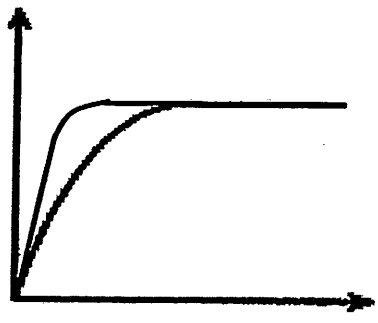
PAPER 2

NO			Description	Mark
1	(a)	(i)	Saponification	1
		(ii)	Concentrated sodium hydroxide solution	1
		(iii)	to lower the solubility of soap	1
		(v)	Grease: y	1
	(b)	(i)	Insoluble salt/a precipitate formed when soap reacts with hard water/calcium ion/magnesium ion //magnesium stearate//calcium stearate	1
		(ii)	Maagnesium ion//Calcium ion	1
	(c)	(i)	silicon dioxide	1
		(ii)	inert towards chemicals	1
		(iii)	Borosilicate glass	1
			Total	9

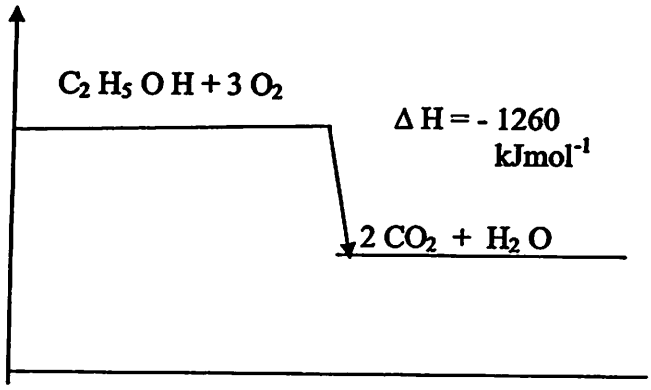
2	(a)	(i)	Cl	1
		(ii)	Ne	1
		(iii)	Al	1
	(b)		Ne, C, Cl, Al, Na	1
	(c)	(i)	1- correct number of electrons in the shell 2-correct ratio of atoms, labelled nucleus and the charge of ions.	1 1
		(ii)	Ionic compound	1
		(iii)	Electrostatic force	1
		(iv)	High melting/boiling point//Soluble in water// Conduct electricity in molten state and aqueous solution	1
			Total	9

3	(a)	(i)	Y	1
		(ii)	Silver nitrate	1
		(iii)	$Ag \rightarrow Ag^+ + e$	1
	(b)	(i)	P : Anode Q : Cathode	1 1
		(ii)	No change in concentration of Cu^{2+} ion. The rate of formation of copper(II) ions, Cu^{2+} at the anode is the same as the rate of discharge of copper(II) ions, Cu^{2+} at the cathode	1 1
	(c)	(i)	Aluminium	1
		(ii)	Aluminium is more electronegative tahan copper	1
		(iii)	$Cu^{2+} + 2e \rightarrow Cu$	1
			Total	10

4	(a)		zinc carbonate	1
	(b)	(i)	Hot – yellow Cold - white.	1+1
		(ii)	The lime water turns chalky.	1
	(c)	(i)	Neutralization	1
		(ii)	Colourless	1
		(iii)	$ZnO + 2HNO_3 \rightarrow Zn(NO_3)_2 + H_2O$	1
	(d)		Name of the reagent Procedure of the test. Observation.	1 1 1
			Total	10

5	(a)	(i)	$Zn + 2HCl \rightarrow ZnCl_2 + H_2$	1+1
		(ii)	Mol = 0.2 x 25 /1000//0.005 Mol H_2 = 0.005/2//0.0025 Volume of H_2 = 0.0025 x 24000//60cm^3	1 1 1
	(b)	(i)	 Slope of the curve is steeper Maximun volume is the same	1 + 1
		(ii)	Size of zinc//Total surface area of the zinc	1

		(iii)	Rate of experiment 2 is higher than experiment 1 When the total surface area is higher The frequency of collision between zinc atom and H^+ is increased The frequency of effective collision betwee particles is increased	1 1 1
			Total	11

6	(a)	(i)	Ethanol	1
		(ii)	The heat released when one mole of ethanol completely burnt in oxygen (under standard conditions) is 1260 kJ	1
	(b)	(i)	No of moles of alcohol = 0.23 / 46 = 0.005 mol 1 mol of alcohol burnt released 1260 kJ Thus, 0.005 mol of alcohol burnt released 6.3 kJ	1 1 1
		(ii)	mcø = 6.3 kJ mcø = 6.3 x 1000 Ø = 6300/ 200 x 4.2 = 7.5^0 C	1 1
	(c)		Heat is lost to the surrounding // Heat is absorbed by the apparatus or containers // Incomplete combustion of alcohol	1
	(d)		Energy  Label energy and diagram has 2 different energy levels Balanced chemical equation	1+1
	(e)		- 2656 kJmol^{-1} // 2500-2700 kJmol^{-1}	1
			Total	11

Section B

<table>
<tr><th colspan="3">NO</th><th>Description</th><th>Mark</th></tr>
<tr><td>7</td><td>(a)</td><td>(i)</td><td>Numbor of electron: 92
Number of neutron: 146</td><td>1
1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Number of proton for both atoms are similar
Number of neutron for both atom are different</td><td>1
1</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>1 - Label axis correctly and correct shape of graph
2 - Show melting point on the graph
3 - Show boiling point on the graph</td><td>1+1
1
1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>
<table>
<tr><th>At 30°C</th><th>At 80°C</th></tr>
<tr><td>Arrangement of X particles in the solid state is closely packed and in orderly manner and fixed position.</td><td>Arrangement of X particles in the liquid state is packed slightly loose and not in orderly/disorderly manner</td></tr>
<tr><td>Force of attraction between X particles is very strong.</td><td>Force of attraction between X particles is moderately strong.</td></tr>
<tr><td>X particles have low kinetic energy.</td><td>X particles have moderately high kinetic energy.</td></tr>
</table>
</td><td>1+1
1+1
1+1</td></tr>
<tr><td></td><td>7(c)</td><td colspan="2">
<table>
<tr><td>Element</td><td>Carbon, C</td><td>Hydrogen, H</td><td>Nitrogen, N</td></tr>
<tr><td>Mass/g</td><td>74.10</td><td>8.64</td><td>17.26</td></tr>
<tr><td>Number of moles</td><td>$\frac{74.10}{12}$ // 6.175</td><td>$\frac{8.64}{1}$ // 8.64</td><td>$\frac{17.26}{14}$ // 1.233</td></tr>
<tr><td>Ratio of moles</td><td>$\frac{6.175}{1.233}$ // 5</td><td>$\frac{8.64}{1.233}$ // 7</td><td>$\frac{1.233}{1.233}$ // 1</td></tr>
<tr><td>Empirical formula</td><td colspan="3">C_5H_7N</td></tr>
</table>
$[C_5H_7N]_n = 162$
$[5(12) + 7(1) + 14]n = 162$
$81n = 162$
$n = 2$
Molecular formula of nicotine is $C_{10}H_{14}N_2$
</td><td>1
1
1
1
1
1</td></tr>
<tr><td></td><td></td><td colspan="2">Total</td><td>20</td></tr>
</table>

NO			Description	Mark
8	(a)		1. 1 mol of hydrochloric acid produce 1 mol of hydrogen ion. 2. to neutralize 1 mol of OH^- from NaOH. 3. 1 mol of sulphuric acid produce 2 mol of hydrogen ion 4. to neutralize 2 mol of OH^- from NaOH	1 1 1 1
	(b)	(i)	1. Mole of KOH = 14.0/56 // 0.25 2. Concentration of NaOH = 0.25 x 1000/250 //1.0 mol dm^{-3}	1 1
		(ii)	1. $KOH + HCl \rightarrow KCl + H_2O$ 2. M_{HCl} = 1.0 x 25.0/24.5 // 1.02 mol dm^{-3}	1 1
		(iii)	1. Mole of KCl = mole of KOH = 1.0 x 25/1000 // 0.025 2. Mass of KCl = 0.025 x 74.5 // 1.86	1 1
	(c)	(i)	<u>HCl:</u> 1. Concentration of acid increases, pH values decreases. 2. The concentration of H^+ increases. 3. Acid becomes more acidic <u>NaOH</u>: 1. Concentration of alkali increases, pH values increases 2. The concentration of OH^- increases 3. Alkali becomes more alkaline.	 1 1 1 1 1 1
		(ii)	1. Ethanoic acid is a weak acid and hydrochloric acid is a strong acid. 2. Ethanoic acid dissociates partially and hydrochloric acid dissociates completely in water. 3. The concentration of H^+ in ehanoic acid is lower. 4. The lower the concentration of H^+ the higher the pH value.	1 1 1 1
			Total	**20 m**

Section C

NO			Description	Mark
9	(a)	(i)	Able to draw the structural formula of methane	1
		(ii)	1- C_2H_4 2- Ethene	1 1....2
		(iii)	1- Methane is saturated hydrocarbon 2- Cannot undergoes addition reaction with bromine 3- Ethene is unsaturated hydrocarbon //Ethene has double bond between carbon atom 4- Ethene undergoes addition reaction with bromine 5- To form 1,2 dibromo ethane	1 1 1 1 1.....5
	(b)	(i)	Reaction I : $C_3H_6 + [O] + H_2O \rightarrow C_3H_6(OH)_2$ 1- Correct formulae of reactants 2- Correct formula of product and balance Reaction III : $C_3H_6 + H_2 \rightarrow C_3H_8$ 1- Correct formulae of reactants 2- Correct formula of product and balance	 1 1 1 1 4
		(ii)	Able to write the correct structural formula of propane-1-ol.	1
		(iii)	1.Propene is reacted with 2-steam 3-at 300°C 4-and 60 atm 5-in presence of phosphoric acid 6,7- $C_3H_6 + H_2O \rightarrow C_3H_7OH$ 1- Correct formulae of reactants 2- Correct formula of product and balance	1 1 1 1 1 2.....7
			Total	20

<table>
<tr><th colspan="3">No</th><th>Description</th><th>Mark</th></tr>
<tr><td>10</td><td>(a)</td><td></td><td>1. Add chlorine/ bromine water to the solution.
2. $Cl_2 + 2Fe^{2+} \rightarrow 2Fe^{3+} + 2Cl^- // Fe^{2+} \rightarrow Fe^{3+} + e$
3. Fe^{2+} is oxidize to Fe^{3+}
4. Fe^{2+} is green colour and Fe^{3+} brown colour.</td><td>1
1
1
1</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>1. Metal X is more electropositive than copper.
2. Atom X oxidizes
3. Cu^{2+} ion reduces to copper
4. Number of Cu^{2+} decreases.
5. Metal Y is less electropositive than copper.</td><td>1
1
1
1
1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Y, Cu, X</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>Materials and apparatus:
1. 1 mol dm^{-3} of P nitrate, Q nitrate, R nitrate and S nitrate solutions.
2. Metals P, Q, R and S strips.
3. Sandpaper
4. Test tubes and test tube rack

Procedure:
1. Clean/rub the metal strips with the sandpaper.
2. Pour 5 cm^3 of solutions P nitrate, Q nitrate, R nitrate and S nitrate into four separate test tubes.
3. Place a strip of metal P into each of solution in the test tubes.
4. Record any observation after 5 minutes.
5. Repeats steps 2 to 4 using strips of metals Q, R and S to replace metal P.</td><td>1+1

1
1
1
1
1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Results;
<table>
<tr><th rowspan="2">Metal</th><th colspan="4">A solution containig</th></tr>
<tr><th>Metal ion P</th><th>Metal ion Q</th><th>Metal ion R</th><th>Metal ion S</th></tr>
<tr><td>P</td><td></td><td>x</td><td>x</td><td>x</td></tr>
<tr><td>Q</td><td>√</td><td></td><td>x</td><td>x</td></tr>
<tr><td>R</td><td>√</td><td>√</td><td></td><td>x</td></tr>
<tr><td>S</td><td>√</td><td>√</td><td>√</td><td></td></tr>
</table>
√ = reaction occurs x = no reaction
Or
S can displace all metals P, Q and R.
P cannot displace any metals.
R can displace metal Q and P.</td><td>

1
1
1</td></tr>
</table>

			Conclusion: S is most electropositive, P is least electropositive and R is more electropositive than Q.	1 Max10/ 11
			Total	20 m