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CHEMISTRY
PAPER 1
July/August - 2009
Time: 2 Hours

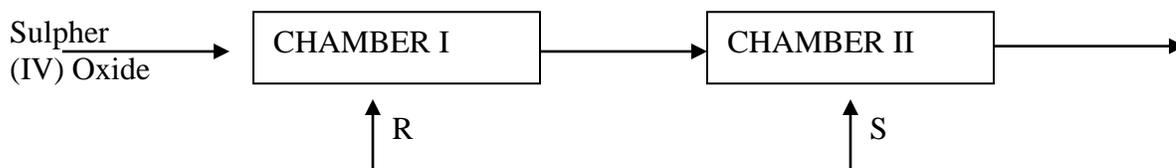
INTERZONAL

Kenya Certificate of secondary Education

CHEMISTRY
PAPER 1
(THEORY)
JULY/AUGUST - 2009
TIME 2 HOURS

1. A mixture of calcium hydroxide and ammonium chloride was heated to produce gas P
 - (a) Identify gas P (1 mark)
 - (b) Write the equation for the reaction that produces gas P (1 mark)
 - (c) Draw a diagram to show a method that can be used to collect gas P (1 mark)

2. The chart below shows the last stages in the manufacture of sulphuric acid using the contact process.



- (a) Identify substances R and S (2 marks)
- (b) Write an equation for the reaction taking place in chamber II (1 mark)

3. Nitric (V) acid reacts with copper (II) Oxide according to the equation below
$$\text{CuO}_{(s)} + 2\text{HNO}_{3(aq)} \rightarrow \text{Cu}(\text{NO}_3)_2 \text{ aq} + \text{H}_2\text{O}_{(l)}$$

0.5 of impure copper (II) oxide reacted with 50cm³ of 0.10M nitric (V) acid.
Calculate the percentage of the copper(II) oxide in the impure sample assuming
that impurities did not react with the acid
(Cu = 64, O = 16, N = 14, H = 1) (2 marks)

4. Name the method that can be used to extract the following
(a) Common salt from a salt solution (1 mark)

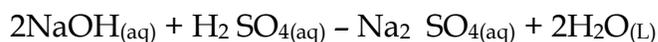
(b) paraffin from crude oil (1 mark)

5. Gas W was prepared by reacting Zinc metal with dilute sulphuric (VI) acid.
When gas W was burned in air, a colourless liquid X was produced
(a) Identify substances W and X
(b) Write an equation for the reaction when gas W burned in air (2 marks)

6. Draw the structural formulae of the following compounds
(a) 2 - methyl propane (1 mark)
(b) 2,3 - dimethylpentane (1 mark)
(c) But-2 - ene (1 mark)

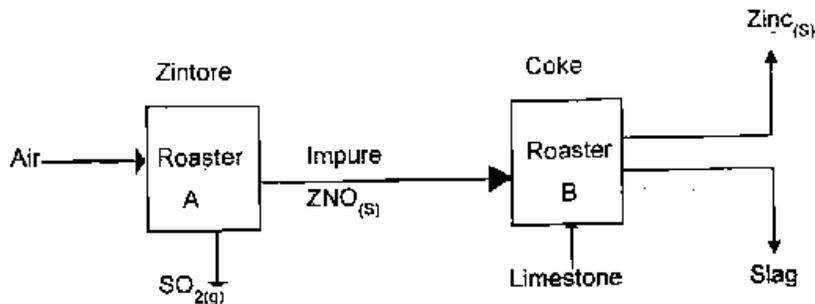
7. Zinc metal conducts electricity whereas zinc chloride does not explain
(2 marks)

8. Sodium hydroxide solution and dilute sulphuric (II) acid react
according to the following equation



- (a) Write an ionic equation for the reaction (1 mark)
(b) Giving a reason, identify the oxidation and the
reducing species from (a) above (2 marks)
9. Gas 4 was prepared by reacting concentrated hydrochloric acid with potassium
manganate III crystals. Gas Y then passed into a solution of potassium iodide.
(a) Identify gas Y (1 mark)
(b) Using equations (s), explain the observation made when gas 4 was
passed into the solution of potassium iodide (2 marks)

10. The flow chart below shows processes involved in extraction of zinc metal. Study it and answer the questions that follow.



- (a) Name the main ore used in the extraction of Zinc (1 mark)
- (b) Write an equation for the reaction that takes place in roaster S (1 mark)
- (c) What is the function of the limestone in roaster B (1 mark)
11. 6 g of iron reacted with hydrogen chloride gas to form iron (II) chloride at S.T.P calculate the volume of the hydrogen chloride gas used (fe = 56; molar volume o gas at s.T.P = 22.4dm³) (3 marks)
12. A compound was found to contain 48.7% carbon, 8.1% hydrogen while the rest was oxygen by mass. If the relative molecular mass of the compound is 148, determine its molecular formula. (C= 12, H = 1, O=16) (3 marks)
13. Atmospheric air contains 21% of oxygen by volume. Calculate the amount of atmospheric air that contain 14cm³ of oxygen (3 marks)
14. Thorium $\left(\begin{matrix} 228 \\ 90 \end{matrix} \text{Th} \right)$ undergoes radioactive decay by emitting two beta particles to form nuclide B. B undergoes radioactive decay by emitting three alpha particles to form nuclide C. Write nuclear equations to show the formation of nuclides B and C (2 marks)

15. The table below shows the atomic numbers of elements T,U,V and W.

Element	T	U	V	W
Atomic No	13	16	17	20

(a) What type of bond would be formed between
(i) Elements U and W? (1 mark)

(ii) Elements V and W? (1 mark)

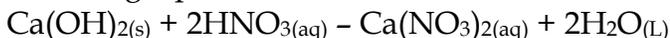
(b) Which of the element are metals (2 marks)

16. Iron pyrite, an iron ore, was roasted in air to give iron (III) oxide and gas W which turns dichromate (VI) solution from orange to green

(a) Identify gas W (1 mark)

(b) Write a chemical equation to show the reaction between gas W and aqueous sodium hydroxide (2 marks)

17. 20cm³ of 0.2 nitric (V) acid react with Ca(OH)₂ to produce a salt according to the following equation

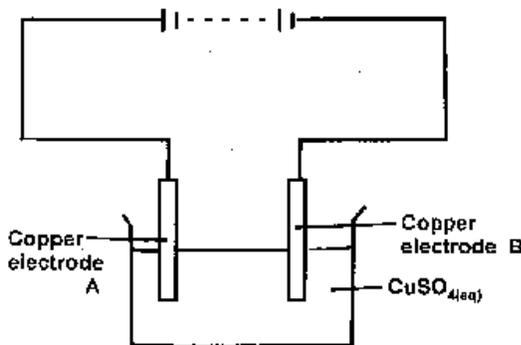


(a) What is the name given to the type of the reaction above (1 mark)

(b) Calculate the number of moles of Ca(OH)₂ that reacted with 20 cm³ of nitric (V) acid (2 marks)

18. Methane diffuse through a porous material at the rate of 8cm³ S⁻¹ Calculate the rate at which gas P, with a molecular mass of 28. 44g will diffuse through the same material (C = 12, H = 1) (3 marks)

19. The diagram below shows electrolysis of copper (II) sulphate copper electrodes



(a) Which electrode loses mass and what is its polarity (1 mark)

(c) What happens to the concentration of copper (II) sulphate electrolyte with time Explain (1 mark)

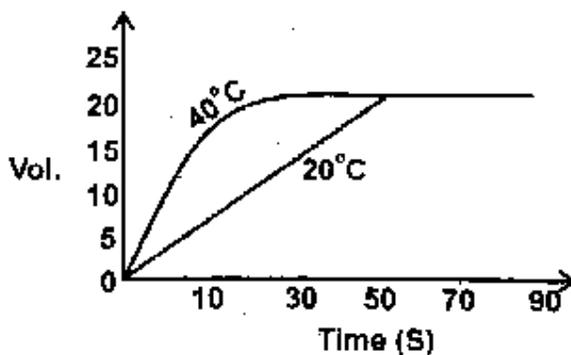
(c) Write down the equation for the reaction taking place at the cathode (1 mark)

20. In an experiment students mixed solutions of Na_2SO_4 , KCl and Na_2CO_3 with solutions containing Zinc ions and then the solution containing Pb^{2+} ions. The results were recorded as shown below.

	Pb^{2+}	Zn^{2+}
Na_2SO_4		
KCl		
Na_2CO_3		

Complete the table by putting a tick () where a precipitate was formed and a cross () where no precipitate was formed. (3 marks)

21. Metal X was reacted with dilute HCl at 20° . The volume of the hydrogen gas liberated was recorded at 30 second intervals. Below is graph of the volume of hydrogen gas evolved against time.



(a) On the same axes, sketch the curve that would be obtained if the experiment was repeated at 40°C . (1 mark)

(b) Calculate the number of moles of hydrogen gas produced (Molar Volume of gas = 24 dm^3) (2 marks)

22. 4 g of methanol produce 98kj of heat on complete combustion

(a) Write an equation for the heat on complete combustion (1 mark)

- (b) Calculate the molar heat of combustion of methanol
(C = 12, H = 1, O = 16) (2 marks)

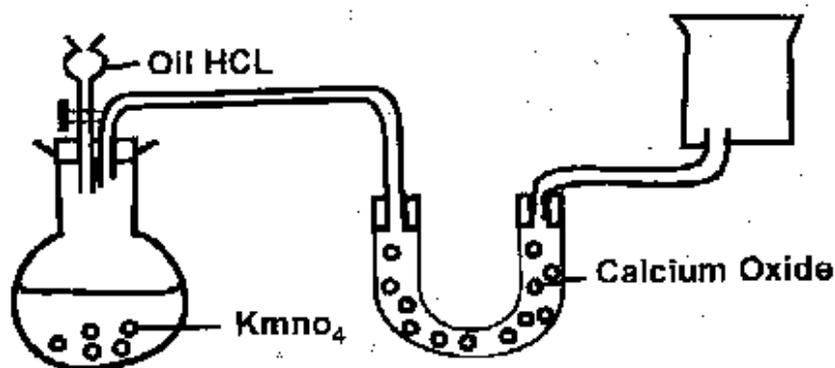
23. A fixed mass of an ideal gas occupies 200cm^3 at a pressure of 740 mmHg
 (a) State Charles law for an ideal gas (1 mark)
 (b) Calculate the volume of the gas 770 mmHg pressure (2 marks)

24. The table below shows some solutions and their P^{H} values

Solution	P^{H} Value
P	1.5
Q	6.0
R	14.0

- Classify the solutions as either strong base, week base, weak acid or strong acid. (3 marks)

25. The set up below was used by students to collect dry chlorine gas



- (a) Identify with reasons, two faults in the set up
 (b) Give another reagent that can be used in the place of potassium manganate (3 marks)
26. When excess Zinc powder is added to 30cm^3 of solution containing copper(II) ions and the mixture stirred, the temperature is noted to have risen by 15°C .
 (a) State the observation made after stirring the mixture (1 mark)
 (b) Calculate the heat change for the reaction (2 marks)

(Specific heat of $\text{H}_2\text{O} = 4.2\text{kJ kg}^{-1}$)

27. Explain why sea water is not suitable for washing clothes (2marks)
28. A compound with a molecular mass of 58 has empirical formula as C_2H_5
(a) Find its molecular formula (2 marks)
(b) Give the IUPAC names of two compounds that the molecular formula as (a) above (C=12.0 H=1.0)