

Mark Scheme (Results)

June 2011

360Science

GCSE Chemistry
Structured Paper C3 (5039/01)

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5039 Mark Scheme
June 2011

| Question Number | Answer | Allow | Reject/ Ignore | Mark |
|-----------------|--|--|---|------|
| 1(a) | alkali metals ; | | | 1 |
| (b)(i) | hydrogen ; | | Ignore all symbols | 1 |
| (ii) | sodium / lithium ; | Na / Li | | 1 |
| (c)(i) | <p>two from: preparation: clean with acid / make wooden splint damp;</p> <p>sample: use of flame test wire (loop) to collect sample/ dip splint into sample or solution;</p> <p>flame: hold sample <u>in</u> (Bunsen) flame [NB: Ignore above or over flame];</p> | <p>If clean rod / spatula etc with acid allow preparation mark</p> <p>Must have correct equipment for sample mark – wire, splint, silica rod: not spatula, (metal) rod, etc</p> | <p>Ignore type of wire</p> <p>Reject ‘yellow’ flame for flame mark</p> | 2 |
| (ii) | lilac ; | | | 1 |
| | | | | (6) |

| Question Number | Answer | Allow | Reject/ Ignore | Mark | | | | | | | | | | |
|------------------|---|-----------|-----------------------|------------------|------|------------------|------------|------------------|-------------|--|-----------|--|--|----------|
| 2(a) | high melting point ; form coloured compounds ; | | | 2 | | | | | | | | | | |
| (b) | catalyst ; | | Ignore enzyme | 1 | | | | | | | | | | |
| (c) (i) | {solid /insoluble product} formed (when solutions are mixed / in reaction) / owtte ; | | | 1 | | | | | | | | | | |
| (ii) | <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;">metal ion</th> <th style="text-align: left;">colour of precipitate</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Cu²⁺</td> <td style="text-align: left;">blue</td> </tr> <tr> <td style="text-align: left;">Fe²⁺</td> <td style="text-align: left;">grey-green</td> </tr> <tr> <td style="text-align: left;">Fe³⁺</td> <td style="text-align: left;">pale yellow</td> </tr> <tr> <td></td> <td style="text-align: left;">red-brown</td> </tr> </tbody> </table> <p>Cu²⁺ line to blue; Fe³⁺ line to red-brown;</p> | metal ion | colour of precipitate | Cu ²⁺ | blue | Fe ²⁺ | grey-green | Fe ³⁺ | pale yellow | | red-brown | | | 2 |
| metal ion | colour of precipitate | | | | | | | | | | | | | |
| Cu ²⁺ | blue | | | | | | | | | | | | | |
| Fe ²⁺ | grey-green | | | | | | | | | | | | | |
| Fe ³⁺ | pale yellow | | | | | | | | | | | | | |
| | red-brown | | | | | | | | | | | | | |
| (iii) | shows what (ion) present / type of substance / test does not involve measurements / does not show how much present ; | | Ignore tests quality | 1 | | | | | | | | | | |
| | | | | (7) | | | | | | | | | | |

| Question Number | Answer | Allow | Reject/ Ignore | Mark |
|-----------------|---|----------------|---|------------|
| 3(a) | answers for type of use or example: solvents (examples: board markers, glues, nail varnish remover) ; perfumes / fragrances / scents (examples: deodorants, candles, air fresheners, soap, cosmetics, beauty products, cleaning products) ; flavourings (sweets, drinks) ; | | | 2 |
| (b)(i) | ethanol ; | | | 1 |
| (ii) | turns red / orange / yellow ; | | Reject any answer with blue, purple, green in them. | 1 |
| (iii) | hydrogen | H ₂ | Ignore 'H' | 1 |
| | | | | (5) |

| Question Number | Answer | Allow | Mark |
|--|--|---|---|
| <p>4(a)</p> <p>(b)(i)</p> <p>(ii)</p> | <p>costs money / supplies may run out (in some countries) / waste of energy (used to purify etc);</p> <p>Mark independently:</p> <p>add (dilute) nitric acid ; add silver nitrate (solution) ; white (precipitate); Note: additional irrelevant substances added e.g. NaOH, HCl, BaCl₂ etc loses one mark if otherwise full marks</p> <p>heat / evaporate water ; weigh after ;</p> <p>plus any one from: take (smaller) sample (from the original 2000 cm³) / weigh container / heat until constant mass / repeat for consistent results ;</p> | <p>For 2 marks maximum: electrolyse (1), detection of chlorine (at anode) (1)</p> <p>[i.e. any test that gives white ppt gets third mark]</p> | <p>1</p> <p>3</p> <p>3</p> <p>(7)</p> |

| Question Number | Answer | Allow | Reject/ Ignore | Mark |
|-----------------|--|---|--|------------|
| 5(a)(i) | one mark for colour: turns red-brown /brown /orange-brown / pink ; one mark for build up (of copper) e.g.: solid / coating / layer / plating / (electrode) becomes larger ; (note: 'forming' is in the stem) | | Ignore any others e.g. red, orange | 2 |
| (ii) | copper ions gain electrons / are reduced ; 2 electrons (gained) ; | Half equation: 1 mark for ion + electron(s); 2 for fully balanced | Reject loss of electrons | 2 |
| (b)(i) | Any two from: copper atoms form ions / lose electrons / are oxidised ; the copper (ions) passes into solution / dissolves ; Impurities lost from electrode ; | | copper atoms into solution does not score for 2 nd point | 2 |
| (ii) | gold / silver / platinum; | | | 1 |
| | | | | (7) |

| Question Number | Answer | Allow | Reject/ Ignore | Mark |
|-----------------|---|-------------------------------------|----------------|------------|
| 6(a) | sodium hydroxide ; | | | 1 |
| (b) | Any two from hydrophobic part / tail in grease ; hydrophilic part / head in water ; enables grease and water to mix / lowers surface tension between water and grease ; | Suitable diagrams can score here | | 2 |
| (c) | no scum formed / no cleaner wasted ; | forms lather (unlike soap) | | 1 |
| | | | | (4) |

| Question Number | Answer | Allow | Reject/ Ignore | Mark |
|-----------------|---|--|--|------------|
| 7(a) | (manufacturing) paints / dyes / fertilisers / detergent or in (car) batteries / etching / as catalyst / rayon / fibres; | | Specifics wanted e.g. 'cleaning products' ignored | 1 |
| (b) | $4 \text{ FeS}_2 (\text{s}) + 11 \text{ O}_2 (\text{g}) \rightarrow 2 \text{ Fe}_2\text{O}_3 (\text{s}) + 8 \text{ SO}_2 (\text{g}) ; ;$ Balanced equation = 1 ; state symbols = 1 ; | | | 2 |
| (c) | Moles S = 1/32 (kmol) ; Mass SO ₂ = 1 / 32 x 64 (= 2 tonnes) ; OR 32 → 64 ; 64 / 32 (= 2 tonnes) ; | 2 tonnes alone gets both marks Must be clear that 32 sulphur → 64 SO ₂ e.g. by writing under equation | | 2 |
| (d)(i) | 2000 (dm ³) ; | | | 1 |
| (ii) | vanadium (V / pent) oxide ; | | | 1 |
| (e)(i) | effervescence / bubbles / fizzes / solid disappears ; | | Ignore gas/ CO ₂ given off, etc Ignore name of gas | 1 |
| (ii) | 120 / 24 000 (= 0.005) | | | 1 |
| | | | | (9) |

| Question Number | Answer | Allow | Reject/ Ignore | Mark |
|-----------------|--|------------------|--|----------|
| 8(a) | add named indicator / pH meter / pH probe ; Correct colour change / reading >7 ; (eg litmus: blue / phenolphthalein: pink / universal: purple or blue / methyl orange or red: yellow) [Has to be phonetically correct, more or less] | | methanol orange | 2 |
| (b)(i) | (25 cm ³) pipette ; | | Reject any others | 1 |
| (ii) | any suitable ; | | Reject universal | 1 |
| (iii) | any three from: <ul style="list-style-type: none"> acid in burette ; {drop by drop / add acid slowly} at end ; swirl / mix / use of white tile ; stop at (correct) colour change /until colour change(s) ; Note: if valid colour change given allow even if indicator not specified e.g. 'pink to colourless' or 'changes to orange' | | | 3 |
| (iv) | Results (suitably) close / similar to each other ; | results the same | Ignore refs to precise, accurate, reliable | 1 |
| (c)(i) | 24.9(0) and 24.8(0) ; | | Reject 'follow a pattern' | 1 |
| (ii) | mean of concordant results as stated in table (= 24.85 if ci correct) ; | | | 1 |
| (iii) | mol of HCl = 24.85 [or cii ans] / 1000 x 0.1 (= 0.002485 mol) ; 1:1 ratio ; conc of NaOH = 0.002485 x 1000 / 25 (= 0.0994) ; OR 1:1 ratio ; 24.85 [or cii ans]/ 25 ; x 0.100 (= 0.0994) ; Also see note on following page. | | | |

| | | | | |
|-----|---|--|--|-------------------------------|
| (d) | <p>Note: If answer from c(ii) is 25.02 or 25.017 or 25.016r then answer in c(iii) will give 0.1000664 or accept 0.1 for 3 marks Do not credit any steps involving molar masses (look for 40, 36.5 etc</p> <p>$\text{Fe}^{3+} + 3 \text{OH}^- \rightarrow \text{Fe}(\text{OH})_3$;; formulae = 1 balancing correct formulae = 1</p> | | | <p>3</p> <p>2</p> <p>(15)</p> |
|-----|---|--|--|-------------------------------|

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