

Mark Scheme (Results)

Summer 2013

GCSE Chemistry (5CH3F)
Paper 01

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---------|--------------------|------------|
| 1(a) | A – air | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--------|--------------------|------------|
| 1(b)(i) | gas | ignore g alone | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|-------------------------------------|------------|
| 1(b)(ii) | reaction is reversible / reaction goes both ways | reaction is in /reaches equilibrium | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|--------------------|------------|
| 1(c) | ammonia + sulfuric acid → ammonium sulfate (2) left hand side (1) right hand side (1) | Allow = for → | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|--|------------|
| 1(d) | improve crop yields / promote plant growth | crops grow faster adds essential elements / OWTTE | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---------|--------------------|------------|
| 1(e)(i) | burette | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|----------------------------|------------|
| 1(e)(ii) | indicator / any named acid-base indicator | ignore Universal indicator | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--------|-----------------------|------------|
| 2(a)(i) | sodium | Na ⁺ or Na | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---------|--|------------|
| 2(a)(ii) | sulfate | SO ₄ ²⁻ or SO ₄ | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|--|------------|
| 2(b) | <p>A description including two points from</p> <p>CLEAN</p> <ul style="list-style-type: none"> • clean (flame test) wire with (hydrochloric) acid (1) <p>SAMPLE</p> <ul style="list-style-type: none"> • put (wire) into solid (1) <p>TEST</p> <ul style="list-style-type: none"> • hold (wire) in (Bunsen) flame (1) | <ul style="list-style-type: none"> • moisten splint • put splint into solid • hold splint in (Bunsen) flame <p>ignore : hold <u>over</u> flame use of tongs / spatula etc for equipment, max 1 if yellow flame, max 1</p> | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|--|------------|
| 2(c) | <p>A description including</p> <p>red-brown (1)</p> <p>precipitate / solid (1)</p> | <p>brown / red / orange or combinations of these (1) ppt (1)</p> | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|--|------------|
| 2(d) | <p>A description including</p> <p>(pass gas into) { limewater / calcium hydroxide solution } (1) which turns { milky / cloudy / white precipitate } (1)</p> | <p>2nd mark dependent on 1st MP</p> <p>ignore : puts out a flame</p> | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|---|------------|
| 3(a)(i) | A description including 2 points from add yeast (to the glucose solution) (1) anaerobic conditions/in absence of air/attach airlock/insert plug of cotton wool (1) warm / less than 40°C (1) | correctly named enzyme for fermentation eg zymase | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---------------------------------------|---|------------|
| 3(a)(ii) | ethanol (1) carbon dioxide (1) | C ₂ H ₅ OH CO ₂ | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|------------------|-----------------------------|--------------------|------------|
| 3(a)(iii) | C – fractional distillation | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|---|------------|
| 3(a)(iv) | any harmful effect eg alcoholism / liver damage / slows reactions / anti-social behaviour / injuries / become drunk / depression / damage to (suitable named) organs / damage to foetus | danger to others / alcohol poisoning ignore affects reaction times alone | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|------------|--------------------|------------|
| 3(b)(i) | 36 ±1 (°C) | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|--------------------|---------------------------|
| 3(b)(ii) | increases /OWTTE | | (1) grad |
| Question Number | Answer | Acceptable answers | Mark |
| 3(c)(i) | C C ₂ H ₆ | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|------------------|--------------------|------------|
| 3(c)(ii) | C propene | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|-------------------|--------------------|------------|
| 4(a) | C oxidised | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|-----------------------|--------------------|------------|
| 4(b) | D preservative | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--------------------------|--|------------|
| 4(c) | yellow / orange /red (1) | Combinations of yellow/orange/red pink | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|------------------------------------|------------|
| 4(d) | $\begin{array}{l} \text{(CH}_3\text{COOH +) NaOH (1)} \\ \quad \quad \quad (\rightarrow \quad \text{CH}_3\text{COONa +)} \\ \quad \quad \quad \text{H}_2\text{O (1)} \end{array}$ | NaHO ignore attempts to balance | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|----------|----------------------------|------------|
| 4(e) | hydrogen | H ₂ ignore H | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|---|------------|
| 4(f)(i) | ethanoic acid + ethanol → ethyl ethanoate + water (2) | correct spellings only left hand side (1) right hand side (1) | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|--|------------|
| 4(f)(ii) | <p>An explanation linking use (1) property (1)</p> <p>eg perfumes /cosmetics (1) pleasant smelling (1)</p> <p>other uses include flavourings / solvents</p> | <p>property dependent on use</p> <p>ignore 'sweet smelling'</p> <p>use – nail varnish remover property – acts as solvent</p> <p>for polyester: use – (polyester) to make clothing property – can be made into fibres</p> | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|---|------------|
| 5(a) | Na ⁺ and Mg ²⁺ | reject if any other ions are given allow names | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|--|------------|
| 5(b) | An explanation linking (reduction is) gain of electrons(2) | if cathode gains electrons – 1 mark loss of oxygen – 1 mark | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|---|------------|
| 5(c) | An explanation linking three of the following { ions / particles } cannot move in solid (1) { ions / particles } move in molten liquid / lattice structure is broken on melting (1) { bromide (ions) / negatively charged (ions / bromine) } { move / attracted } to anode (1) bromide (ions) lose electrons / (bromide ions) are oxidised(1) to form bromine atoms (1) bromine molecules / Br ₂ formed (1) | Half equation, even unbalanced, showing bromide ions losing electrons (2) | (3) |

| Question Number | | Indicative Content | Mark |
|-----------------|--------------|--|------------|
| QWC | *5(d) | <p>A description / explanation including some of the following points</p> <p>anode</p> <ul style="list-style-type: none"> • the anode decreases in mass / size • copper atoms form ions by losing electrons • copper ions pass into electrolyte • oxidation takes place at the anode • (anode) sludge forms as • impurities {are left behind / fall to the bottom} (under electrode) <p>cathode</p> <ul style="list-style-type: none"> • the cathode increases in mass / size • copper ions gain electrons to form copper • pure copper deposits on the cathode • reduction takes place at the cathode <p>electrolyte</p> <ul style="list-style-type: none"> • copper sulfate solution does not change in colour • no change in concentration of copper ions • copper ions in the electrolyte move toward the cathode | (6) |
| Level | 0 | No rewardable content | |
| 1 | 1 - 2 | <ul style="list-style-type: none"> • a limited description e.g. copper leaves the anode and deposits on the cathode. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy | |
| 2 | 3 - 4 | <ul style="list-style-type: none"> • a simple description e.g. copper leaves the anode and deposits on the cathode and impurities fall to the bottom of the beaker. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy | |
| 3 | 5 - 6 | <ul style="list-style-type: none"> • a detailed description and explanation e.g. copper atoms from the anode lose electrons to form copper ions; copper ions are attracted to the cathode where they gain electrons to form pure copper. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors | |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|--|--------------------|------------|
| 6(a) | A description including excess magnesium oxide (1) filter (to remove excess solid / magnesium oxide) (1) | | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|------------------------------|------------|
| 6(b) | $\text{MgCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2\text{O} + \text{CO}_2$ (2) left hand side (1) right hand side (1) | max 1 if incorrect balancing | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|-----------------|---|---|------------|
| 6(c) | A calculation involving mass of solid = $258.515 - 258.450$ (1) (= 0.065 g) concentration = $0.065 \times \frac{1000}{500}$ (1) (= 0.130 (g dm ⁻³)) | allow TE from mass of solid for second mark | (2) |

| Question Number | | Indicative Content | Mark |
|-----------------|-------|--|------|
| QWC | *6(d) | <p>A description including some of the following points</p> <ul style="list-style-type: none"> • hardness caused by dissolved calcium and/or magnesium ions • boiling water • removes temporary hardness only / not permanent hardness • ions removed • by formation of limescale / calcium carbonate • ion exchange resin • run tap water through resin • calcium and / or magnesium ions are exchanged for other ions • which do not cause hardness <p>allow full credit for use of other correct methods such as use of washing soda</p> | (6) |
| Level | 0 | No rewardable content | |
| 1 | 1 - 2 | <ul style="list-style-type: none"> • a limited description e.g. temporary hardness by boiling water / permanent hardness (& temporary hardness) by ion exchange • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy | |
| 2 | 3 - 4 | <ul style="list-style-type: none"> • a simple description e.g. use of ion exchange and boiling water removes ions causing hardness • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy | |
| 3 | 5 - 6 | <ul style="list-style-type: none"> • a simple description and explanation e.g. boiling water removes only temporary hardness, ion exchange resin removes both types of hardness, by removing calcium and/or magnesium ions from hard water • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors | |

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