

**Mark scheme 5070/2 – Theory November 2001**

- A1(a)(i) A (aqueous sodium sulphate) and B (zinc) 1  
 (ii) (aqueous) sodium sulphate (not Copper sulphate) 1  
 (iii) A (aqueous sodium sulphate) 1  
 4

- (b)(i) anode and cathode must be on electrodes 1  
 (ii) Any of these combinations:

Group II / Transition metal	Halide
(allow Beryllium)	Fluoride
Magnesium	Chloride
Calcium	Bromide
Strontium	Iodide
Barium	Astatide
Radium	
Iron(II)	
Cobalt(II)	
Nickel(II)	
Copper(II)	
Zinc	
Lead(II)	

- (ii) Must have oxidation state if transition metal is chosen 1  
 (ii)  $M^{2+}$  any metal from before 1  
 (iv) Ions need to move 1  
 (v) ions in solid cannot move 1

A2(a) O and Q /  $O^{2+}$  and  $Q^{3+}$  1

(b) M 1

(c) N and O 1

(d) L and P 1

(e) Q 1

A3(a)(i) different forms / structures / arrangement of the same atoms /  
 element 1

(ii) many atoms bonded together / giant covalent structure / giant  
 molecule 1

(b) The layers (of graphite) 1  
 Can move over each other / bonding between layers is weak 1

(c) Cutting / drilling or specific example 1  
**NOT** gemstones / jewellery

A4(a)	K floats, (lilac / purple / pink) flame; moves around, fizzing; temp increase; melts / forms a ball; gets smaller, pops <u>or</u> explodes <u>or</u> sparks [Any 2]	2
(b)(i)	other shell of potassium 0 to 8 electrons, outer shell fluorine 8 – with one <u>different</u> (if inner shells shown, must be correct)	1
	Charges shown correctly $K^+$ and $F^-$	1
(ii)	attraction between <u>ions / charges</u> / is strong or has a lattice structure	1
(c)	1	1
	$Cs_2O$	1
	Caesium hydroxide and hydrogen	1
(d)	Cs lower in group / reactivity increases down group <b>IGNORE</b> ‘more reactive’ / higher in ecs – too vague Because Cs electron lost more easily / because bigger atom / more shielding by inner / of outer electrons / electrons further from nucleus	1 1
A5(a)(i)	fluorine / $F_2$ – <b>NOT</b> fluoride / F	1
(ii)	F reduced and H oxidised / electron transfer H to F / oxidation number of F decreases and H increases one electron transferred / F oxidation number 0 to $-1$ and H oxidation number 0 to $+1$	1 1
(b)(i)	3 5 3 2 All 4 correct (2) 2/3 correct only (1)	2
(ii)	reaction A produces larger <u>volume</u> of gas than reaction B / or A <u>volume</u> increases; B <u>volume</u> decreases	1
(c)	Temperature / pressure are not the same (as RTP) / the gases are not at room temperature and pressure	1
A6(a)(i)	Smooth curve or line Plotting of points	1 1
(ii)	Check graph: $\pm 1$ – <u>must have <math>^{\circ}C</math></u>	1
(b)	Not $C_nH_{2n+2}$ / is $C_nH_{2n}$ / is an alkene / not enough hydrogen / should be $C_8H_{18}$	1
(c)(i)	not enough oxygen / air	1
(ii)	$2 C_4H_{10} + 9O_2 \rightarrow 8CO + 10 H_2O$ Correct formulae & balanced	1
(iii)	toxic / poisonous / kills if inhaled / bonds to haemoglobin Or effects on body: headaches / tiredness / brain damage	1
(d)	Lead / $SO_2$ / $NO_x$ / unburnt hydrocarbons / soot / allow $CO_2$ Any 2 (2)	2
B7(a)	No. mols $HCl = 0.5 \times 10/1000 (=0.005)$	1

	No. mols H <sub>2</sub> = ans/2	1
	Vol H <sub>2</sub> = ans x 24 dm <sup>3</sup> = 60 cm <sup>3</sup> /0.06 dm <sup>3</sup>	1
(b)(i)	slows then stops / decreases to 0	1
(ii)	<u>acid</u> used up / <u>acid</u> concentration falling. <b>NOT</b> zinc	1
(c)	Zn + H <sub>2</sub> SO <sub>4</sub> → ZnSO <sub>4</sub> + H <sub>2</sub>	1
	Faster	1
	<u>because</u> H <sup>+</sup> is greater / more H <sup>+</sup>	1
	More H <sub>2</sub> produced	1
	H <sub>2</sub> SO <sub>4</sub> is dibasic / produces 2H <sup>+</sup> per molecule	1
B8(a)	Yeast, (sugar), water	1
	40 °C +/- 5 or no air	1
	glucose → ethanol + carbon dioxide / any named sugar	1
(b)	Lime water / calcium hydroxide (soln)	1
(c)	C <sub>2</sub> H <sub>5</sub> OH + 3 O <sub>2</sub> → 3H <sub>2</sub> O + 2 CO <sub>2</sub>	1
	No. mols ethanol = 23/46 (=0.5)	1
	0.5 x 1367 = 683.5 <u>kJ</u> (Ignore ‘-’ sign)	1
	[Mark consequentially on the given ethanol formula – it must be an alcohol]	
(d)	Correct structure for ethane	1
	Correct structure for ethanol	1
	Ethene contains double bond / unsaturated	1
B9(a)(i)	precipitation, accept double decomposition	1
(ii)	Ca <sup>2+</sup> + CO <sub>3</sub> <sup>2-</sup> → CaCO <sub>3</sub>	1
(iii)	Filtering	1
(b)(i)	(anode) 2 Cl <sup>-</sup> → 2e <sup>-</sup> + Cl <sub>2</sub>	1
	(cathode) 2 H <sup>+</sup> + 2e <sup>-</sup> → H <sub>2</sub>	1
(ii)	1 mol NaCl produces 0.5 mols Cl <sub>2</sub>	1
	No. mols NaCl = 175.5 x 1000 / 58.5 (=3000)	1
	Volume Cl <sub>2</sub> = (3000/2) x 24 = 36000 dm <sup>3</sup>	1
(c)(i)	Electrons around Cl correct	1
	Rest of molecule correct	1
B10(a)(i)	<b>Reagents:</b> Chlorine soln. mixed with potassium iodide soln.	1
	<b>Observation:</b> Colourless to brown / orange	1
	<b>Eqn:</b> Cl <sub>2</sub> + 2KI → I <sub>2</sub> + 2KCl or ionic	1
(ii)	<b>Reagents:</b> magnesium and copper sulphate solution	1
	<b>Observation:</b> brown / red-brown / pink / black (allow orange or copper-coloured) metal / deposit / solid formed / blue colour fades	1
	<b>Eqn:</b> Mg + CuSO <sub>4</sub> → Cu + MgSO <sub>4</sub> or ionic	1
	Negative result to confirm outcome in either case	1

(b)(i)	X Z Y	1
(ii)	X = Ag / Au / Pt	
	Z = Zn / Cu / Fe / Sn	
	Y = Al	
	3 correct (2)	
	2/1 correct only (1)	3