1     |
|          |   |     |      |  | All marks in c are independent  |       |
|          |   |     |      |  | Ignore heat   |       |

|  |   |    |  |  |  |   |
|--|---|----|--|--|--|---|
|  | d | i  | M1   | $C_nH_{2n+2}$  | Accept other letters/symbols such as x<br>accept $C_nH_{2(n+1)}$   | 1 |
|  |   | ii | M1   | same/similar chemical properties / same functional group | reject trend in chemical properties<br><br>reject same/similar physical properties<br>Ignore references to general formula and references to saturation/unsaturation/specific functional group<br>Accept any two for 1 mark each |   |
|  |   | M2 | gradation in physical properties / gradation in specified physical property (eg boiling point) |  |  |   |
|  |   | M3 | neighbouring members differ by $CH_2$  | 2  |  |   |

SECTION B TOTAL: 45 MARKS

PAPER TOTAL: 100 MARKS



Further copies of this publication are available from  
International Regional Offices at [www.edexcel.com/international](http://www.edexcel.com/international)

For more information on Edexcel qualifications, please visit [www.edexcel.com](http://www.edexcel.com)  
Alternatively, you can contact Customer Services at [www.edexcel.com/asktheexpert](http://www.edexcel.com/asktheexpert) or on + 44 1204 770 696

Edexcel Limited. Registered in England and Wales no.4496750  
Registered Office: One90 High Holborn, London, WC1V 7BH