MGS- P2

Section A (50 marks)

Answer all the questions in the spaces provided.

A1 Choose from the following compounds to answer the questions below.

$BaSO_4$

$FeCl_2$

CO_2

$CuCO_3$

$CaCO_3$

CF_3Cl

$MgSO_4$

NaCl

$ZnSO_4$

Each compound can be used once, more than once or not at all.

State the compound which

(a) is responsible for ozone depletion,

.....[1]

(b) is prepared by titration method,

.....[1]

(c) is an insoluble green solid,

.....[1]

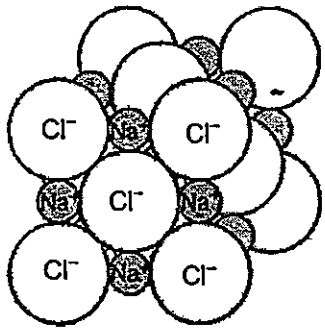
(d) is a product of fermentation,

.....[1]

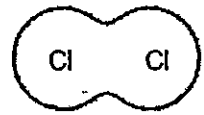
(e) in aqueous state will react with aqueous barium chloride to give a white precipitate.

.....[1]

A2 The structures of sodium chloride and chlorine are shown below.



sodium chloride



chlorine

(a) The melting point of sodium chloride is 801°C.
The melting point of chlorine is –101°C.

Explain in terms of bonding and structure, why the melting point of chlorine is so low.

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.....

[2]

(b) Explain why molten sodium chloride conducts electricity but solid sodium chloride does not.

.....

.....

[1]

(c) The reactions occurring at the electrodes when molten sodium chloride is electrolysed are shown below.

Negative electrode $Na^+ + e^- \rightarrow Na$
Positive electrode $2Cl^- \rightarrow Cl_2 + 2e^-$

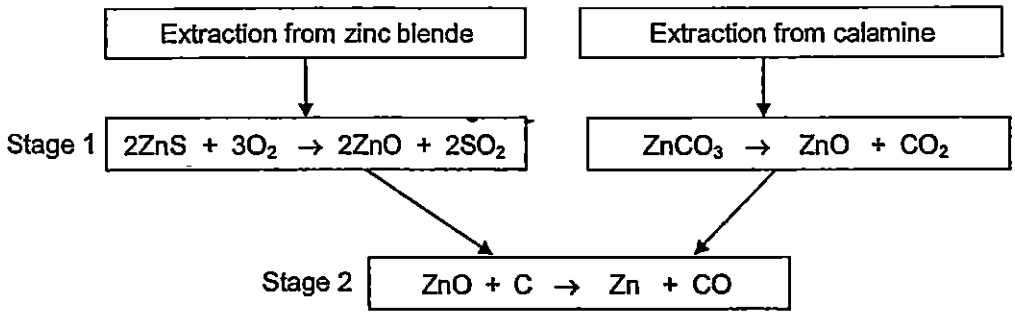
With reference to both equations, explain why this electrolysis involves both oxidation and reduction.

.....

.....

[2]

A3 Zinc can be extracted from zinc blende, ZnS, or from calamine, $ZnCO_3$, in a two-stage process



(a) Explain why the gas from stage 2 must be removed for the safety of the workers.

.....

.....

[1]

(b) Explain why the reactions in the two-stage process cannot be used to extract sodium from sodium carbonate, Na_2CO_3.

.....

.....

.....

.....

[2]

(c) Industrial processes release large amounts of sulfur dioxide and carbon dioxide into the atmosphere.

(i) State a **natural** source of sulfur dioxide.

[1]

.....

(ii) Carbon dioxide contributes to global warming.

Describe one environmental consequence of an increase in global warming.

.....

.....

.....

.....

[1]

.....

(d) The zinc obtained in stage 2 has to be purified further for more useful purposes.

One of the most common uses for zinc is as an anti-corrosion agent.

Explain why zinc is able to act as an anti-corrosion agent in galvanized **steel lamp posts.**

.....

.....

.....

[2]

.....

(e) The most abundant and stable zinc isotope is ^{65}Zn
State the number of protons and neutrons in this isotope of zinc.

Number of protons .....

Number of neutrons ..... [1]

A4 Sulfamic acid, SO_3NH_3, is a weak acid used to remove limescale, deposited calcium carbonate, from kettles

(a) Explain the meaning of the term *weak acid*.

.....

[1]

.....

(b) The pH of an aqueous solution of sulfamic acid can be determined using a pH meter.

Describe another way of estimating the pH of a solution of sulfamic acid.

.....

.....

.....

[1]

.....

(c) A 0.105 g sample of sulfamic acid is dissolved in some water. This sulfamic acid solution requires 10.8 cm^3 of 0.100 mol/dm^3 potassium hydroxide for complete neutralisation.

Calculate the number of moles of sulfamic acid that react with one mole of potassium hydroxide

[3]

(d) Aqueous sulfamic acid reacts with magnesium to form magnesium sulfamate, $Mg(SO_3NH_2)_2$.

(i) Write an equation for this reaction.

[1]

.....

(ii) Limescale contains calcium carbonate.

Describe, with the aid of an equation, what is observed when aqueous sulfamic acid reacts with calcium carbonate.

.....

.....

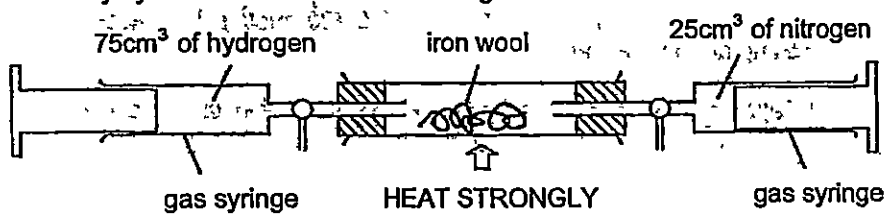
[2]

.....

A5 Ammonia is a compound of hydrogen and nitrogen with a formula of NH_3. It is a colourless gas with a pungent smell. The formation of ammonia is made by reacting nitrogen and hydrogen in a reversible reaction as shown in the equation below.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

(a) The reaction to produce ammonia can be demonstrated in the science laboratory by the method shown in the diagram below:



The mixture of nitrogen and hydrogen is passed backwards and forwards over the hot iron wool until there is no further reaction.

(i) Explain why air must not be present in the above reaction.

.....

[1]

.....

(ii) Assuming only 15% of the nitrogen and hydrogen react to produce ammonia, calculate the volume of ammonia produced at room temperature and pressure.

[2]

(b) In industries, ammonia is manufactured in the Haber Process The table below shows the percentage yield of ammonia at different temperature and pressures.

Temperature/°C	Percentage yield of ammonia at equilibrium		
	200 atm	300 atm	400 atm
350	24	40	48
450	20	23	30
550	10	12	15

(i) State how the increase in pressure affects the percentage yield of ammonia at equilibrium.

.....

[1]

(ii) Suggest one advantage and one disadvantage of using 450°C rather than 350°C as the working temperature

.....

.....

.....

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[2]

(iii) Explain why the use of expensive metals as catalyst does not increase the cost of production of ammonia in the Haber Process.

.....

[1]

A6 Hydrogen peroxide, H_2O_2, is a covalent compound. Hydrogen peroxide decomposes to form water and oxygen according to the equation:

$$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$$

(a) The decomposition of hydrogen peroxide involves a change from the liquid state to the gaseous state

Describe the difference in both the movement and arrangement of particles in a liquid and in a gas.

Movement:

.....

.....

.....

.....

Arrangement:

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[2]

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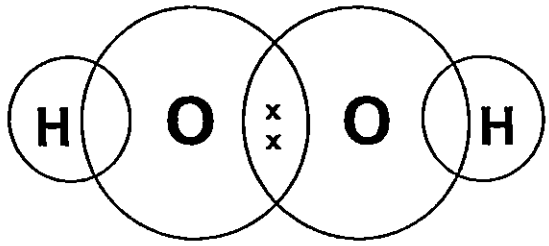
(b) Complete the 'dot and cross' diagram to show the bonding present in hydrogen peroxide, H_2O_2, using the legend stated.



Key

x : electrons of oxygen atoms

●: electrons of hydrogen atoms

[2]

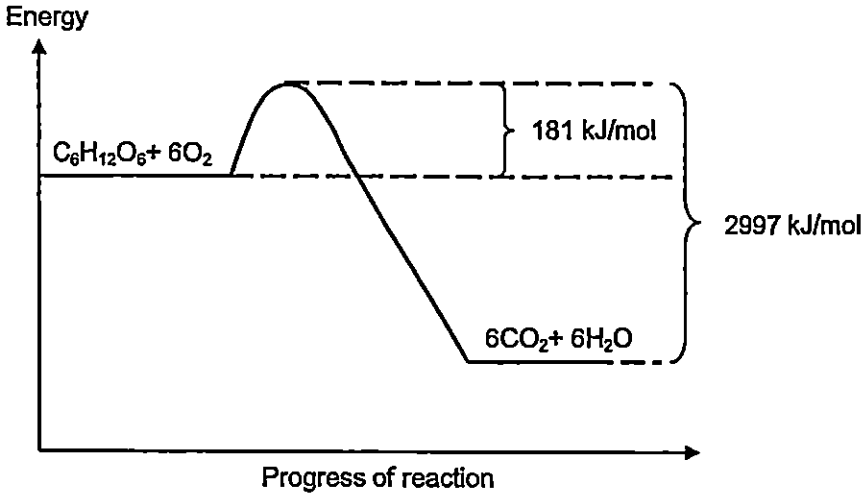
(c) Hydrogen peroxide can act as an oxidising agent or a reducing agent.

Deduce the nature of hydrogen peroxide in each test described.

Test	Observation	Nature of hydrogen peroxide
hydrogen peroxide is added to iron(II) sulfate	light green solution turns yellow	
hydrogen peroxide is added to acidified potassium manganate (VII)	purple solution turns colourless	

[2]

A7 The following energy profile diagram shows the differences in amount of energy associated with the combustion of glucose, $C_6H_{12}O_6$, during cellular respiration to produce carbon dioxide and water.



(a) Calculate the enthalpy change, ΔH, of the reaction.

[1]

(b) Explain whether this reaction is endothermic or exothermic in terms of bond breaking and bond forming.

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[2]

.....

(c) Calculate the energy released per gram of glucose.

[2]

A8 Crude oil is a raw material which is processed in an oil refinery. Two of the processes used are fractional distillation and cracking.

The table below shows the percentage of the supply and demand of each fraction in crude oil.

Fraction	Number of carbon atoms per molecule	Percentage of supply in crude oil	Percentage of demand in crude oil
Petroleum gases	1 - 4	4%	11%
Petrol (gasoline)	5 - 9	11%	22%
Kerosene	10 - 14	12%	20%
Diesel oil	14 - 20	18%	15%
Waxes and bitumen	Over 20	23%	4%

(a) State the physical property which is used to separate crude oil by fractional distillation.

[1]

.....

(b) Use the information from the table to

(i) identify the fractions that would undergo cracking to meet the demand for petrol.

[1]

.....

(ii) explain your choice in (i)

.....

.....

[1]

.....

(c) Heptane, an alkane with 7 carbon atoms, can be cracked into smaller molecules under high temperatures and a catalyst.

A large volume of heptane was subjected to cracking and the main product was methane. Gas B which has a relative molecular mass of 28 was also isolated in the product mixture and was found to be unsaturated.

(i) Write an equation to show the cracking process.

.....

[1]

.....

(ii) Describe a chemical test that can be used to distinguish between methane and gas **B**

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[2]

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Section B (30 marks)

Answer all three questions in this section.
The last question is in the form of EITHER/OR and only one alternative should be attempted.

B9 Aqueous chlorine dioxide, a yellow solution, reacts with an alkali according to the following equation:

$$\underset{\text{yellow}}{2ClO_2\,(aq)} + 2OH^-\,(aq) \rightarrow ClO_3^-\,(aq) + \underset{\text{colourless}}{ClO_2^-\,(aq)} + H_2O\,(l)$$

A student carried out different experiments to investigate the rate of reaction using different concentrations of aqueous chlorine dioxide and alkali. In each experiment, she measured how quickly the colour of aqueous chlorine dioxide disappeared.

The table showed the results obtained with differing concentrations of aqueous chlorine dioxide and alkali used in each experiment.

Experiment	Concentration of ClO_2 / mol/dm^3	Concentration of OH^- / mol/dm^3	Rate of disappearance of ClO_2 / mol/dm^{3}s
1	0.020	0.030	0.00276
2	0.040	0 030	0.01104
3	0.020	0.060	0.00552
4	0.040	0.060	0.02208
5	0.040	0.090	0.03312
6	0.120	0.030	0 09936

The reaction of aqueous chlorine dioxide with alkali is interesting because it is an example of a disproportionation reaction. Disproportionation happens when the oxidation state of the same element both increases and decreases in the reaction.

(a) Describe the trend in the rate of reaction with respect to the concentration of the reagents used.

Explain and justify your answer using the results in the table, stating clearly the experiment number you are using for **each** reagent.

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[3]

(b) Using Collisions Theory, explain the trend stated in **(a)**.

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.....

.....

[2]

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(c) Two students have different opinion about the data.

Student 1: I think that the rate of reaction depends on the concentration of aqueous chlorine dioxide to a greater extent.

Student 2: I think that the rate of reaction depends on the concentration of alkali to a greater extent.

Who do you agree with? Explain your answer using results from the table. State which experiment number you are using, and show clearly how you arrived at your answer.

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[2]

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(d) Predict the rate of the disappearance of ClO_2 if the experiment was conducted using 0.040 mol/dm^3 of ClO_2 and 0.120 mol/dm^3 of OH^-.

[1]

.....

(e) Use the idea about oxidation state to explain why the reaction of chlorine dioxide with an alkali is a disproportionation reaction.

.....

.....

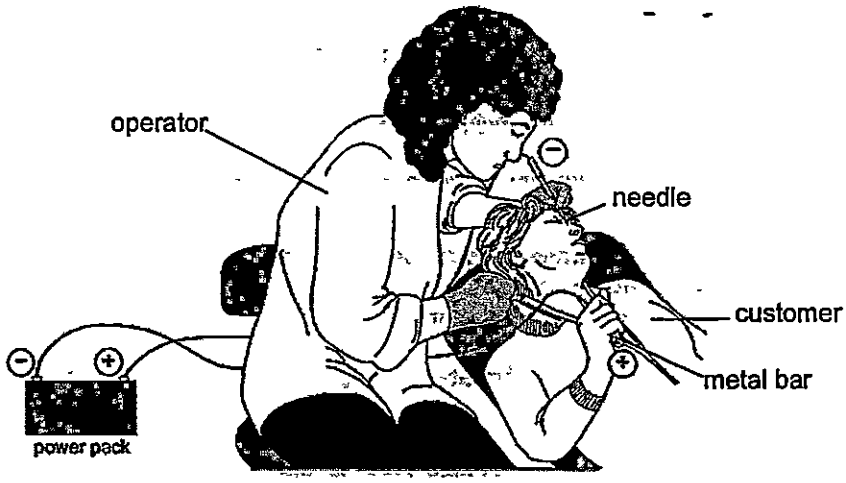
.....

[2]

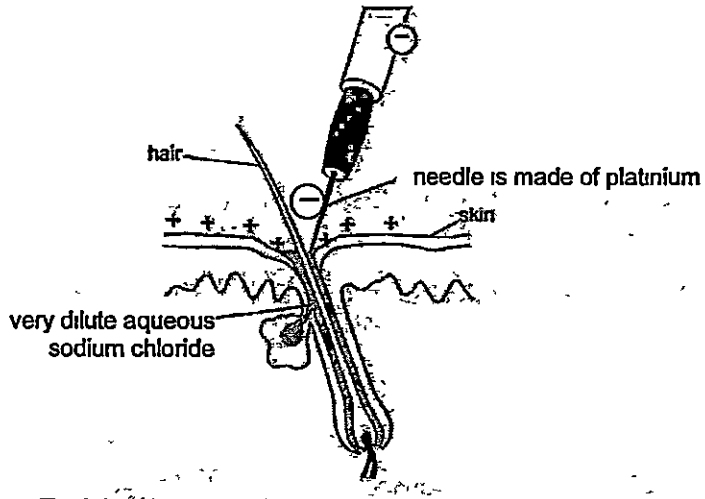
.....

[Total: 10]

B10 Electrolysis can be used to remove unwanted hair. The customer holds a metal bar which acts as a positive electrode. A needle, which acts as the negative electrode, is held by the operator.



(a) The solution around the tip of the needle is very dilute aqueous sodium chloride.



(i) Explain why very dilute aqueous sodium chloride is used instead of pure water.

.....

[1]

.....

(ii) Give the formulae of all the ions present in very dilute aqueous sodium chloride during this electrolysis.

[1]

.....

(iii) During electrolysis, a small amount of gas is formed at the surface of the skin.

Name the gas formed and write a half equation for the formation of gas.

.....

[2]

.....

(iv) During electrolysis, hydrogen gas is also formed at the tip of the negatively charged needle. The formation of gas caused the pH of the remaining solution to change.

Explain why the formation of the gas caused the pH of the remaining solution to change.

.....

.....

.....

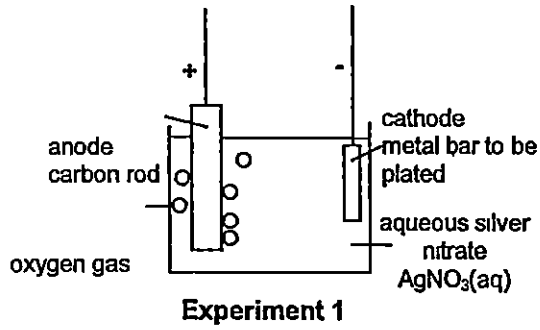
.....

[2]

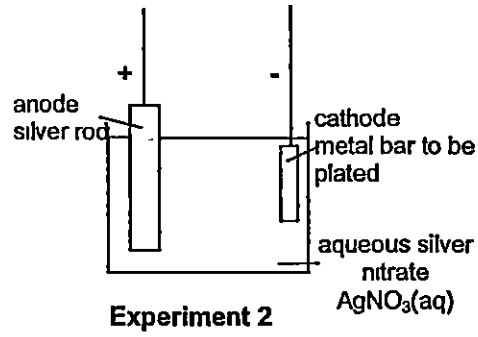
.....

(b) During the hair removal by electrolysis, the metal bar held by the customer acts as an electrode.

Two different experiments are set up by a student to electroplate the metal bar used with silver to improve its appearance.



Experiment 1



Experiment 2

At the beginning of each experiment, a sample of the electrolyte, aqueous silver nitrate, is removed and placed in a test-tube. A few drops of aqueous sodium chloride are then added to the sample of electrolyte.

(i) Describe what the student sees in the test tube.

[1]

.....

(ii) After some time, it is observed that when no more silver is being deposited on the metal bar in experiment 1, more silver is still being deposited on the metal bar in experiment 2.

Suggest a reason for this observation. Predict what the student will see if aqueous sodium chloride is added to the electrolyte in experiment 1.

.....

.....

.....

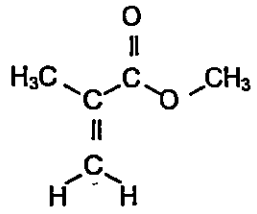
.....

[3]

[Total: 10]

EITHER

B11 (a) **PMMA** is a member of a family of polymers known as acrylics It is a clear plastic and is often used as a shatterproof replacement for glass. It is formed from a single monomer, **methyl methacrylate,** that has the following structure:



(i) State the actual name of **PMMA.**

[1]

.....

(ii) Draw the structure of **PMMA** with 3 repeat units.

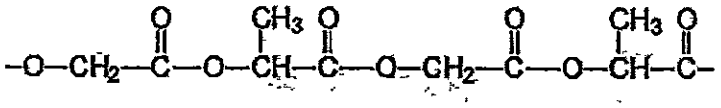
[2]

(iii) Name the reaction that is used to form **PMMA.**

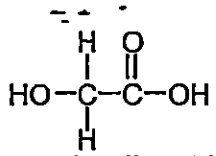
[1]

.....

(b) **PLGA** is another polymer which is used in manufacturing staples for closing surgical wounds. **PLGA** is synthesized by means of polymerisation of two different monomers, lactic acid and glycolic acid. Lactic acid and glycolic acid can be found in food.



PLGA



glycolic acid

(i) State the type of polymer the **PLGA** is classified as.

[1]

.....

(ii) State the functional groups in the monomers that react to form **PLGA**.

[1]

.....

(iii) Draw the full structural formula of lactic acid.

[1]

(iv) **Name** the reaction and **draw** the **full structural formula** of the molecule formed when glycolic acid is left in the air for a long period of time.

.....

Full structural formula

[2]

(v) Name one advantage of using **PLGA**.

[1]

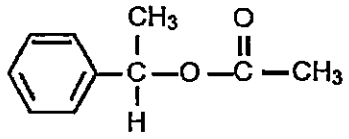
.....

[Total: 10]

OR

B11 Perfumes usually contain three groups of compounds called the top note, the middle note and the end note

(a) Top notes consist of small, light molecules that evaporate quickly. An example of a top note compound is styrallyl acetate as shown below:



top note

(i) With reference to the structure of the compound, explain why it is likely to have a pleasant smell.

.....

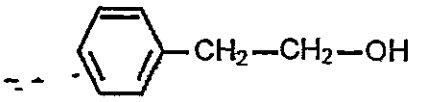
[1]

.....

(ii) Draw the structural formula of the alcohol and carboxylic acid used to make styrallyl acetate.

[2]

(b) The middle note compounds form vapours less rapidly than the top note compounds. A typical compound of the middle note is 2-phenylethanol. The structure of 2-phenylethanol is shown below:



middle note

(i) Describe a chemical test which would distinguish between the top note and the middle note compounds

.....

.....

.....

[2]

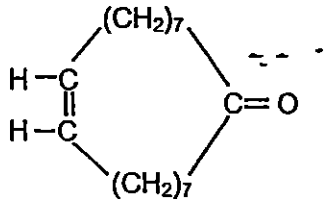
(ii) **Name** and **draw** the **full structural formula** of the molecule formed in the positive test in **(i)**.

.....

Full structural formula

[2]

(c) The end note compound of a perfume has a long lasting odour which stays with the user. An example of an end note compound is shown below.



end note

(i) Explain why the end note compound is described as unsaturated.

.....

[1]

.....

(ii) The end note compound undergoes hydrogenation reaction.

State the conditions that are essential for the hydrogenation reaction.

.....

[1]

.....

(iii) Iodine reacts with unsaturated compounds. The iodine value is a measure of how unsaturated a compound is. It is based on the mass, in g, of iodine that reacts with 100 g of the compound.

The relative molecular mass of the end note compound is 250.

Calculate the iodine value for the end note compound.

[1]

[Total: 10]

MGIS

Answer for 2015 Chemistry Prelim Paper 1

1	A	21	B
2	A	22	B
3	B	23	C
4	D	24	D
5	C	25	A
6	A	26	C
7	A	27	C
8	C	28	C
9	D	29	A
10	B	30	A
11	B	31	B
12	B	32	A
13	C	33	C
14	B	34	C
15	B	35	B
16	D	36	D
17	A	37	C
18	A	38	C
19	C	39	D
20	D	40	B

METHODIST GIRLS' SCHOOL
SECONDARY FOUR PRELIM EXAMINATION (2015)

Answer Scheme

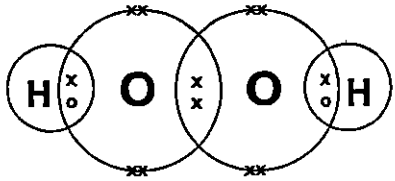
Section A

1	(a)	CF_3Cl	1
	(b)	NaCl	1
	(c)	$CuCO_3$	1
	(d)	CO_2	1
	(e)	$ZnSO_4$ / $MgSO_4$	1
2	(a)	Chlorine has a simple molecular structure/ exists as molecules There are weak intermolecular forces of attraction between the chlorine molecules hence little energy is needed to overcome these forces, thus the melting point of chlorine is low.	1 1
	(b)	Molten sodium chloride has mobile ions but the ions in solid sodium chloride are held in fixed positions, hence it cannot move to conduct electricity	1
	(c)	Sodium ions gain electrons to form sodium it is reduced Chloride ions lose electrons to form chlorine, it is oxidised Or The oxidation state of sodium increases from +1 in sodium to 0 in sodium The oxidation state of chlorine decreases from -1 in chloride ion to 0 in chlorine	1 1
3	(a)	CO is poisonous as it combines with the haemoglobin in the red blood cells to form carboxyhaemoglobin which prevents transport of oxygen to other parts of the body	1
	(b)	Stage 1. Sodium carbonate cannot be decomposed by heat as it is a very stable compound Stage 2: Sodium oxide cannot be reduced to by carbon Electricity is needed to break the strong ionic bonds between sodium ions and oxide ions OR Carbon is not reactive enough to break the strong ionic bonds in sodium oxide	1 1
	(c)(i)	Volcanic eruptions	1
	(c)(ii)	Flooding of low-lying areas as sea level rise due to melting ice caps OR Extreme changes in global climate The rise in temperature will cause more land areas to be infertile deserts, resulting in decrease in crop yields/food shortages/drought.	1 1

	(d)	Zinc is more reactive than iron in the steel Zinc loses electrons more easily than iron, thus it will corrode preferentially and protect iron	1 1
	(e)	Number of protons = 30 Number of neutrons = 35	1
4	(a)	A weak acid is a substance that when dissolves in water ionises partially to give hydrogen ions	1
	(b)	Use universal indicator Idea that the different colours indicate different pH values / match colour against a colour chart (Allow this mark even for an incorrect indicator)	1 1
	(c)	No of moles of sulfamic acid =0 105/97 = 0 001082	1
		No of moles of KOH = 10 8/1000 x 0 1 = 0 00108	1
		Thus, 1 mole of sulfamic acid reacts with 1 mole of KOH	1
	(d)(i)	$Mg + 2SO_2NH_3 \rightarrow Mg(SO_3NH_2)_2 + H_2$	1
	(d)(ii)	$CaCO_3 + 2SO_3NH_3 \rightarrow Ca(SO_3NH_2)_2 + H_2O + CO_2$ Bubbles of gas formed when sulfamic acid reacts with calcium carbonate	1 1
5	(a)(i)	Hydrogen burns in air to release a lot of heat energy/ Oxygen in the air will react with the heated iron to form iron oxide	1
	(a)(ii)	Volume of NH_3 formed if 100% conversion = 25 x 2 = 50cm^3 If only 15% converted, volume of NH_3 formed = 50 x 15/100 = 7 5cm^3	1 1
	(b)(i)	As pressure increases, the % yield of ammonia increases	1
	(b)(ii)	Advantage higher temperature, the rate of reaction will increase/faster	1
		Disadvantage: lower % yield of ammonia.	1
	(b)(iii)	Only a small amount is needed / can be recycled/ catalyst remained unchanged at the end of the reaction, hence can be recovered if used as catalyst.	1

6 (a) Movement: The particles in the liquid move and slide in and throughout each other while the particles in the gas move randomly and at high speed in all direction 1

Arrangement: The particles in the liquid are closely packed but arranged in a disorderly manner / irregular arrangement The particles in the gas are far apart. 1



1

1

1m for correct covalent bond between H and O
1m for correct correctly shown valence electron in O

(c)

Test	Observation	Nature of hydrogen peroxide
hydrogen peroxide is added to iron(II) sulfate	light green solution turns yellow	Oxidising agent
hydrogen peroxide is added to acidified potassium manganate (VII)	purple solution turns colourless	Reducing agent

1

1

7 (a) Enthalpy change of reaction = 2997 – 181 = – 2816 kJ/mol 1

Students need to give the negative sign, to be awarded the 1m

(b) Exothermic. 1
More energy is released to make the bonds in water and carbon dioxide than energy taken in to break the bonds in glucose and oxygen 1

(c) 1 mole contains 180g of glucose (which contains 2816 kJ energy) 1
1 g of glucose contains (2816/180) = 15 6kJ of energy 1

8 (a) Boiling point. 1

(b)(i) diesel oil, waxes and bitumen 1

(b)(ii) Lower in demand compared to percentage of supply Hence the excess can be used for cracking-to form petrol 1

(c)(i) $C_7H_{16} \rightarrow CH_4 + 3C_2H_4$ 1

(ii) Bubble the gases separately into aqueous bromine / bromine solution 1
Gas B turns reddish-brown aqueous bromine colourless whereas aqueous bromine remained reddish-brown when methane was bubbled into it. 1

Answer Scheme for Section B

B9 **(a)** As the concentration of the reagent increases, the rate of reaction also increases
Comparing experiment 2, 4 and 5, while keeping the concentration of aqueous chlorine dioxide the same, as the concentration of aqueous sodium hydroxide/hydroxide ion increases, the rate of disappearance of aqueous chlorine dioxide also increases.

Comparing experiment 1, 2 and 6, while keeping the concentration of aqueous sodium hydroxide /hydroxide ion the same, as the concentration of aqueous chlorine dioxide increases, the rate of disappearance of aqueous chlorine dioxide also increases

1m for stating the general trend
1m for comparing the correct experiment
1m for mention that keeping concentration of the other reagent the same

(b) When the concentration of aqueous chlorine dioxide or hydroxide ions increases, the number of aqueous chlorine dioxide particles or hydroxide ions per unit volume increases or the number of moles of aqueous chlorine dioxide particles or hydroxide ions per unit volume increases. 1
This causes an increase in the frequency of effective collisions, hence, the rate of reaction also increases. 1

(c) Comparing experiment 1 and 2, when the concentration of aqueous chlorine dioxide is doubled/twice, rate of disappearance increased by 4 times.

Comparing experiment 2 and 4 or (1 and 3), when the concentration of aqueous sodium hydroxide /hydroxide ion is doubled/twice, rate of disappearance increased by 2 times/ is doubled/twice.
Hence, I agreed with student 1
OR
Comparing experiment 2 and 5, when the concentration of aqueous chlorine dioxide is thrice, rate of disappearance increased by 9 times

Comparing experiment 2 and 6, when the concentration of aqueous sodium hydroxide /hydroxide ion is thrice, rate of disappearance increased by 3 times
Hence, I agreed with student 1.

1m for stating 2 pairs of experiment number.
1m for the working

(d) Rate of disappearance
= using expt 4 (0 040 mol/dm^3 of ClO_2 and 0.060 mol/dm^3 of OH^-)
multiply by 2
= 0 02208 x 2
=0 04416 mol/ dm^3 s 1

(e) The oxidation state of chlorine increased from +4 in ClO_2 to +5 in ClO_3^-. 1

The oxidation state of chlorine decreased from +4 in ClO_2 to +3 in ClO_2^-. 1

[Total.10]

B10 **(a)** **(i)** Dilute aqueous sodium chloride contain mobile ions OR Pure water does not contain mobile charged particles. 1

(II) H^+, OH^-, Na^+, Cl^- 1
(all correct: award 1 mark)

(III) The gas is oxygen. 1

$4OH^-(aq) \rightarrow 2H_2O(l) + O_2(g) + 4e^-$ 1

(iv) As more and more hydrogen ions are preferentially discharged to form hydrogen gas, concentration of hydrogen ions decreases 1
OR
the remaining solution is sodium hydroxide
Hence, the pH of the solution will increase. 1

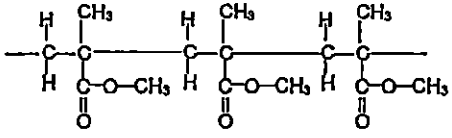
(b) (I) White precipitate is observed 1

(II) In experiment 1, all the silver ions in the electrolyte are completely discharged. In experiment 2, the silver in the anode will continue to oxidise and form silver ions which go into the solution. The silver ions will continue to be discharged at the cathode 1
No white precipitate formed/ No visible change when aqueous sodium chloride is added 1
OR
Silver in the anode in experiment 2 will oxidise to form silver ions which go into the solution (1m)
In experiment 1, the silver ions that discharged on the metal bar come from the silver nitrate solution only In experiment 2, while 1 mole of silver ions is discharged, 1 mole of silver ions will be replenished in the solution (1m)
No white precipitate formed/ No visible change when aqueous sodium chloride is added (1m)

[Total:10]

EITHER
B11 (a) (I) Polymethylmethacrylate 1

(II) 2

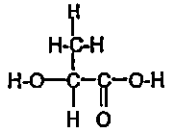


(III) Addition polymerisation 1

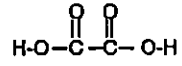
(b) (I) PLGA is a condensation polymer. 1

(II) ~~The monomers must have carboxyl and hydroxyl functional~~ 1
groups (Both correct: award 1 m)

6

(iii)  1

(iv) oxidation 1

 1

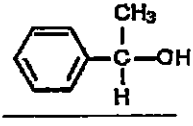
(v) PLGA is biodegrable 1

[Total 10]

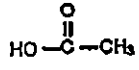
OR

B11 (a) (i) The compound consists of a functional group named ester 1

(ii) Alcohol

 1

Carboxylic acid

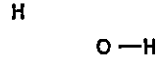
 1

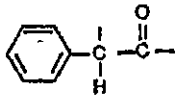
(b) (i) Add acidified potassium manganate(VII) solution to each sample of top note compound and middle note compound 1

If the acidified potassium manganate(VII) solution turned from purple to colourless, the sample is middle note. 1
If the acidified potassium manganate(VII) solution remained purple, the sample is top note.

OR
Add acidified potassium dichromate(VI) solution to each sample, if the solution turned from orange to green, the sample is middle note or if the solution remained green, the sample is top note.
1m for test, 1 m for the observation

(ii) 2-phenylethanoic acid 1

 7



1

(c) (i) The end note consists of carbon-carbon double bond 1

(ii) Temperature of 200°C and the catalyst used is nickel 1

(iii) 1 mol of end note reacts with 1 mol of Iodine
No of mole of end note
$=\frac{100}{250}$
$= 0.4$
No of mole of Iodine = 0.4
Mass of Iodine
$=0.4 \times 2 \times 127$
$=102$
Iodine value is 102. 1

[Total 10]