

# Mark Scheme (Results)

## June 2010

GCE

GCE Chemistry (6CH07/01)

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Question Number	Acceptable Answers	Reject	Mark
1 (a)(i)	Nichrome wire / platinum wire / ceramic / silica rod (1) Accept recognisable spelling eg platinum, nickrome  (Concentrated /dilute) hydrochloric acid/HCl/HCl(aq)/ solution (1)  Salt (mixed with wire and acid, and) placed in a hot/blue/roaring/non-luminous/Bunsen/Bunsen burner flame (1)	Titanium, aluminium, nickel, chromium, copper, silicon  Salt placed in Bunsen burner OR flame alone OR burn it	3

Question Number	Acceptable Answers	Reject	Mark
1 (a)(ii)	Li <sup>+</sup>  Accept li <sup>+</sup> / Li <sup>+</sup> ions/ A is Li <sup>+</sup>  Ignore (aq), (s), (l), (g)	Li, Li <sup>2+</sup> , Ca, Sr, Rb Ca <sup>2+</sup> , Sr <sup>2+</sup> , Rb <sup>+</sup> Lithium/ lithium ions	1

Question Number	Acceptable Answers	Reject	Mark
1 (b)(i)	Calcium hydroxide/Ca(OH) <sub>2</sub> / slaked lime  Accept calcium oxide/CaO / quicklime  Ignore (aq) / solution / (s) / solid	Calcium/Ca  CO <sub>2</sub> /CaCO <sub>3</sub>	1

Question Number	Acceptable Answers	Reject	Mark
1 (b)(ii)	$\text{CO}_3^{2-}$ / $\text{HCO}_3^-$ (1) Ignore separated additional cation  Carbon dioxide gas given off (when this carbonate /hydrogencarbonate is heated/decomposed) (1)  Second mark depends on a recognisable carbonate/hydrogencarbonate ie $\text{CO}_3$ , $\text{CO}_3^-$ , carbonate, hydrogencarbonate  $\text{Li}_2\text{CO}_3$ , $\text{LiHCO}_3$ , $\text{CaCO}_3$ etc	$\text{CO}_3$ , $\text{CO}_3^-$ , carbonate, hydrogencarbonate $\text{Li}_2\text{CO}_3$ , $\text{LiHCO}_3$ , $\text{CaCO}_3$ etc	2

Question Number	Acceptable Answers	Reject	Mark
1 (c)(i)	Oxide / $\text{O}^{2-}$	Oxygen, $\text{O}_2$ , O, $\text{O}^-$ calcium oxide / CaO	1

Question Number	Acceptable Answers	Reject	Mark
1 (c)(ii)	Hydroxide / $\text{OH}^-$ / $(\text{OH})_2$	$(\text{OH})_2^-$	1

Question Number	Acceptable Answers	Reject	Mark
1 (c)(iii)	<p>Mark with reference to (ii)</p> <p>For correct answer to (ii)</p> <p>Universal indicator (paper) (1) Turns blue/purple/pH12-14 (1) Accept other appropriate indicators eg (red) litmus (paper) turns blue OR Add a suitable metal ion solution (1) to give a correct colour of precipitate (1) [see User Guide 2 page 17 for some details] OR <b>Warm / heat with ammonium ions (1)</b> Alkaline gas given off/damp red litmus turns blue/ammonia gas given off (1) OR Other reasonable tests with results eg Titrate with hydrochloric acid and suitable indicator with correct final colour</p> <p>If incorrect answer to (ii) but answer as above (1) max</p> <p>If incorrect answer to (ii) with correct test and correct result for that ion (1) max</p>		2

Question Number	Acceptable Answers	Reject	Mark
1 (d)	<p><math>\text{Li}_2\text{CO}_3</math> Accept <math>\text{Li}_2(\text{CO}_3)</math> OR <math>\text{LiHCO}_3</math></p> <p>Accept correct formula of any red flame coloured s block metal carbonate/hydrogencarbonate eg <math>\text{Rb}_2\text{CO}_3</math>, <math>\text{CaCO}_3</math>, <math>\text{SrCO}_3</math></p>	$\text{LiCO}_3$	1

Question Number	Acceptable Answers	Reject	Mark
2 (a)(i)	Silver(I)iodide (solid / precipitate) / AgI / Ag <sup>+</sup> I <sup>-</sup> / AgI(s)  OR  Silver(I)iodide (solid / precipitate) and AgI / Ag <sup>+</sup> I <sup>-</sup> / AgI(s)	Iodide (alone) Iodine Silver ((I)) iodine AgBr and AgI Cl <sup>-</sup> /Br <sup>-</sup> /I <sup>-</sup>  If both name and formula are given and either is wrong eg Silver((I)) iodine and AgI	1

Question Number	Acceptable Answers	Reject	Mark
2 (a)(ii)	C <sub>3</sub> H <sub>7</sub> I (in any order)  Accept additional information like additional formulae	Any answer which does not have C <sub>3</sub> H <sub>7</sub> I somewhere	1

Question Number	Acceptable Answers	Reject	Mark
2 (a)(iii)	$  \begin{array}{c}  \text{H} \text{ H} \text{ H} \\    \quad   \quad   \\  \text{H}-\text{C} - \text{C} - \text{C} -\text{H} \\    \quad   \quad   \\  \text{H} \quad \text{I} \quad \text{H}  \end{array}  $ Accept structural formula CH <sub>3</sub> CHICH <sub>3</sub>	Displayed or structural formula for 1-iodopropane	1

Question Number	Acceptable Answers	Reject	Mark
2 (a)(iv)	<p>At first ignore answer to (iii)</p> <p>Propan-2-ol / 2-propanol / <math>\text{CH}_3\text{CH}(\text{OH})\text{CH}_3</math></p> <p>Accept displayed formula (allow slightly displaced bonds C)</p> $\begin{array}{c}   \\ \text{HO} \end{array}$ <p>Accept skeletal formula</p> <p>Allow TE from (a)(iii) eg 1-iodopropane forms propan-1-ol</p>	Propanol prop-1-ol $\text{C}_3\text{H}_7\text{OH}$	1

Question Number	Acceptable Answers	Reject	Mark
2 (b)(i)	<p>Mark colours independently</p> <p>From orange (1)</p> <p>To green/blue (1)</p> <p>Accept shades of green eg dark green, muddy green, green-brown</p>	yellow	2

Question Number	Acceptable Answers	Reject	Mark
2 (b)(ii)	<p>Propanone</p> <p>Accept propan-2-one</p> <p>Allow propanal/propanoic acid if TE from (a)(iv)</p>	prop((-2-))one	1

Question Number	Acceptable Answers	Reject	Mark
2 (b)(iii)	<p>Oxidation / redox / oxidation and reduction / oxidation of ... (eg alcohol)</p>	Reduction Condensation/ substitution/ Addition	1

Question Number	Acceptable Answers	Reject	Mark
3 (a)(i)	(Glass/graduated/volumetric/bulb)pipette (and pipette filler)  Accept any recognisable spelling of pipette eg pipet, pipette etc	Burette/ pipette and burette/ measuring cylinder/ teat pipette/ dropping pipette  Pipate/pipotte	1

Question Number	Acceptable Answers	Reject	Mark
3 (a)(ii)	Starch (solution) (1)  Accept starch  Blue-black/blue/black to colourless (1)  Accept purple/blue-black to colourless  Second mark depends on first	Other indicators eg Methyl orange /phenolphthalein  Colourless to blue-black/blue/black	2

Question Number	Acceptable Answers	Reject	Mark
3 (b)(i)	14.5(0), 13.7(0), 13.75 All three needed for the mark		1



Question Number	Acceptable Answers	Reject	Mark
3 (b)(ii)	<p>The first result is discarded/ ignored/ not included/a range finder</p> <p>OR</p> <p>Only use last two values</p> <p>OR</p> <p>The second and third are concordant / first value not within <math>0.2 \text{ cm}^3</math></p> <p>Accept:</p> <p>This is the average of the second and third runs</p> <p>OR</p> <p>Actual correct average calculation to give 13.73/13.725</p>		1

Question Number	Acceptable Answers	Reject	Mark
3 (b)(iii)	<p><math>\frac{13.73 \times 0.0200}{1000} = 2.746 \times 10^{-4} \text{ /} 0.0002746(\text{mol})</math></p> <p>Accept <math>2.7/2.75 \times 10^{-4}</math></p> <p>Note that 13.725 gives <math>2.745 \times 10^{-4}</math></p> <p>Allow TE from different calculated average titre</p>	1 sf	1

Question Number	Acceptable Answers	Reject	Mark
3 (c)	<p><math>1.373 \times 10^{-4} \text{ /} 0.0001373(\text{mol})</math></p> <p>Also <math>1.35/1.37/1.375 \text{ /} 1.4 \times 10^{-4}</math></p> <p>Accept answer to <math>\frac{\text{(b)(iii)}}{2}</math></p>	1 sf (unless already penalised anywhere in this question)	1

Question Number	Acceptable Answers	Reject	Mark
3 (d)	$4.58 \times 10^{-5}$ /0.0000458(mol) $4.57667/4.577 \times 10^{-5}$ etc Also $4.583/4.57/4.6(0) \times 10^{-5}$ Accept answer to $\frac{(c)}{3}$	1 sf (unless already penalised anywhere in this question)	1

Question Number	Acceptable Answers	Reject	Mark
3 (e)(i)	Volumetric/graduated (flask)	(100 cm <sup>3</sup> ) round bottomed flask/ conical flask/ measuring cylinder	1

Question Number	Acceptable Answers	Reject	Mark
3 (e)(ii)	These marks are independent of flask used in (i) Transfer solution and rinsings/washings (1) Make up to the mark (1) Mixing / inverting / shaking (this must be at the end) (1)	Make sure it is all transferred	3

Question Number	Acceptable Answers	Reject	Mark
3 (e)(iii)	$4.58 \times 10^{-4}$ /0.000458 (mol) Also $4.57/4.6 \times 10^{-4}$ Accept Answer to (d) x 10	1 sf (unless already penalised anywhere in this question)	1

Question Number	Acceptable Answers	Reject	Mark
3 (e)(iv)	$4.58 \times 10^{-4} \times 214$ $= 0.098 / 0.98012 \text{ g}$  Also 0.097941/0.0979 etc  Accept answer to (e)(iii) x 214 Ignore SF	1 sf (unless already penalised anywhere in this question)	1

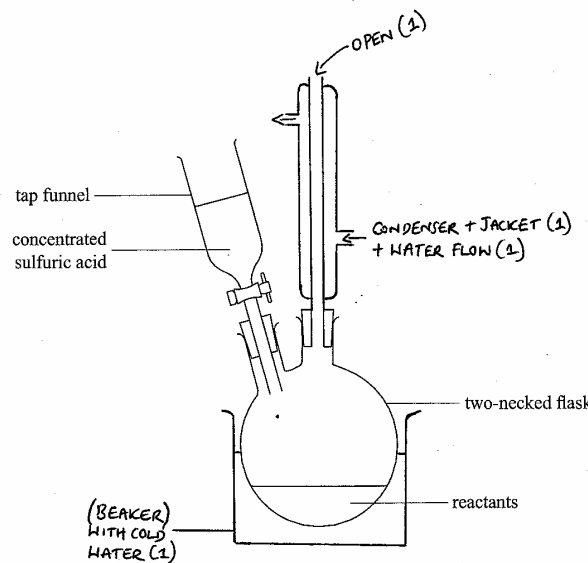
Question Number	Acceptable Answers	Reject	Mark
3 (e)(v)	$0.098 \times 100$ $0.10$ $= 98 / 98.0 / 98.01 / 98.012 \%$  Also 97.941/97.94/97.9 %  Accept answer to <u>(e)(iii)</u> x100 $0.10$  correct answer with no working scores (1) Ignore SF	1 sf (unless already penalised anywhere in this question)	1

Question Number	Acceptable Answers	Reject	Mark
3 (f)	Sulfuric acid is corrosive/irritant/irritable/burns (skin)	Sulfuric acid is harmful/hazardous/toxic	1

Question Number	Acceptable Answers	Reject	Mark
4 (a)(i)	<p>From the equation 1 mol butan-1-ol gives 1 mol of 1-bromobutane / ratio 1:1 OWTTE (1) As 80% yield, 0.125 mol of butan-1-ol gives 0.125 <math>\times 0.8 \text{ mol} = 0.1 \text{ mol}</math> of 1-bromobutane (1)</p> <p>Accept any clear indication that they appreciate the proportion calculation and the mole ratio</p> <p>Examples:</p> <p>Number of moles of butan-1-ol = <math>0.1 \times \frac{100}{80} / \frac{0.1}{0.8}</math> (= 0.125)</p> <p>OR</p> <p>Number of moles of 1-bromobutane = <math>\frac{80}{100} \times 0.125</math> (= 0.1)</p> <p>In both these examples 'butan-1-ol' / '1-bromobutane' as appropriate, must be present to gain (2)</p> <p>The numerical expression alone would gain (1)</p> <p>OR</p> <p>As above examples but additionally using molar masses to calculate masses</p>		2

Question Number	Acceptable Answers	Reject	Mark
4 (a)(ii)	<p><math>74 \times 0.125</math> (1) = 9.25 (g)</p> <p><math>\frac{9.25}{0.81} = 11.4 / 11.42 / 11.420 / 11.419753 \text{ cm}^3</math> (1)</p> <p>ie ignore sf unless only one</p> <p>Accept <math>11.4 / 11.42 / 11.420 / 11.419753 \text{ cm}^3</math> (2) (with no working)</p>	1sf	2

Question Number	Acceptable Answers	Reject	Mark
4 (a)(iii)	$0.125 \times 119 = 14.875$ /14.87/14.88/14.9/15 (g)	1 sf	1

Question Number	Acceptable Answers	Reject	Mark
4 (b)	<p>Flask in beaker of labelled cold water (1) Water need not be drawn in but...</p> <p>Condenser with jacket (1) Need not be labelled, can be at any angle so long as it goes upwards</p> <p>Condenser inlet and outlet with correct water direction (1) This mark can be given if no jacket is present</p> <p>open at top and no leaks(1) This mark is conditional on a condenser</p> <p><b>Do not penalise</b> accidental closures in drawing or attempts to draw out perimeter of apparatus making the condenser appear closed</p> <p>If distillation set up is drawn the beaker of cold water mark can be awarded</p> 	<p>heated beaker (of cold water)</p> <p>stopper in the top/tap funnel in the top of the condenser unless clearly open</p>	4

Question Number	Acceptable Answers	Reject	Mark
4 (c)(i)	Lower layer as more dense  Lower layer is 1-bromobutane because it is denser  Lower layer as denser than water / butan-1-ol		1

Question Number	Acceptable Answers	Reject	Mark
4 (c)(ii)	To remove / neutralize / react with remaining hydrochloric acid/HCl/acid/sulfuric acid/H <sub>2</sub> SO <sub>4</sub> (1)  by reacting to form carbon dioxide (gas) (1)		2

Question Number	Acceptable Answers	Reject	Mark
4 (d)(i)	Distillation /fractional distillation /redistil /distil /distillate  Accept any recognisable spelling  Ignore further description  Allow a description which includes the words heating / boiling followed by condensing	Dry/filter/or anything else	1

Question Number	Acceptable Answers	Reject	Mark
4 (d)(ii)	Measure boiling temperature of liquid {and compare with Data Book value (101.7 °C) (Pure if it agrees)}  OR Boils at boiling temperature of liquid/ 101.7 °C / boils over a very small temperature range/ boils at one particular temperature  OR Collect the product at 101.7 °C/ between 100 and 103 °C		1

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