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Mark Scheme November 2007

IGCSE

IGCSE Chemistry (4335)

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November 2007

Contents

CHEMISTRY 4335, November 2007, MARK SCHEME

Key

/ indicates alternatives
eq allow for correct equivalent
__ word underlined means no alternatives allowed

Paper 1F

Question Number	Question		
1	**(a)**		
	Acceptable Answers	Reject	Mark
	8 **Notes**		**(1)**

Question Number	Question		
1	**(b)**		
	Acceptable Answers	Reject	Mark
	6 **Notes**		**(1)**

Question Number	Question		
1	**(c)**		
	Acceptable Answers	Reject	Mark
	Si **Notes**		**(1)**

Question Number	Question		
1	**(d)**		
	Acceptable Answers	Reject	Mark
	N **Notes**		**(1)**

Question Number	Question		
1	**(e)**		
	Acceptable Answers	Reject	Mark
	6 **Notes**		**(1)**

Total 5 marks

Question Number	Question		
2	**(a)**		
	Acceptable Answers	Reject	Mark
	Protons / electrons **Notes**		**(1)**

Question Number	Question		
2	**(b)**		
	Acceptable Answers	Reject	Mark
	Neutrons **Notes**		**(1)**

Question Number	Question		
2	**(c)**		
	Acceptable Answers	Reject	Mark
	Elements **Notes**		**(1)**

Question Number	Question		
2	**(d)**		
	Acceptable Answers	Reject	Mark
	Compounds **Notes**		**(1)**

Question Number	Question		
2	**(e)**		
	Acceptable Answers	Reject	Mark
	Electrons **Notes**		**(1)**

Question Number	Question		
2	**(f)**		
	Acceptable Answers	Reject	Mark
	Carbon **Notes**		**(1)**

Total 6 marks

Question Number	Question		
3	**(a)**		
	Acceptable Answers	Reject	Mark
	Distillation **Notes**	Fractional distillation	**(1)**

Question Number	Question		
3	**(b)**		
	Acceptable Answers	Reject	Mark
	Crystallisation / evaporation **Notes**		**(1)**

Question Number	Question		
3	**(c)**		
	Acceptable Answers	Reject	Mark
	Filtration/ decantation **Notes**		**(1)**

Question Number	Question		
3	**(d)**		
	Acceptable Answers	Reject	Mark
	Chromatography **Notes**		**(1)**

Question Number	Question		
3	**(e)**		
	Acceptable Answers	Reject	Mark
	Fractional distillation **Notes**	Distillation	**(1)**

Total 5 marks

Question Number	Question		
4	**(a)**		
	Acceptable Answers	Reject	Mark
	s l aq g **Notes** 4 correct = **2**, 3/2 correct = **1** and 1/0 correct = **0**.		**(2)**

Question Number	Question		
4	**(b)**		
	Acceptable Answers	Reject	Mark
	• Fizzing/effervescence/bubbles • Moves/darts about • Gets smaller /Disappears • Floats **Notes** Max 2.	Reference to flames. Reject 'dissolves'	**(2)**

Question Number	Question		
4	**(c)**		
	Acceptable Answers	Reject	Mark
	Lithium **Notes**	Li	**(1)**

Question Number	Question		
4	**(d)**		
	Acceptable Answers	Reject	Mark
	(add) red litmus/universal indicator turns blue. Allow 'purple' for UI **Notes**		**(2)**

Total 7 marks

Question Number	Question		
5	**(a)**		
	Acceptable Answers	Reject	Mark
	brown / red-brown/ orange-brown/ foxy brown **Notes**	Rusty Orange Red	**(1)**

Question Number	Question		
5	**(b)**		
	Acceptable Answers	Reject	Mark
	air / oxygen water/ moisture/ dampness **Notes**		**(2)**

Question Number	Question		
5	**(c)**		
	Acceptable Answers	Reject	Mark
	iron (III) oxide accept iron oxide **Notes** Ignore reference to hydrated		**(1)**

Question Number	Question		
5	**(d)**		
	Acceptable Answers	Reject	Mark
	oxidation (3rd box) **Notes**		**(1)**

Question Number	Question		
5	**(e)**		
	Acceptable Answers	Reject	Mark
	Galvanising **Notes**		**(1)**

Question Number	Question		
5	**(f)**		
	Acceptable Answers	Reject	Mark
	(cover with) oil / grease / paint / plastic **Notes**		**(1)**

Total 7 marks

Question Number	Question		
6	**(a)**		
	Acceptable Answers	Reject	Mark
	hydrochloric acid **Notes**	hydrogen chloride	**(1)**

Question Number	Question		
6	**(b)**		
	Acceptable Answers	Reject	Mark
	effervescence / fizzing / bubbles / solid disappears or dissolves **Notes**		**(1)**

Question Number	Question		
6	**(c)**		
	Acceptable Answers	Reject	Mark
	limewater cloudy / milky / white precipitate **Notes**		**(2)**

Question Number	Question		
6	**(d)**		
	Acceptable Answers	Reject	Mark
	other gases are acidic other gases give some result **Notes**		**(1)**

Question Number	Question		
6	**(e)**		
	Acceptable Answers	Reject	Mark
	sulphur dioxide + water $\rightarrow$ sulphurous acid accept sulphuric (IV) acid **Notes**		**(1)**

Question Number	Question		
6	**(f)**		
	Acceptable Answers	Reject	Mark
	fish harmed/killed stonework eaten away/ OWTTE iron rusts (more quickly) plants killed **Notes** Max 2		**(2)**

Total 8 marks

Question Number	Question		
7	**(a)**		
	Acceptable Answers	Reject	Mark
	H H | | H—C—C—H | | H H **Notes** Ignore bond angles		**(1)**

Question Number	Question		
7	**(b)**		
	Acceptable Answers	Reject	Mark
	C_3H_8 **Notes**		**(1)**

Question Number	Question		
7	**(c)**		
	Acceptable Answers	Reject	Mark
	C_nH_{2n+2} (2^{nd} option) **Notes**		**(1)**

Question Number	Question		
7	**(d)**		
	Acceptable Answers	Reject	Mark
	similar chemical properties **Notes** Bottom box		**(1)**

Question Number	Question		
7	**(e)**		
	Acceptable Answers	Reject	Mark
	contain <u>only</u> <u>carbon</u> and <u>hydrogen</u> **Notes**		**(1)**

Question Number	Question		
7	**(f)**		
	Acceptable Answers	Reject	Mark
	butane + oxygen → carbon dioxide + water **Notes** *(reactants = 1, products = 1)*		**(2)**

Total 7 marks

Question Number	Question		
8	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) iron oxide (III) accept iron oxcide/ haematite / Fe_2O_3	iron ore	**(1)**
	(ii) coke / carbon / C *(not coal)*		**(1)**
	(iii) limestone / calcium carbonate / $CaCO_3$	lime	**(1)**
	Notes marks (**i)** – (**iii)** can be awarded in any order		
	(iv) slag / calcium silicate / $CaSiO_3$		**(1)**
	(v) iron / Fe		**(1)**
	Notes award **1** if (**iv)** and (**v)** are correct but in wrong order	Iron (II) or iron (III)	

Question Number	Question		
8	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) 1		**(1)**
	(ii) carbon dioxide		**(1)**
	loses oxygen/ oxidation number of carbon decreases		**(1)**
	Notes		

Question Number	Question		
8	**(c)**		
	Acceptable Answers	Reject	Mark
	toxic / poisonous/ correct effect on blood **Notes**		**(1)**

Question Number	Question		
8	**(d)**		
	Acceptable Answers	Reject	Mark
	too reactive / higher than carbon in reactivity series/ very reactive **Notes**		**(1)**

Total 10 marks

Question Number	Question		
9	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) C / F **(ii)** A and B **(iii)** E **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
9	**(b)**		
	Acceptable Answers	Reject	Mark
	Poly(()ethene()). Accept polythene/Polyethylene correct repeat unit H | —C— | H Or any multiple length (2 + carbons) continuation bonds ___ ____ or ….. ….. (only if first mark awarded) **Notes** Ignore 'brackets' and 'n' or other subscripts		**(1)** **(1)** **(1)**

Total 6 marks

Question Number	Question		
10	**(a)**		
	Acceptable Answers	Reject	Mark
	<table><tr><th>Particle</th><th>Relative mass</th><th>Relative charge</th></tr><tr><td>Electron</td><td>$\frac{1}{1840}$ $\frac{1}{2000}$ $\frac{1}{1850}$ $\frac{1}{1836}$</td><td>-1</td></tr><tr><td>Neutron</td><td></td><td>0 / nil</td></tr><tr><td>Proton</td><td>1</td><td></td></tr></table> **Notes** Ignore negligible	0 for mass	**(4)**

Question Number	Question		
10	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) helium /carbon / nitrogen / oxygen / neon / magnesium / silicon / sulphur / calcium (ii) silicon (iii) hydrogen **Notes** Max penalty 1 if give symbols for all 3 rather than names		**(1)** **(1)** **(1)**

Question Number	Question		
10	**(c)**		
	Acceptable Answers	Reject	Mark
	7 **Notes**		**(1)**

Question Number	Question		
10	**(d)**		
	Acceptable Answers	Reject	Mark
	(i) full / complete ignore saturated (ii) unreactive/inert/do not undergo reactions **Notes**		**(1)** **(1)**

Total 10 marks

Question Number	Question		
11	**(a)**		
	Acceptable Answers	Reject	Mark
	zinc is less reactive than magnesium Magnesium is more reactive than Zinc **Notes** Or correct reference to positions in reactivity series	It is more reactive	**(1)**

Question Number	Question		
11	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$ reagents products **Notes** incorrect balancing = **-1** be generous with cases **(ii)** (dark) grey **(1)** to pink-brown **(1)** blue **(1)** to green **(1)** **Notes** Ignore additional information		**(1)** **(1)** **(2)** **(2)**

Question Number	Question		
11	**(c)**		
	Acceptable Answers	Reject	Mark
	hydrogen more reactive than copper hydrogen less reactive than iron **Notes** Hydrogen between Fe + Cu for both marks	Iron(II) or Copper (II)	**(1)** **(1)**

Total 9 marks

Question Number	Question		
12	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) enthalpy / (heat) energy change (ii) increases/goes up **Notes** Mark independently. Ignore reference to bonds.		**(1)** **(1)**

Question Number	Question		
12	**(b)**		
	Acceptable Answers	Reject	Mark
	Water **Notes**	Formulae	**(1)**

Question Number	Question		
12	**(c)**		
	Acceptable Answers	Reject	Mark
	• stir (allow heat) • excess magnesium carbonate • filter • evaporate/heat/window-ledge • crystallisation point • Cool • final separation (decant/filter/tweezers) • Suitable method of drying. Allow use of oven but not if T > 100°c; filer paper – mark dependant on crystals being separated. **Notes** If heated to dryers then no further marks given (evaporating stage) If excess acid, max 3 Max 5		**(5)**

Total 9 marks

Question Number	Question		
13	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) shared electron pair all other electrons correct (ignore inner shells even if wrong) **(ii)** bottom box crossed **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
13	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) H^+/H_3O^+ other ions negate **(ii)** no acid made / no Hydrogen ions stays covalent/does not ionize **Notes**		**(1)** **(1)**

Question Number	Question		
13	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) red/ orange bleached/ white **(ii)** same number of electrons / same electronic configurations 'Same protons' negates **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
13	**(d)**		
	Acceptable Answers	Reject	Mark
	add sodium hydroxide (solution)/ammonia solution/ ammonium hydroxide green ppt/solid/suspension Orange/brown/orange-brown/foxy brown/rusty brown/red-brown ppt/ solid/suspension **Notes** If miss out ppt then give 1 mark for 2 correct colours result marks only given if test correct	Powder/crystals/bits Orange/ rusty/red	**(1)** **(1)** **(1)**

Total 11 marks

Paper total 100 marks

Paper 2H

Question Number	Question		
1	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) C / F **(ii)** A **and** B **(iii)** E **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
1	**(b)**		
	Acceptable Answers	Reject	Mark
	Poly(()ethene()). Accept polythene/Polyethylene correct repeat unit H | —C— | H Or any multiple length (2 + carbons) continuation bonds ___ ____ or ….. ….. (only if first mark awarded) **Notes** Ignore 'brackets' and 'n' or other subscripts		**(1)** **(1)** **(1)**

Total 6 marks

Question Number	Question		
2	**(a)**		
	Acceptable Answers	Reject	Mark
	<table><tr><th>Particle</th><th>Relative mass</th><th>Relative charge</th></tr><tr><td>Electron</td><td>$\frac{1}{1840}$ $\frac{1}{2000}$ $\frac{1}{1850}$ $\frac{1}{1836}$</td><td>-1</td></tr><tr><td>Neutron</td><td></td><td>0 / nil</td></tr><tr><td>Proton</td><td>1</td><td></td></tr></table> **Notes** Ignore negligible		**(4)**

Question Number	Question		
2	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) helium /carbon / nitrogen / oxygen / neon / magnesium / silicon / sulphur / calcium (ii) silicon (iii) hydrogen **Notes** Max penalty 1 if give symbols for all 3 rather than names		**(1)** **(1)** **(1)**

Question Number	Question		
2	**(c)**		
	Acceptable Answers	Reject	Mark
	7 **Notes**		**(1)**

Question Number	Question		
2	**(d)**		
	Acceptable Answers	Reject	Mark
	(i) full / complete ignore saturated (ii) unreactive/inert/do not undergo reactions **Notes**		**(1)** **(1)**

Total 10 marks

Question Number	Question		
3	**(a)**		
	Acceptable Answers	Reject	Mark
	zinc is less reactive than magnesium Magnesium is more reactive than Zinc **Notes** Or correct reference to positions in reactivity series	It is more reactive	**(1)**

Question Number	Question		
3	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$ reagents products **Notes** incorrect balancing = **-1** be generous with cases **(ii)** (dark) grey **(1)** to pink-brown **(1)** blue **(1)** to green **(1)** **Notes** Ignore additional information		**(1)** **(1)** **(2)** **(2)**

Question Number	Question		
3	**(c)**		
	Acceptable Answers	Reject	Mark
	hydrogen more reactive than copper hydrogen less reactive than iron **Notes** Hydrogen between Fe + Cu for both marks	Iron(II) or Copper (II)	**(1)** **(1)**

Total 9 marks

Question Number	Question		
4	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) enthalpy / (heat) energy change (ii) increases/goes up **Notes** Mark independently. Ignore reference to bonds.		**(1)** **(1)**

Question Number	Question		
4	**(b)**		
	Acceptable Answers	Reject	Mark
	Water **Notes**	Formulae	**(1)**

Question Number	Question		
4	**(c)**		
	Acceptable Answers	Reject	Mark
	• stir (allow heat) • excess magnesium carbonate • filter • evaporate/heat/window-ledge • crystallisation point • Cool • final separation (decant/filter/tweezers) • Suitable method of drying. Allow use of oven but not if T > 100°c; filer paper – mark dependant on crystals being separated. **Notes** If heated to dryers then no further marks given (evaporating stage) If excess acid, max 3 Max 5		**(5)**

Total 9 marks

Question Number	Question		
5	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) shared electron pair all other electrons correct (ignore inner shells even if wrong) **(ii)** bottom box crossed **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
5	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) H^+/H_3O^+ other ions negate **(ii)** no acid made / no Hydrogen ions stays covalent/does not ionize **Notes**		**(1)** **(1)**

Question Number	Question		
5	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) red/ orange bleached/ white **(ii)** same number of electrons / same electronic configurations 'Same protons' negates **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
5	**(d)**		
	Acceptable Answers	Reject	Mark
	add sodium hydroxide (solution)/ammonia solution/ ammonium hydroxide green ppt/solid/suspension Orange/brown/orange-brown/foxy brown/rusty brown/red-brown ppt/ solid/suspension **Notes** If miss out ppt then give 1 mark for 2 correct colours result marks only given if test correct	Powder/crystals/bits Orange/ rusty/red	**(1)** **(1)** **(1)**

Total 11 marks

Question Number	Question		
6	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) sugar / carbohydrate **(ii)** CH_2O **Notes** Ignore glucose		**(1)** **(1)**

Question Number	Question		
6	**(b)**		
	Acceptable Answers	Reject	Mark
	solution / dissolve in water yeast = 1 20 - 40 °C no air / oxygen **Notes** Any other condition = 1 Max 2		**(2)**

Question Number	Question		
6	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) $C_2H_4 + H_2O \rightarrow C_2H_5OH$ **(ii)** phosphoric acid steam / heat / high temperature / temperature range 250-350°C high pressure / pressure range 60-70 atm **Notes** **(ii)** max 2		**(1)** **(2)**

Question Number	Question		
6	**(d)**		
	Acceptable Answers	Reject	Mark
	shortage/cost of (crude) oil/ petroleum availability of sugar (cane) **Notes**	Petrol glucose	**(1)** **(1)**

Question Number	Question		
6	**(e)**		
	Acceptable Answers	Reject	Mark
	(i) sodium/ Na **(ii)** sodium ethoxide **(iii)** ionic **Notes**		**(1)** **(1)** **(1)**

Total 12 marks

Question Number	Question		
7	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) S_8 **(ii) (I)** covalent (bonding)/bonds between atoms **(II)** van der Waals'/intermolecular forces/bonds between molecules **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
7	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) $2SO_2 + O_2 \rightleftharpoons 2SO_3$ **ACCEPT** $\rightarrow$ all formulae correct balancing **(ii)** 450 °C / temperature in range 400-500 °C 1-2 atm *(accept atmospheric pressure)* vanadium(V) oxide (catalyst)/ vanadium oxide **Notes**		**(1)** **(1)** **(1)** **(1)** **(1)**

Question Number	Question		
7	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) $SO_3 + H_2O \rightarrow H_2SO_4$ **(ii)** fish harmed/ killed stonework eaten away/ OWTTE iron rusts (more quickly) **Notes** **(ii)** max 2	Damages buildings	**(1)** **(2)**

Total 11 marks

Question Number	Question		
8	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) giant/regular structure/lattice of positive ions delocalised electrons/free electrons/sea of electrons/ **(ii)** can be beaten/hammered/rolled into (thinner) shape **(iii)** layers (of atoms/ions) slide over each other **Notes**	Nuclei Molecules/covalent/ionic = 0/2 Molecules/covalent/ionic = 0/2	**(1)** **(1)** **(1)** **(1)** **(1)**

Question Number	Question		
8	**(b)**		
	Acceptable Answers	Reject	Mark
	(shared/bonding) pair of electrons attracted to fluorine nuclei **Notes**		**(1)** **(1)**

Question Number	Question		
8	**(c)**		
	Acceptable Answers	Reject	Mark
	2,7 2.8 **Notes**		**(1)** **(1)**

Question Number	Question		
8	**(d)**		
	Acceptable Answers	Reject	Mark
	(ion) 2 and 8 • or × shown on diagram 2+ shown **Notes**		**(1)** **(1)**

Question Number	Question		
8	**(e)**		
	Acceptable Answers	Reject	Mark
	Mg ion / Mg^{2+} has higher charge (than Na ion / Na^{+}) stronger attraction between ions/ stronger <u>ionic</u> bonds **Notes**		**(1)** **(1)**

Total 13 marks

Question Number	Question		
9	**(a)**		
	Acceptable Answers	Reject	Mark
	decreases increases increases no change **Notes**		**(4)**

Question Number	Question		
9	**(b)**		
	Acceptable Answers	Reject	Mark
	rate increases (reactant) particles closer together/more particles in given volume molecules/particles collide more frequently/ more collisions per second **Notes** If no mention of particles/molecules max 1 for explanation	Rate same/rate decreases = 0/3 atoms	**(1)** **(1)** **(1)**

Question Number	Question		
9	**(c)**		
	Acceptable Answers	Reject	Mark
	recycled / put back into reactor **Notes**	Used again	**(1)**

Question Number	Question		
9	**(d)**		
	Acceptable Answers	Reject	Mark
	(i) oxidation / redox/ accept exothermic **(ii)** platinum / rhodium/ Pt/ Rh **(iii)** $2NO + O_2 \rightarrow 2NO_2$ all formulae correct balancing **Notes**		**(1)** **(1)** **(1)** **(1)**

Question Number	Question		
9	**(e)**		
	Acceptable Answers	Reject	Mark
	NH_4NO_3 **Notes**		**(1)**

Question Number	Question		
9	**(f)**		
	Acceptable Answers	Reject	Mark
	phosphorus potassium **Notes**	Phosphate	**(1)** **(1)**

Total 15 marks

Question Number	Question		
10	**(a)**		
	Acceptable Answers	Reject	Mark
	brick red/ orange - red **Notes**	Red / orange	**(1)**

Question Number	Question		
10	**(b)**		
	Acceptable Answers	Reject	Mark
	water / H_2O **Notes**		**(1)**

Question Number	Question		
10	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) $M_r = 74$ n $Ca(OH)_2 = 14.8 \div 74 = 0.2$ *(ECF)* **(ii)** n $HNO_3 = 2 \times 0.2 = 0.4$ *(ECF)* $V = 0.4 \div 1.6 = 0.25$ (dm^3) $= 250$ cm^3 **(iii)** $M_r = 164$ $m = 0.05 \times 164 = 8.2$ g **Notes** Penalise 1 sf in (iii)		**(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)**

Question Number	Question		
10	**(d)**		
	Acceptable Answers	Reject	Mark
	$Ca(NO_3)_2 + Na_2CO_3 \rightarrow CaCO_3 + 2NaNO_3$ all formulae correct balancing white precipitate/solid/ suspension **accept** ionic equation **Notes**		 **(1)** **(1)** **(1)**

Total 12 marks

Question Number	Question		
11	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) *(on diagram)* – in left and + in right **(ii)** H^+ gain of electrons **(iii)** *(on diagram)* horizontal line in right-hand tube about halfway between given line and top of tube *(explanation)* for same number of electrons in I and II 2 moles/molecules of hydrogen formed for 1 mole/molecule of oxygen **Notes**	oH^- = 0/2 If wrong level 0/3	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)**

Question Number	Question		
11	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) 0.2(0) **(ii)** 0.2 × 24 = 4.8 (dm^3) **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
11	**(c)**		
	Acceptable Answers	Reject	Mark
	(i) 0.2(0) **(ii)** 0.2 × 32 = 6.4 (g) **Notes** Penalise 1 sf in ii		**(1)** **(1)** **(1)**

Total 12 marks

Paper total 120 marks

Paper 03

Question Number	Question		
1			
	Acceptable Answers		Mark
			(8)

Variable to be measured	**Apparatus used**	**Units of variable**
time	stop watch	s
mass	balance	g / grams accept kg
length	rule	cm / centimetres / mm
volume	burette	cm3 / ml / centimetres cubed / cubic centimetres / millilitres
temperature	thermometer	centigrade / Celsius / °C

Notes

Total 8 marks

Question Number	Question		
2	**(a)**		
	Acceptable Answers	Reject	Mark
	• amount metal carbonate / allow mass • form/ surface oven/particle of size metal carbonate • volume limewater / amount limewater • size Bunsen flame / distance of tube from Bunsen/ temp or type of flame **Notes** Max 2		**(2)**

Question Number	Question		
2	**(b)**		
	Acceptable Answers	Reject	Mark
	Repeated **Notes**		**(1)**

Question Number	Question		
2	**(c)**		
	Acceptable Answers	Reject	Mark
	y scale labelled. Time (for limewater to turn cloudy) in seconds 4 bars of correct height indication of which bar is for which substance **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
2	**(d)**		
	Acceptable Answers	Reject	Mark
	magnesium (carbonate) **Notes**		**(1)**

Question Number	Question		
2	**(e)**		
	Acceptable Answers	Reject	Mark
	(i) measuring cylinder not vertical **(ii)** lower volume / reduces **(iii)** gas syringe **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
2	**(f)**		
	Acceptable Answers	Reject	Mark
	(i) 15 (cm^3) 44 (cm^3) 29 (cm^3) (cq) **(ii)** 29 / 30 = 0.97 dividing answer to (i) by 30 correct to 2 sf **(iii)** middle box ticked **Notes**		**(1)** **(1)** **(1)** **(1)** **(1)** **(1)**

Total 16 marks

Question Number	Question		
3	**(a)**		
	Acceptable Answers	Reject	Mark
	(i) directly proportional. Allow 1 mark for qualitative link (e.g. increasing volume, increasing time) **(ii)** quantative link, such as – twice as big means twice as much air/oxygen = 2 qualitative – bigger means more air/oxygen = 1 **(iii)** stop more air getting in **Notes**		**(2)** **(2)** **(1)**

Question Number	Question		
3	**(b)**		
	Acceptable Answers	Reject	Mark
	fill with water and pour into measuring cylinder **Notes**		**(1)**

Question Number	Question		
3	**(c)**		
	Acceptable Answers	Reject	Mark
	B / second one results closest together / repeats most similar **Notes**		**(1)** **(1)**

Question Number	Question		
3	**(d)**		
	Acceptable Answers	Reject	Mark
	94 **Notes**	Anything else	**(1)**

Question Number	Question		
3	**(e)**		
	Acceptable Answers	Reject	Mark
	(i) suitable scales used (>half grid in both directions) points plotted correctly (-1 mark per error) straight line drawn; may go through origin or hit x-axis **(ii)** point at 700 circled (cq on points) **(iii)** must correctly explain why time longer. e.g. spout not sealed air got in **OR** smaller flame/wick used up oxygen more slowly **OR** smaller candle more air in beaker **OR** bigger beaker more air **(iv)** more points below 240 **Notes**		**(1)** **(2)** **(1)** **(1)** **(1)** **(1)** **(1)**

Question Number	Question		
3	**(f)**		
	Acceptable Answers	Reject	Mark
	(i) contains 5 x as much oxygen / air only 20% oxygen (must be quantitative) (ii) read correct value from graph correct multiplication by 5 **Notes**		**(1)** **(1)** **(1)**

Total 20 marks

Question Number	Question		
4	**(a)**		
	Acceptable Answers	Reject	Mark
	BOTH being sodium one carbonate one hydrogen carbonate **Notes**		**(1)** **(1)** **(1)**

Question Number	Question		
4	**(b)**		
	Acceptable Answers	Reject	Mark
	(i) both Li and Sr give red flames both carbonate and hydroxide turn UI blue **(ii)** add (nitric) acid – does NOT fizz **Notes**		**(1)** **(1)** **(1)**

Total 6 marks

Paper total 50 marks

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