



EXAMINATION NO.: _____

THE MALAWI NATIONAL EXAMINATIONS BOARD

MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

SAMPLE PAPER

CHEMISTRY

Subject Number: M036/I

Time Allowed: 2 hours
8:00 – 10:00 am

PAPER I
(100 marks)

Instructions

1. This paper contains 12 printed pages. Please check.
2. Fill in your **Examination Number** at the top of each page.
3. This paper contains **two** sections, **A** and **B**. In **Section A** there are **ten** short answer questions while in **Section B** there are **three** restricted essay questions.
4. Answer all the **thirteen** questions in the spaces provided.
5. Use of electronic calculators is allowed.
6. The maximum number of marks for each answer is indicated against each question.
7. In the table provided on this page. **tick** against the number of the question you have answered.

Question Number	Tick if answered	Do not write in these columns		Marker's Name
1				
2				
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SECTION A (70 marks)

1. a. (i) Write the electron configuration of phosphorous P if its atomic number is 15.

(1 mark)

- (ii) Explain how phosphorous can improve food security.

(3 marks)

- b. (i) Explain why Lithium, atomic number 3, is less reactive than Potassium, K, atomic number 19.

(2 marks)

- (ii) Give any **three** reasons why Potassium, K atomic number 19 reacts faster than Calcium, Ca, atomic number 20.

(3 marks)

2. a. What is a condensation reaction?

(1 mark)

Continued/...

2. (Continued)

b. Below are some organic compounds' formulae labelled A, B and C.

A: $\text{CH}_3\text{CH}_2\text{OH}$

B: C_9H_{20}

C: CH_3COOH

(i) Which compound is a hydrocarbon?

_____ (1 mark)

(ii) Name compound A.

_____ (1 mark)

(iii) Explain why compound A is soluble in water.

_____ (2 marks)

(iv) State any **two** ways in which the reaction between compound C and compound A is important to human life.

_____ (2 marks)

3. Below are the general formulae of some homologous series represented by letters P, Q and R.

P: C_nH_{2n}

Q: $\text{C}_n\text{H}_{2n+1}\text{COOH}$

R: $\text{C}_n\text{H}_{2n+1}\text{OH}$

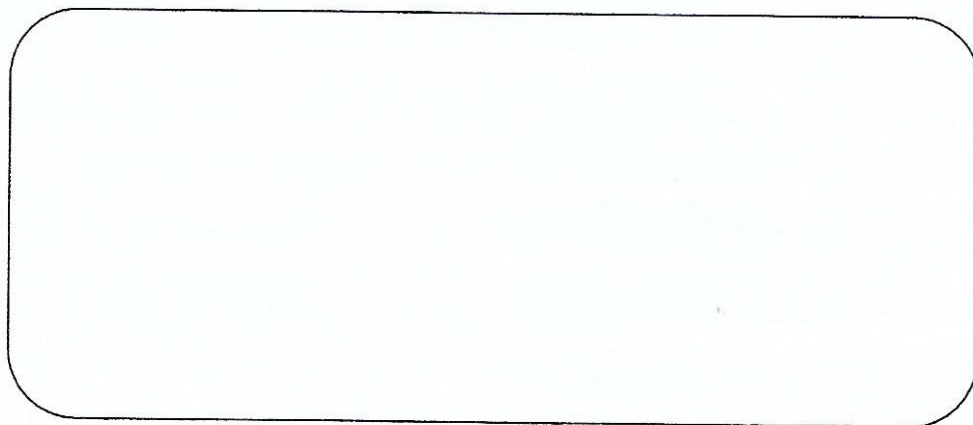
a. Name the homologous series represented by Q.

_____ (1 mark)

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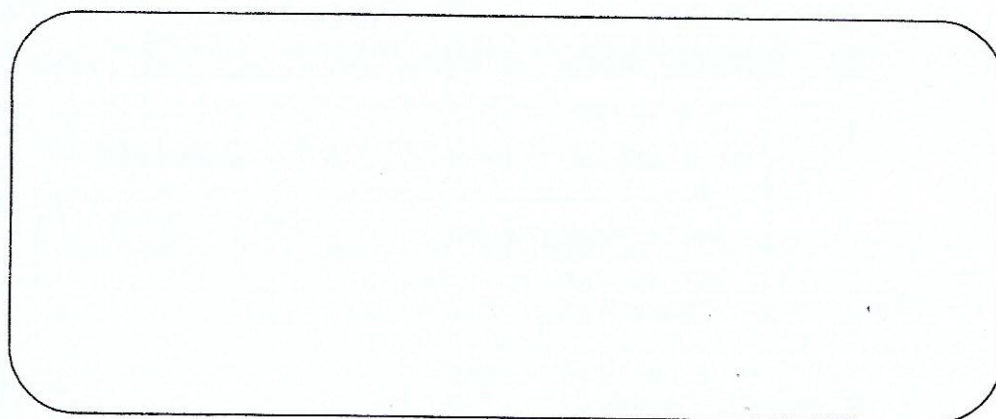
3. (Continued)

- b. Draw the structure of a compound with 4 carbon atoms in homologous series **R**.



(2 marks)

- c. Draw **all** the structural isomers of the compound with 4 carbon atoms in homologous series **P**.



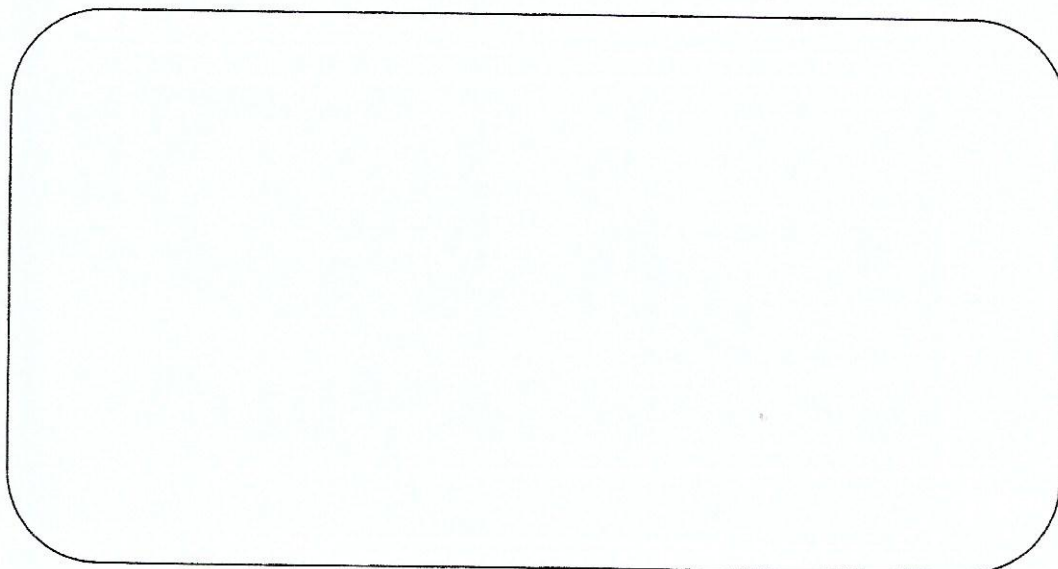
(3 marks)

- d. Explain how a compound in homologous series **Q** could be distinguished from a compound in homologous series **R**.

(3 marks)

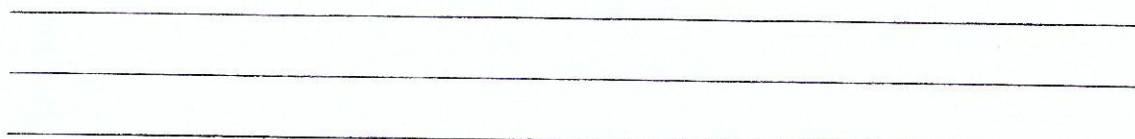
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4. a. With the aid of a dot and cross diagram, draw the structure of an ammonia molecule, NH_3 . (N = 7, H = 1)



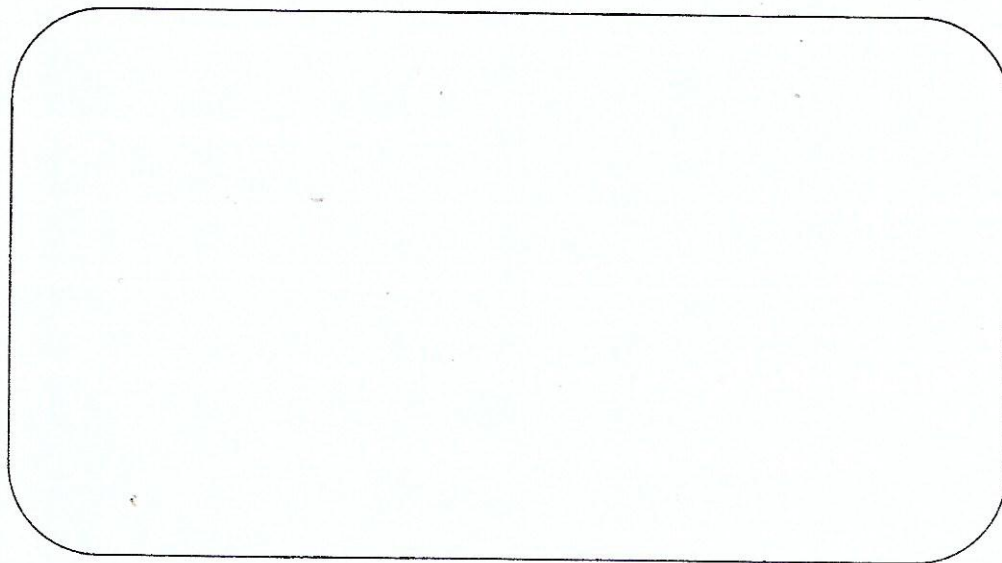
(2 marks)

- b. Explain why metals have high boiling and melting points.



(2 marks)

5. a. A hydrocarbon is found to contain 24g of carbon and 4g of hydrogen. Work out its empirical formula (C = 12, H = 1).

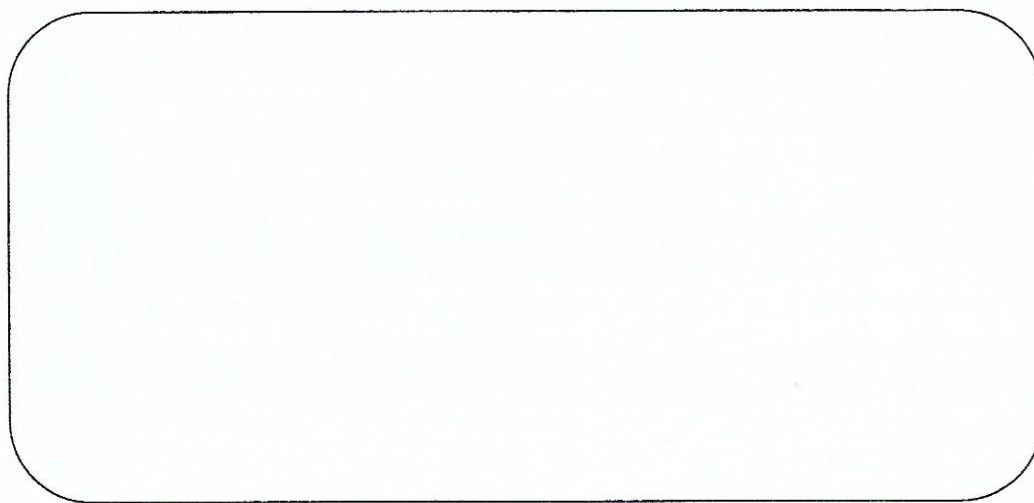


(3 marks)

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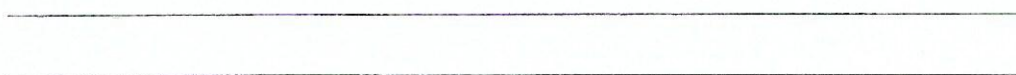
5. (Continued)

- b. Calculate the molarity of 10% sodium hydroxide (NaOH) solution
(Na = 23, O = 16, H = 1).



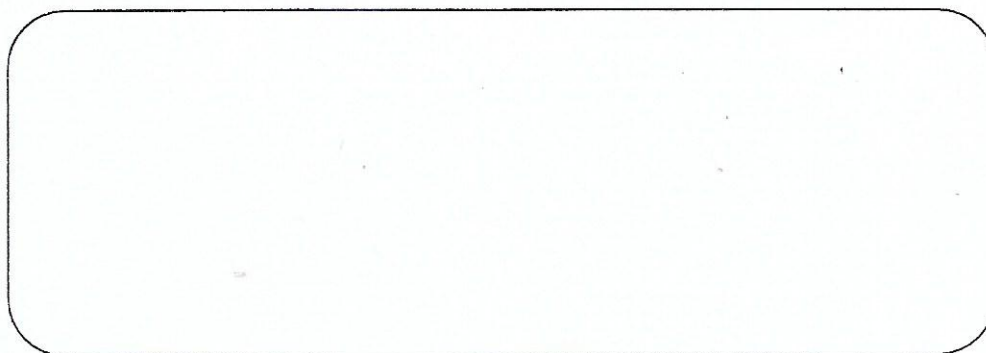
(4 marks)

6. a. (i) Define the 'mole'.



(1 mark)

- (ii) Calculate the number of moles that are contained in 20g of sodium hydroxide, (NaOH) . {Na = 23, O = 16, H = 1}



(3 marks)

- b. Methane (CH₄) burns in excess oxygen as shown by the chemical equation below:



- (i) Name the products of the reaction.

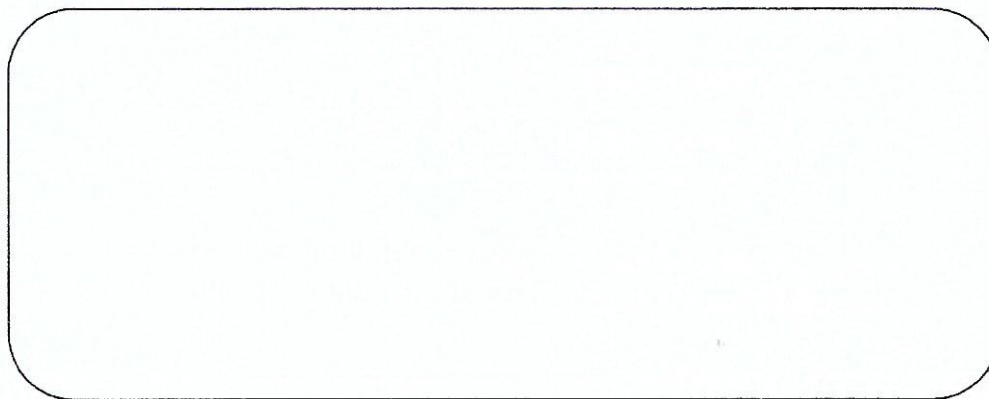


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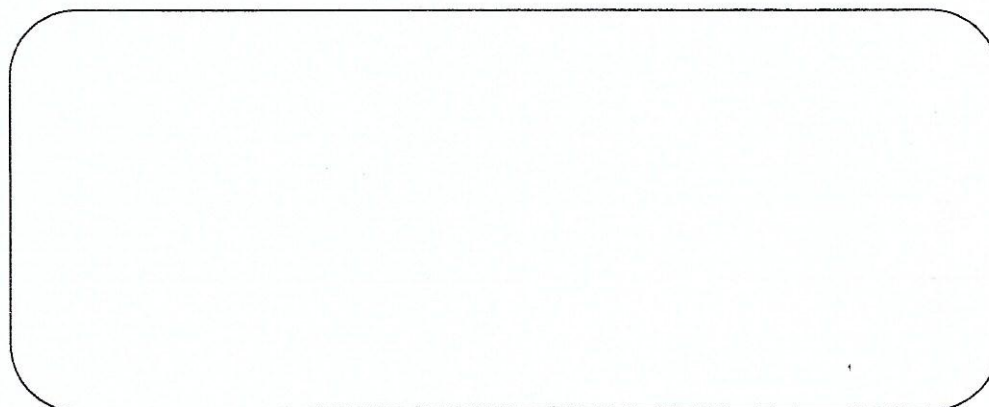
6. b. (Continued)

(ii) Balance the equation $\text{CH}_4(\text{g}) + \text{O}_2(\text{g}) \longrightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\ell)$.



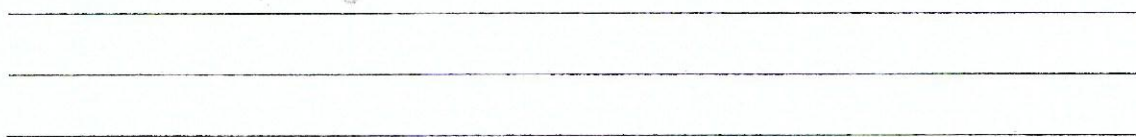
(2 marks)

(iii) Work out the percentage composition by mass of hydrogen in methane; (C = 12, H = 1).



(3 marks)

7. a. State any **two** branches of chemistry.



(2 marks)

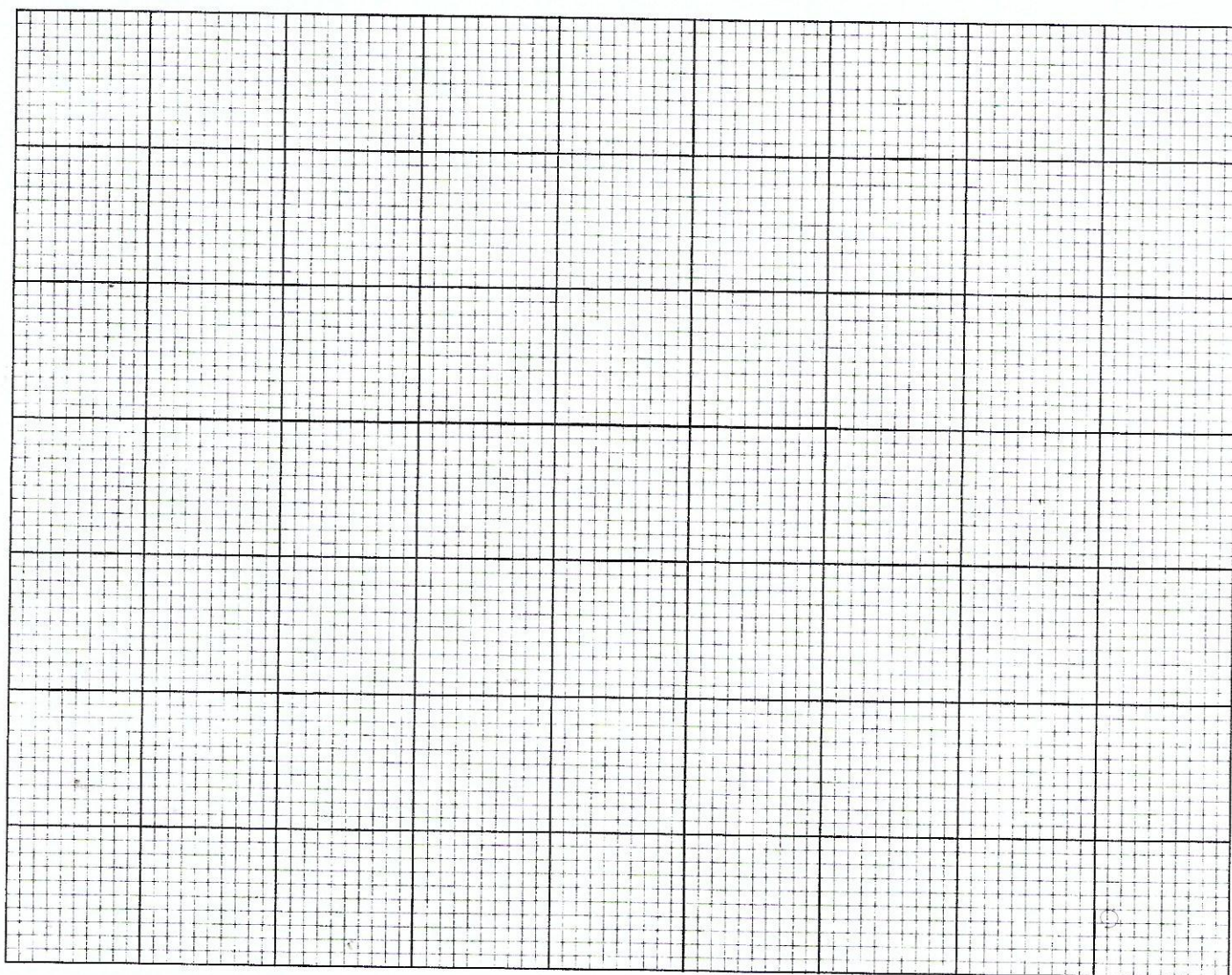
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7. (Continued)

- b. The table below shows results of an experiment showing change in temperature against time.

Temperature ($^{\circ}\text{C}$)	10	20	30	40
Time (minutes)	2	4	6	8

Using a scale of 2 cm to represent 1 unit on the horizontal axis and 2 cm to represent 10 units on the vertical axis, draw a graph of temperature against time.



(3 marks)

Continued/...

7. (Continued)

- c. Explain how oxygen gas could be identified.

(2 marks)

- d. How can the purity of a substance be determined using melting and boiling points?

(3 marks)

8. Describe any **two** effects of hard water in everyday life.

(4 marks)

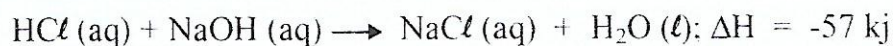
9. a. State any **one** condition necessary for rusting to occur.

(1 mark)

- b. Explain why a piece of magnesium in contact with a steel pipeline prevents the pipeline from rusting.

(3 marks)

10. Hydrochloric acid (HCl) react with sodium hydroxide (NaOH) according to the following equation:



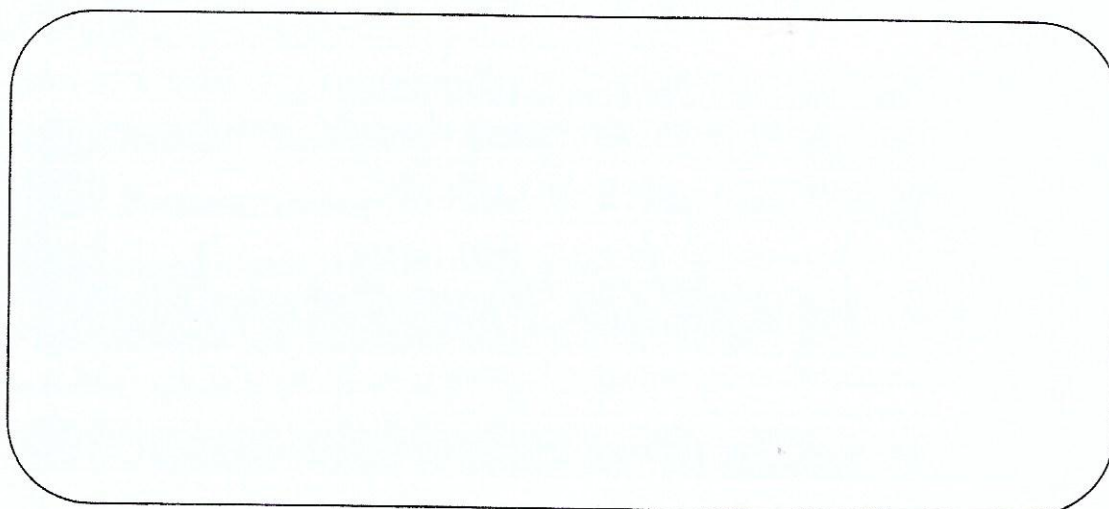
- a. What type of reaction is shown by this equation?

(1 mark)

Continued/...

10. (Continued)

- b. Draw a well labelled energy level diagram for this reaction.



(4 marks)

SECTION B (30 marks)

11. a. Describe **two** types of polymerization.

(4 marks)

- b. A country banned the manufacture of thin plastic bags in preference to thick plastic bags. Explain the importance of the decision with reference to the impact of plastics to the environment.

(6 marks)
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13. With the aid of a labelled diagram, explain what happens during the electroplating of an iron nail with copper using copper chloride as an electrolyte.

(10 marks)

END OF QUESTION PAPER

This paper contains 12 printed pages