

# Mark Scheme November 2007

IGCSE

## IGCSE Chemistry (4335)

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## CHEMISTRY 4335, November 2007, MARK SCHEME

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### 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		
<b>2</b>	<b>(e)</b>		
	Acceptable Answers	Reject	Mark
	Electrons		
	<b>Notes</b>		<b>(1)</b>

Question Number	Question		
<b>2</b>	<b>(f)</b>		
	Acceptable Answers	Reject	Mark
	Carbon		
	<b>Notes</b>		<b>(1)</b>

**Total 6 marks**

Question Number	Question		
<b>3</b>	<b>(a)</b>		
	Acceptable Answers	Reject	Mark
	Distillation	Fractional distillation	
	<b>Notes</b>		<b>(1)</b>

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

Question Number	Question		
<b>3</b>	<b>(c)</b>		
	Acceptable Answers	Reject	Mark
	Filtration/ decantation		
	<b>Notes</b>		<b>(1)</b>

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

Question Number	Question		
3	(e)		
	Acceptable Answers	Reject	Mark
	Fractional distillation	Distillation	
	Notes		(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
	<ul style="list-style-type: none"> <li>Fizzing/effervescence/bubbles</li> <li>Moves/darts about</li> <li>Gets smaller /Disappears</li> <li>Floats</li> </ul>	Reference to flames.  Reject 'dissolves'	
	Notes Max 2.		(2)

Question Number	Question		
4	(c)		
	Acceptable Answers	Reject	Mark
	Lithium	Li	
	Notes		(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	Rusty Orange Red	
	Notes		(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 (3 <sup>rd</sup> 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	hydrogen chloride	
	Notes		(1)

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

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

Question Number	Question		
<b>6</b>	<b>(d)</b>		
	Acceptable Answers	Reject	Mark
	other gases are acidic other gases give some result <b>Notes</b>		<b>(1)</b>

Question Number	Question		
<b>6</b>	<b>(e)</b>		
	Acceptable Answers	Reject	Mark
	sulphur dioxide + water → sulphurous acid accept sulphuric (IV) acid  <b>Notes</b>		<b>(1)</b>

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

**Total 8 marks**

Question Number	Question		
7	(a)		
	Acceptable Answers	Reject	Mark
	$  \begin{array}{c}  \text{H} \quad \text{H} \\    \quad   \\  \text{H}-\text{C}-\text{C}-\text{H} \\    \quad   \\  \text{H} \quad \text{H}  \end{array}  $ <p>Notes Ignore bond angles</p>		(1)

Question Number	Question		
7	(b)		
	Acceptable Answers	Reject	Mark
	$\text{C}_3\text{H}_8$ <p>Notes</p>		(1)

Question Number	Question		
7	(c)		
	Acceptable Answers	Reject	Mark
	$\text{C}_n\text{H}_{2n+2}$ (2 <sup>nd</sup> 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 carbon</u> and <u>hydrogen</u>  Notes		(1)

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

Total 7 marks

Question Number	Question		
<b>8</b>	<b>(a)</b>		
	Acceptable Answers	Reject	Mark
	(i) iron oxide (III) accept iron oxide/ haematite / Fe <sub>2</sub> O <sub>3</sub>	iron ore	(1)
	(ii) coke / carbon / C (not coal)		(1)
	(iii) limestone / calcium carbonate / CaCO <sub>3</sub>	lime	(1)
	<b>Notes</b> marks (i) - (iii) can be awarded in any order		
	(iv) slag / calcium silicate / CaSiO <sub>3</sub>		(1)
	(v) iron / Fe		(1)
	<b>Notes</b> award 1 if (iv) and (v) are correct but in wrong order	Iron (II) or iron (III)	

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

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

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

**Total 10 marks**

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

Question Number	Question		
9	(b)		
	Acceptable Answers	Reject	Mark
	Poly(())ethene()). Accept polythene/Polyethylene correct repeat unit $\begin{array}{c} \text{H} \\   \\ -\text{C}- \\   \\ \text{H} \end{array}$ Or any multiple length (2 + carbons)  continuation bonds ___ ___ or ..... (only if first mark awarded)  <b>Notes</b> Ignore 'brackets' and 'n' or other subscripts		(1) (1) (1)

Total 6 marks

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

Question Number	Question		
10	(b)		
	Acceptable Answers	Reject	Mark
	(i) helium /carbon / nitrogen / oxygen / neon / magnesium / silicon / sulphur / calcium  (ii) silicon  (iii) hydrogen  <b>Notes</b> 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		(1)
	(ii) unreactive/inert/do not undergo reactions		(1)
	Notes		

Total 10 marks

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

Question Number	Question		
11	(b)		
	Acceptable Answers	Reject	Mark
	(i) $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$ reagents products		(1) (1)
	Notes incorrect balancing = -1 be generous with cases		(2)
	(ii) (dark) grey (1) to pink-brown (1) blue (1) to green (1)		(2)
	Notes Ignore additional information		

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

**Total 9 marks**

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

Question Number	Question		
12	(b)		
	Acceptable Answers	Reject	Mark
	Water	Formulae	
	<b>Notes</b>		(1)



Question Number	Question		
12	(c)		
	Acceptable Answers	Reject	Mark
	<ul style="list-style-type: none"> <li>• stir (allow heat)</li> <li>• excess magnesium carbonate</li> <li>• filter</li> <li>• evaporate/heat/window-ledge</li> <li>• crystallisation point</li> <li>• Cool</li> <li>• final separation (decant/filter/tweezers)</li> <li>• Suitable method of drying. Allow use of oven but not if <math>T &gt; 100^{\circ}\text{C}</math>; filter paper - mark dependant on crystals being separated.</li> </ul> <p><b>Notes</b>            If heated to dryers then no further marks given (evaporating stage)            If excess acid, max 3            Max 5</p>		(5)

Total 9 marks

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

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

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

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

Total 11 marks

Paper total 100 marks

Paper 2H

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

Question Number	Question		
1	(b)		
	Acceptable Answers	Reject	Mark
	Poly(())ethene()).		(1)
	Accept polythene/Polyethylene		(1)
	correct repeat unit		(1)
	$\begin{array}{c} \text{H} \\   \\ -\text{C}- \\   \\ \text{H} \end{array}$	Or any multiple length (2 + carbons)	
	continuation bonds ___ ___ or ..... (only if first mark awarded)		
	Notes		
	Ignore 'brackets' and 'n' or other subscripts		

Total 6 marks

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

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

Question Number	Question		
2	(c)		
	Acceptable Answers	Reject	Mark
	7		
	<b>Notes</b>		(1)

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

**Total 10 marks**

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

Question Number	Question		
3	(b)		
	Acceptable Answers	Reject	Mark
	(i) $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$ reagents products  <b>Notes</b> incorrect balancing = -1 be generous with cases		(1) (1)
	(ii) (dark) grey (1) to pink-brown (1) blue (1) to green (1)  <b>Notes</b> Ignore additional information		(2) (2)

Question Number	Question		
3	(c)		
	Acceptable Answers	Reject	Mark
	hydrogen more reactive than copper hydrogen less reactive than iron  <b>Notes</b> 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		(1)
	(ii) increases/goes up  <b>Notes</b> Mark independently. Ignore reference to bonds.		(1)

Question Number	Question		
4	(b)		
	Acceptable Answers	Reject	Mark
	Water  <b>Notes</b>	Formulae	(1)

Question Number	Question		
4	(c)		
	Acceptable Answers	Reject	Mark
	<ul style="list-style-type: none"> <li>• stir (allow heat)</li> <li>• excess magnesium carbonate</li> <li>• filter</li> <li>• evaporate/heat/window-ledge</li> <li>• crystallisation point</li> <li>• Cool</li> <li>• final separation (decant/filter/tweezers)</li> <li>• Suitable method of drying. Allow use of oven but not if T &gt; 100° c; filter paper - mark dependant on crystals being separated.</li> </ul> <p><b>Notes</b>            If heated to dryers then no further marks given (evaporating stage)            If excess acid, max 3            Max 5</p>		(5)

Total 9 marks

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

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

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

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

**Total 11 marks**

Question Number	Question		
6	(a)		
	Acceptable Answers	Reject	Mark
	(i) sugar / carbohydrate		(1)
	(ii) CH <sub>2</sub> O		(1)
	<b>Notes</b> Ignore glucose		

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

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

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

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

**Total 12 marks**

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



Question Number	Question		
7	(b)		
	Acceptable Answers	Reject	Mark
	(i) $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$ <b>ACCEPT</b> → all formulae correct balancing		(1) (1)
	(ii) 450 °C / temperature in range 400-500 °C 1-2 atm ( <i>accept atmospheric pressure</i> ) vanadium(V) oxide (catalyst)/ vanadium oxide		(1) (1) (1)
	<b>Notes</b>		

Question Number	Question		
7	(c)		
	Acceptable Answers	Reject	Mark
	(i) $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$		
	(ii) fish harmed/ killed stonework eaten away/ OWTTE iron rusts (more quickly)	Damages buildings	(1)
	<b>Notes</b> (ii) max 2		(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/	Nuclei Molecules/c ovalent/ioni c = 0/2	(1) (1)
	(ii) can be beaten/hammered/rolled into (thinner) shape		(1)
	(iii) layers (of atoms/ions) slide over each other		(1)
	<b>Notes</b>	Molecules/c ovalent/ioni c = 0/2	(1)

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

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

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

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		(1) (1)
	Notes		

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	Rate same/rate decreases = 0/3  atoms	(1) (1) (1)
	Notes If no mention of particles/molecules max 1 for explanation		

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

Question Number	Question		
9	(d)		
	Acceptable Answers	Reject	Mark
	(i) oxidation / redox/ accept exothermic		(1)
	(ii) platinum / rhodium/ Pt/ Rh		(1)
	(iii) $2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$ all formulae correct		(1)
	balancing		(1)
	Notes		

Question Number	Question		
<b>9</b>	<b>(e)</b>		
	Acceptable Answers	Reject	Mark
	NH <sub>4</sub> NO <sub>3</sub>		(1)
	Notes		

Question Number	Question		
<b>9</b>	<b>(f)</b>		
	Acceptable Answers	Reject	Mark
	phosphorus	Phosphate	(1)
	potassium		(1)
	Notes		

**Total 15 marks**

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

Question Number	Question		
<b>10</b>	<b>(b)</b>		
	Acceptable Answers	Reject	Mark
	water / H <sub>2</sub> O		
	Notes		(1)

Question Number	Question		
10	(c)		
	Acceptable Answers	Reject	Mark
	(i) $M_r = 74$ $n \text{ Ca(OH)}_2 = 14.8 \div 74 = 0.2$ (ECF)		(1) (1)
	(ii) $n \text{ HNO}_3 = 2 \times 0.2 = 0.4$ (ECF) $V = 0.4 \div 1.6 = 0.25$ (dm <sup>3</sup> ) $= 250$ cm <sup>3</sup>		(1) (1) (1)
	(iii) $M_r = 164$ $m = 0.05 \times 164 = 8.2$ g		(1) (1)
	Notes Penalise 1 sf in (iii)		

Question Number	Question		
10	(d)		
	Acceptable Answers	Reject	Mark
	$\text{Ca(NO}_3)_2 + \text{Na}_2\text{CO}_3 \rightarrow \text{CaCO}_3 + 2\text{NaNO}_3$ all formulae correct balancing white precipitate/solid/ suspension accept ionic equation		(1) (1) (1)
	Notes		

Total 12 marks

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

Question Number	Question		
11	(b)		
	Acceptable Answers	Reject	Mark
	(i) 0.2(0)		(1)
	(ii) $0.2 \times 24$ = 4.8 (dm <sup>3</sup> )		(1) (1)
	Notes		

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

Total 12 marks

Paper total 120 marks

Paper 03

Question Number	Question																			
1																				
	Acceptable Answers	Mark																		
	<table border="1"> <thead> <tr> <th>Variable to be measured</th> <th>Apparatus used</th> <th>Units of variable</th> </tr> </thead> <tbody> <tr> <td>time</td> <td>stop watch</td> <td>s</td> </tr> <tr> <td>mass</td> <td>balance</td> <td>g / grams accept kg</td> </tr> <tr> <td>length</td> <td>rule</td> <td>cm / centimetres / mm</td> </tr> <tr> <td>volume</td> <td>burette</td> <td>cm<sup>3</sup> / ml / centimetres cubed / cubic centimetres / millilitres</td> </tr> <tr> <td>temperature</td> <td>thermometer</td> <td>centigrade / Celsius / °C</td> </tr> </tbody> </table> <p>Notes</p>	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	cm <sup>3</sup> / ml / centimetres cubed / cubic centimetres / millilitres	temperature	thermometer	centigrade / Celsius / °C	(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	cm <sup>3</sup> / ml / centimetres cubed / cubic centimetres / millilitres																		
temperature	thermometer	centigrade / Celsius / °C																		

Total 8 marks

Question Number	Question	
2	(a)	
	Acceptable Answers	Reject
	<ul style="list-style-type: none"> <li>amount metal carbonate / allow mass</li> <li>form/ surface oven/particle of size metal carbonate</li> <li>volume limewater / amount limewater</li> <li>size Bunsen flame / distance of tube from Bunsen/ temp or type of flame</li> </ul> <p>Notes Max 2</p>	(2)

Question Number	Question	
2	(b)	
	Acceptable Answers	Reject
	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  <b>Notes</b>		(1) (1) (1)

Question Number	Question		
2	(d)		
	Acceptable Answers	Reject	Mark
	magnesium (carbonate)  <b>Notes</b>		(1)

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

Question Number	Question		
2	(f)		
	Acceptable Answers	Reject	Mark
	(i) 15 (cm <sup>3</sup> ) 44 (cm <sup>3</sup> ) 29 (cm <sup>3</sup> ) (cq)  (ii) 29 / 30 = 0.97 dividing answer to (i) by 30 correct to 2 sf  (iii) middle box ticked  <b>Notes</b>		(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)		(2)
	(ii) quantitative link, such as - twice as big means twice as much air/oxygen = 2		(2)
	qualitative - bigger means more air/oxygen = 1		
	(iii) stop more air getting in		(1)
	Notes		

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		(1)
	results closest together / repeats most similar		(1)
	Notes		

Question Number	Question		
3	(d)		
	Acceptable Answers	Reject	Mark
	94	Anything else	
	Notes		(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		(1) (2) (1) (1)
	(ii) point at 700 circled (cq on points)		(1)
	(iii) must correctly explain why time longer. e.g. spout not sealed air got in		(1)
	OR smaller flame/wick used up oxygen more slowly		
	OR smaller candle more air in beaker		(1)
	OR bigger beaker more air		
	(iv) more points below 240		
	Notes		

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

Total 20 marks

Question Number	Question		
4	(a)		
	Acceptable Answers	Reject	Mark
	<b>BOTH</b> being sodium one carbonate one hydrogen carbonate		(1) (1) (1)
	Notes		

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

Total 6 marks

Paper total 50 marks

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