

S4 MOCK 2 2006 EXAMINATIONS  
545/2 CHEMISTRY  
PAPER 2  
TIME: 2 HOURS

**Instructions:**

Section A consists of 10 structured questions. Attempt all questions in this section. Answers to these questions must be written in the spaces provided.

Section B consists of 4 semi-structured questions, Attempt any two questions from this section. Answers to the questions must be written in the answer sheets provided.

In both sections all working must be clearly shown.

1 mole of gas occupies  $24\text{dm}^3$  at room temperature  
1 mole of gas occupies  $22.4\text{dm}^3$  at s.t.p  
Faraday's constant = 96480  
(Zn = 65, Cu = 63.5, Na = 23, O = 16, C = 12, H = 1 )

Section A :

1. Oxygen gas may be prepared in the laboratory from hydrogen peroxide and manganese (IV) oxide.

(a) (i) What is the use of the manganese (IV) oxide in the reaction?

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(ii) Write the equation for the reaction

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(b) (i) State what is observed when a piece of magnesium ribbon is burnt in air

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(ii) Write the equation for the reaction

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(c) State two industrial uses of oxygen

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2. (a) Define the term isotopes

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(b) (i) Name two elements that can exhibit isotopy

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(ii) Give the isotopes of one of the elements named above.

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(c) Given elements X and Y with atomic numbers 8 and 11 respectively.

(i) Give the group and period in which element X belongs

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(ii) Write the formula for the compound formed between X and Y

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3. (a) What is meant by the term vulcanisation?

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(b) (i) State two uses of rubber

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(ii) Name two synthetic polymers

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(c) State two disadvantages of synthetic polymers

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4. Ethanol can be produced from glucose.

(a) (i) Name the process by which ethanol is obtained from glucose

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(ii) Write the equation for the reaction in a (i)

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(b) A few pieces of sodium metal are added to 5cm<sup>3</sup> of ethanol.

(i) State what is observed

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(ii) Write the equation for the reaction

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(c) State two uses of ethanol other than the preparation of ethene.

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5. 1.25g of zinc carbonate were strongly heated until there was no further change.

(a) (i) State what was observed

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(ii) Write the equation for the reaction

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(b) Determine the volume of the gaseous product liberated at s.t.p.

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6. Copper II sulphate solution was electrolysed between carbon electrodes by passing a current of 1.2 amps for 1 hour 20 minutes.

(a) State what was observed

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(b) Determine the mass of substance liberated at the cathode

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(c) State two applications of electrolysis

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7. (a) Dry ammonia gas is passed over heated copper (II) oxide.

(i) State what is observed

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(ii) Write equation for the reaction

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(b) The solid residue in (a) was added to concentrated nitric acid in a beaker

(i) State what was observed

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(ii) Write the equation for the reaction

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8. 32.5cm<sup>3</sup> of 2M sodium hydroxide solution reacted completely with 18.4cm<sup>3</sup> of sulphuric acid.

(a) Determine the molarity of the sulphuric acid

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(b) (i) Define the term dibasic acid

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(ii) Determine the number of moles of hydrogen ions in 20cm<sup>3</sup> of 2M sulphuric acid

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9. 1.3g of zinc were added to 200cm<sup>3</sup> of 0.5M copper (II) sulphate solution and the set up left for two days.

(a) (i) State what was observed

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(ii) Write the equation for the reaction

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(b) Determine the mass of the solid deposited

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10. (a) Define the following terms:

(i) Hard water

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(ii) Temporary hardness of water

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(b) State two disadvantages of hard water

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(c) State two ways of removing hardness in water

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**SECTION B:**

11. Excess concentrated sulphuric acid was added to a liquid Q in a beaker at 180°C to produce a gas R. Gas R was bubbled through acidified potassium dichromate solution and the orange solution turned green.

(a) Identify the substances : Q and R

(b) Write the equation for the reaction leading to the formation of R

(c) Write the equations and name the products of the reaction of R with

(i) Hydrogen

(ii) Oxygen

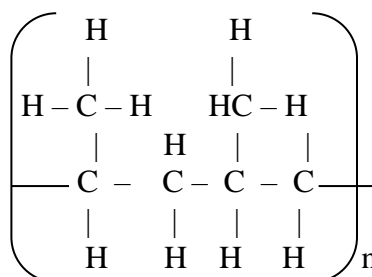
State the conditions of the reactions

(d) (i) State the method used to separate the components of crude oil. Why is it possible to use the method given?

(ii) Give two uses of alkanes.

12. (a) With reference to polyethene, explain the term polymerisation

(b) Given the polymer



Draw the structure and name the monomer of the above polymer

(c) (i) Define the term fibre  
(ii) Name two natural fibres

(d) State two advantages of synthetic polymers over natural polymers  
(e) State two uses of polyethene.

13. The table below shows the volume of oxygen produced with time when hydrogen peroxide solution decomposes in the presence of manganese (IV) oxide.

Time/sec	0	60	120	180	240	300	360	420
Volume/cm <sup>3</sup>	0	29	42.5	47.5	50.5	51.5	52.0	52.0

(a) Draw a diagram of apparatus that can be used to perform this experiment.

(b) Plot a graph of volume of oxygen against time.

(c) From the graph, determine

- how long it took to complete the reaction
- the total volume of oxygen produced
- the volume of oxygen produced in half the time taken for complete reaction. Explain why this volume is not half the total volume of oxygen produced.

(d) On the same axes sketch a curve you would expect if the experiment used the same volume and concentration of hydrogen peroxide solution without manganese (IV) oxide.

(e) Given the enthalpy of combustion of methane is  $-1560 \text{ Kmol}^{-1}$ . Determine the temperature rise of 2 litres of water when 3 litres of methane gas at room temperature are burnt in air.

(Density of water =  $1 \text{ g cm}^{-3}$ , SHC of water  $42 \text{ Jg}^{-1} \text{ K}^{-1}$ )

14. (a) Given a Daniel cell:  $\text{Zn(s)}/\text{Zn}^{2+}(\text{aq}) / \text{Pb}^{2+}(\text{aq}) / \text{Pb(s)}$

- Name two substances that can be used as electrolytes in the above cell
- Identify the anode
- Write the overall cell reaction equation
- Draw a setup of apparatus representing the above cell

(c) (i) Give three raw materials used in Biogas production

- (iii) Explain how biogas is produced from the above raw materials
- (iv) Name two major components of biogas
- (v) State two advantages of biogas production.

*End*