

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 ⁺ Accept li ⁺ / Li ⁺ ions/ A is Li ⁺ Ignore (aq), (s), (l), (g)	Li, Li ²⁺ , Ca, Sr, Rb Ca ²⁺ , Sr ²⁺ , Rb ⁺ Lithium/ lithium ions	1

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

Question Number	Acceptable Answers	Reject	Mark
1 (b)(ii)	CO_3^{2-} / 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 CO_3 , CO_3^- , carbonate, hydrogencarbonate Li_2CO_3 , LiHCO_3 , CaCO_3 etc	CO_3 , CO_3^- , carbonate, hydrogencarbonate Li_2CO_3 , LiHCO_3 , CaCO_3 etc	2

Question Number	Acceptable Answers	Reject	Mark
1 (c)(i)	Oxide / O^{2-}	Oxygen, O_2 , O, O^- calcium oxide / CaO	1

Question Number	Acceptable Answers	Reject	Mark
1 (c)(ii)	Hydroxide / 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 Warm / heat with ammonium ions (1) 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>Li_2CO_3 Accept $\text{Li}_2(\text{CO}_3)$ OR LiHCO_3</p> <p>Accept correct formula of any red flame coloured s block metal carbonate/hydrogencarbonate eg Rb_2CO_3, CaCO_3, SrCO_3</p>	LiCO_3	1

Question Number	Acceptable Answers	Reject	Mark
2 (a)(i)	Silver(I)iodide (solid / precipitate) / AgI / Ag ⁺ I ⁻ / AgI(s) OR Silver(I)iodide (solid / precipitate) and AgI / Ag ⁺ I ⁻ / AgI(s)	Iodide (alone) Iodine Silver (I) iodine AgBr and AgI Cl ⁻ /Br ⁻ /I ⁻ 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 ₃ H ₇ I (in any order) Accept additional information like additional formulae	Any answer which does not have C ₃ H ₇ I somewhere	1

Question Number	Acceptable Answers	Reject	Mark
2 (a)(iii)	$ \begin{array}{ccccc} & \text{H} & \text{H} & \text{H} & \\ & & & & \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{H} \\ & & & & \\ & \text{H} & \text{I} & \text{H} & \end{array} $ Accept structural formula CH ₃ CHICH ₃	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 / $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$</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 startch Blue-black/blue/black to colourless (1) Accept purple/blue-black to colourless Second mark depends on first	Other indicators eg Methyl orange /phenolph- thalein 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 0.2 cm^3</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>$\frac{13.73 \times 0.0200}{1000} = 2.746 \times 10^{-4} \text{ /} 0.0002746(\text{mol})$</p> <p>Accept $2.7/2.75 \times 10^{-4}$</p> <p>Note that 13.725 gives 2.745×10^{-4}</p> <p>Allow TE from different calculated average titre</p>	1 sf	1

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

Question Number	Acceptable Answers	Reject	Mark
3 (d)	4.58×10^{-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 ³) 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)	4.58×10^{-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

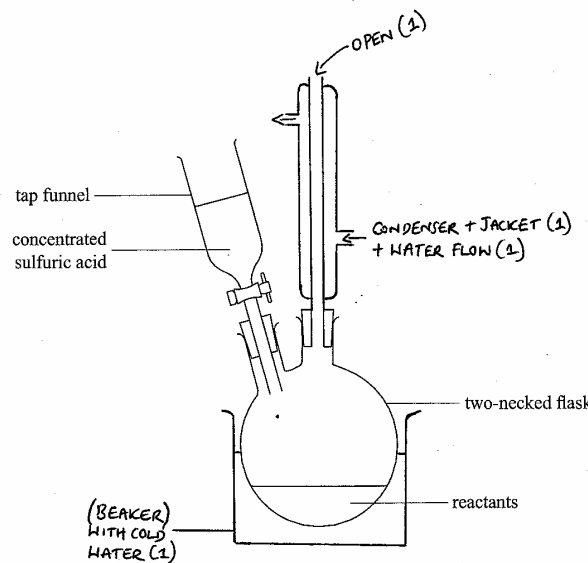
Question Number	Acceptable Answers	Reject	Mark
3 (e)(v)	0.098×100 0.10 $= 98 / 98.0 / 98.01 / 98.012 \%$ Also 97.941/97.94/97.9 % Accept answer to <u>(e)(iii)</u> x100 0.10 correct answer with no working scores (1) Ignore SF	1 sf (unless already penalised anywhere in this question)	1

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 x 0.8 mol = 0.1 mol 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 = $0.1 \times \frac{100}{80} / \frac{0.1}{0.8}$ (= 0.125)</p> <p>OR</p> <p>Number of moles of 1-bromobutane = $\frac{80}{100} \times 0.125$ (= 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>74×0.125 (1) = 9.25 (g)</p> <p>$\frac{9.25}{0.81} = 11.4 / 11.42 / 11.420 / 11.419753 \text{ cm}^3$ (1)</p> <p>ie ignore sf unless only one</p> <p>Accept $11.4 / 11.42 / 11.420 / 11.419753 \text{ cm}^3$ (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>Do not penalise 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 ₂ SO ₄ (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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