

Name .....

Index Number .....

School .....

Candidate's Signature .....

233/1

Date .....

**CHEMISTRY**

**Paper 1**

**2015**

2 hours

**MAKUENI COUNTY KCSE 2015 PREPARATORY EXAMINATION**

**Kenya Certificate of Secondary Education**

**CHEMISTRY**

**Paper 1**

2 hours

**Instructions to Candidates**

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) Answer all the questions in the spaces provided in this question paper.
- (d) KNEC Mathematical tables and silent electronic calculators may be used.
- (e) All working **must** be clearly shown where necessary.
- (f) **This paper consists of 14 printed pages.**
- (g) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (h) **Candidates should answer the questions in English.**

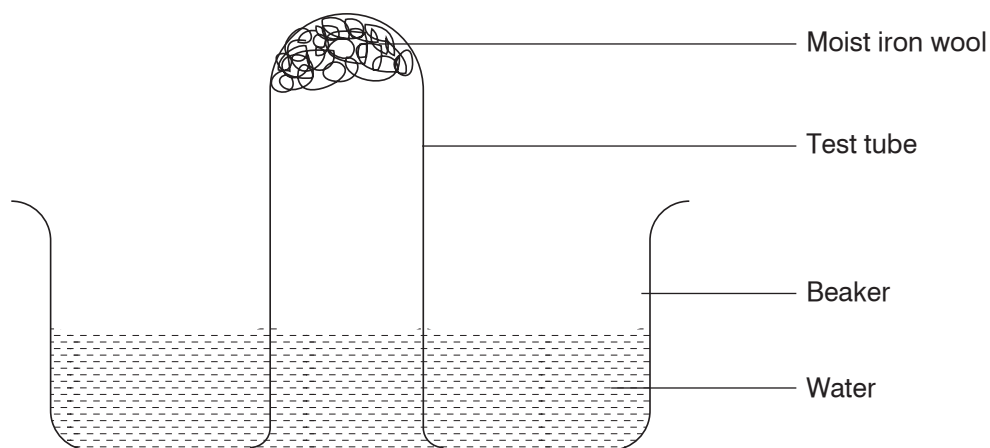
**For Examiner's Use Only**

Questions	Maximum Score	Candidate's Score
1 - 29	80	

*Sponsored by H.E. Prof. Kivutha Kibwana, Governor, Makueni County.*

TURN OVER

1. Ndawa set up an experiment as shown in the diagram.



State and explain two observations that would be made at the end of the experiment. (2 marks)

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2. (a) What is the relationship between the rate of diffusion of a gas and its molecular mass? (1 mark)

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(b) A sample of carbon (IV) oxide takes 200 seconds to diffuse across a porous plug. How long will it take the same amount of carbon (II) oxide to diffuse through the same plug? (C=12, O=16) (2 marks)

3. Below is a table showing the solubilities of salts Q and R at different temperatures.

Temperature (°C)		0	10	20	30	40	50
Solubilities in grams per 100 g of water	Salt Q	3.0	5.0	7.4	10.0	14.0	19.0
	Salt R	15.0	17.0	20.7	25.7	28.7	33.0

(a) Define the term “solubility of salt”. (1 mark)

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(b) If both salts Q and R are present in 100 cm<sup>3</sup> of saturated solution at 50°C, what will be the total mass of crystals formed if the solution was cooled to 20°C? (2 marks)

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4. Study the table below and answer the question that follows.

Compound	Hexane	Ethanol	Water
Density, g/cm <sup>3</sup>	0.66	0.79	1.00

Hexane and ethanol are miscible liquids. Explain how a mixture of hexane and ethanol can be separated. (3 marks)

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5. A bee-keeper found that when stung by a bee, application of a little solution of sodium hydrogencarbonate helped to retrieve the irritation of the affected area. Explain. (2 marks)

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6. Substances **A** and **B** are represented by the formulae **ROH** and **RCOOH**, respectively. They belong to two different homologous series of organic compounds. If both **A** and **B** react with potassium metal:

(a) name the common product produced by both. (1 mark)

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(b) state the observation made when each of the samples **A** and **B** are reacted with sodium hydrogen-carbonate.

(i) **A** (1 mark)

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(ii) **B** (1 mark)

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7. (a) Name the property of concentrated sulphuric (VI) acid illustrated by its action on:

(i) sugar. (1 mark)

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(ii) sodium chloride. (1 mark)

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(b) Write the equation for the reaction of concentrated sulphuric (VI) acid with sodium chloride. (1 mark)

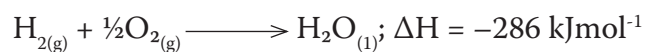
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8. (a) Half-life of a radioactive element is 30 days. Calculate the time required for its activity to drop from 4 800 counts per minute to 300 counts per minute. (2 marks)

(b) State one use of radioactive isotopes in the paper industry. (1 mark)

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9. Using the heats of combustion of the following substances, calculate the heat of formation of ethanol. (3 marks)



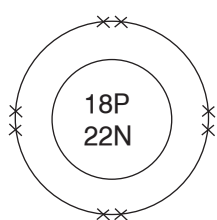
10. Below are structures of particles. Use them to answer the questions that follow. In each case, only electrons in the outermost energy level are shown.

**Key**

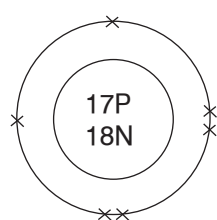
P = Proton

N = Neutron

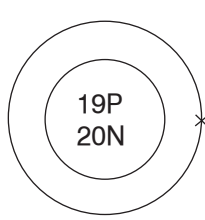
X = Electron



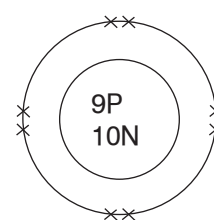
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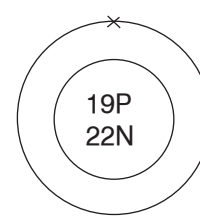
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Z

- (a) Identify the particle which is an anion.

(1 mark)

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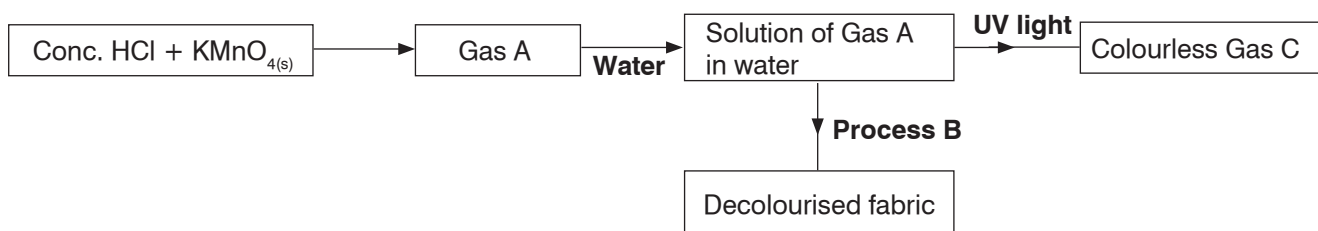
- (b) Choose a pair of isotopes. Give a reason.

(2 marks)

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11. Study the flow chart below and use it to answer the questions that follow.



(a) Name gas A. (1 mark)

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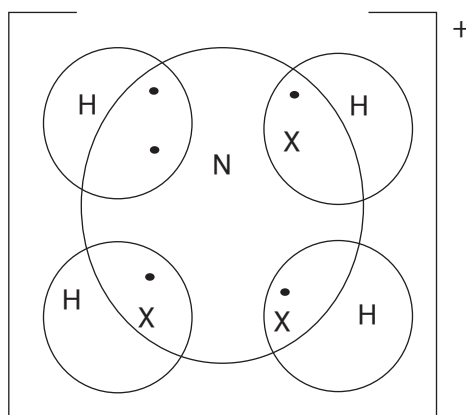
(b) Identify process B. (1 mark)

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(c) Write an equation for the formation of gas C. (1 mark)

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12. Below is a dot (•) and cross (x) diagram of a particle.



Identify the bond types in the diagram. (2 marks)

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13. A strip of copper metal was immersed into a nitrate solution of metal Q overnight. Use the information below to answer the questions that follow.

	$E^\circ$ Volts
$Q^+_{(aq)} + e^- \longrightarrow Q_{(s)}$	+0.80
$Cu^{2+}_{(aq)} + 2e^- \longrightarrow Cu_{(s)}$	+0.34

- (a) State the observations made at the end of the experiment. (1 mark)

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- (b) Give a reason for the observations made in (a) above. (1 mark)

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- (c) Calculate the emf of the cell above. (1 mark)

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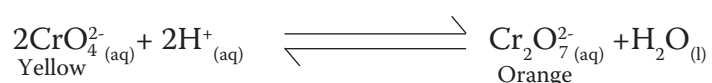
14. (a) State Le Chatelier's principle. (1 mark)

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- (b) An equilibrium reaction is represented by the following equation:



State and explain the observation made when sodium hydroxide solution is added to the mixture at equilibrium. (2 marks)

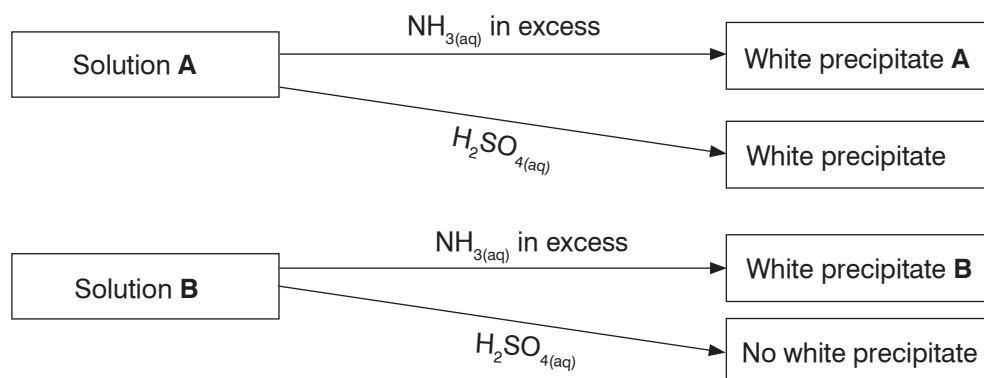
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15. Study the flow charts below and use them to answer the questions that follow.



(a) Identify possible cations present in:

(i) solution **A**.

(½ mark)

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(ii) solution **B**.

(½ mark)

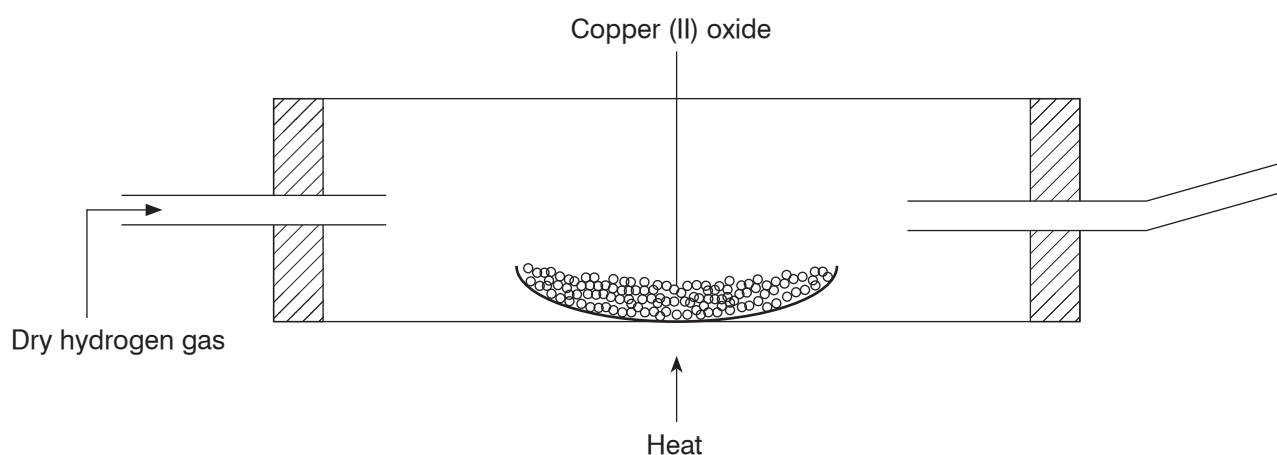
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(b) State and explain the observations made when a sample of dry white precipitate **B** is heated in a test tube. (2 marks)

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**16.** In the experiment, hydrogen gas was passed over heated copper (II) oxide as shown.



(a) State the observations made in the combustion tube after the experiment. (1 mark)

(1 mark)

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(b) Name two other gases that would react with copper (II) oxide like hydrogen gas.

(i) ..... (1 mark)

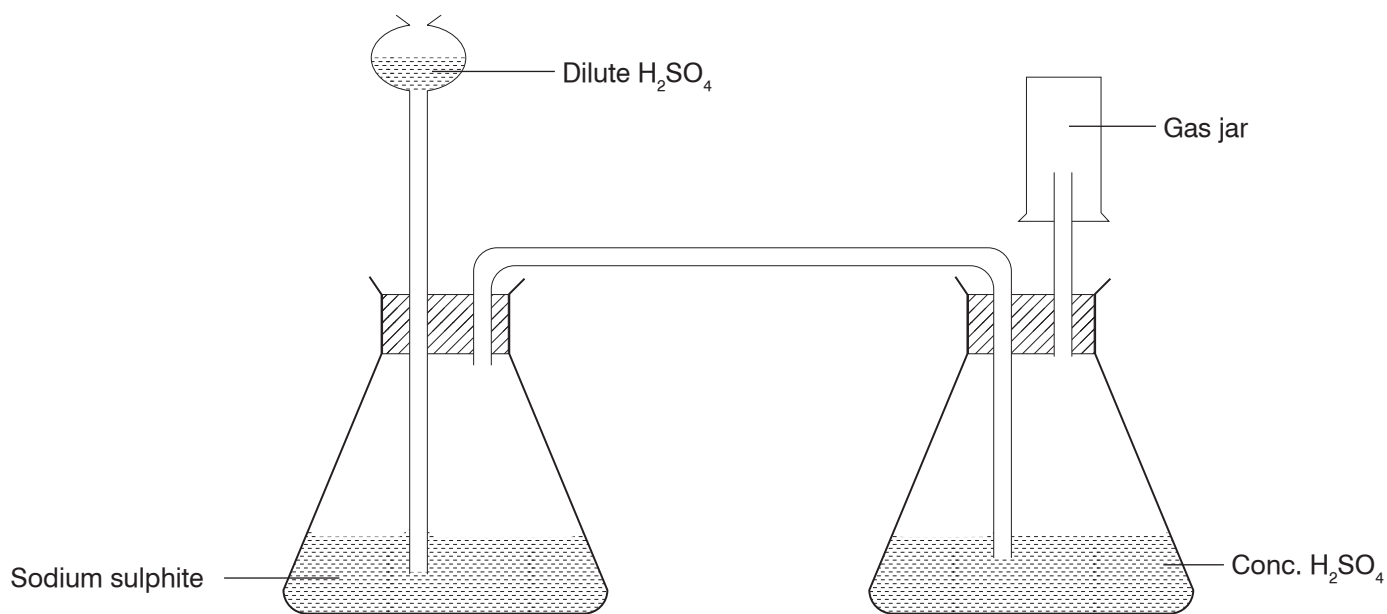
(1 mark)

(ii) ..... (1 mark)

(1 mark)



17. The set-up is used to prepare dry sulphur (IV) oxide in the laboratory. Answer the questions that follow.



(a) Identify the mistake in the set-up. (1 mark)

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(b) Write an equation for the reaction in the set-up. (1 mark)

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(c) State how the polluting effects of the gas on the environment can be controlled. (1 mark)

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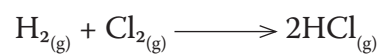
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18. Calculate the number of nitrate ions in 25 cm<sup>3</sup> of 2 M aluminium nitrate solution. (Avogadro's no. 6.0 × 10<sup>23</sup> per mole) (3 marks)

19. The table below gives bond energies for three covalent bonds.

Bond	Bond energy (kJmol <sup>-1</sup> )
H – H	435
Cl – Cl	240
H – Cl	430

(a) Calculate the energy change for the following reaction:

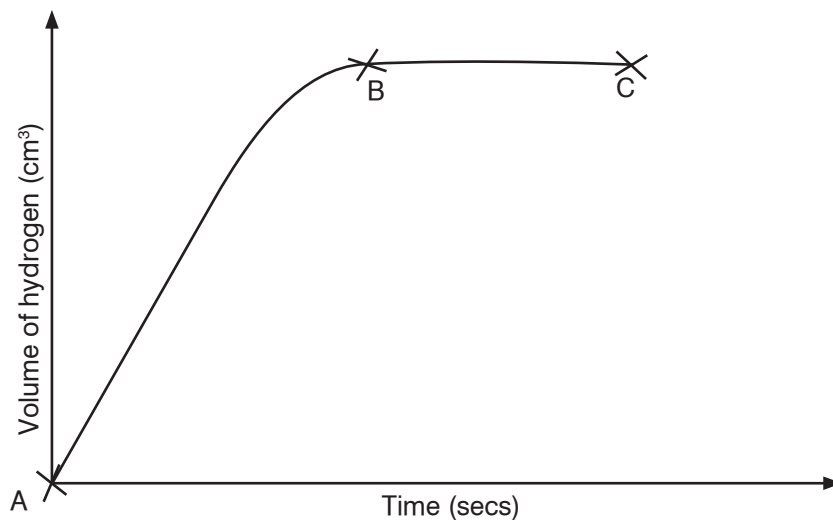


(1 mark)

(b) Sketch an energy level diagram for the reaction in (a) above.

(2 marks)

20. The sketch was obtained when 2 g of magnesium was reacted with excess of 2M hydrochloric acid. The volume of hydrogen was then plotted against time as shown below.



- (a) On the same axis, plot the graph that would be obtained if 1M hydrochloric acid was used instead of 2M hydrochloric acid. Explain. (1 mark)

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- (b) Explain the significance of the flat portion **BC** of the curve. (1 mark)

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21. Starting with magnesium oxide, describe how a sample of magnesium hydroxide can be prepared. (3 marks)

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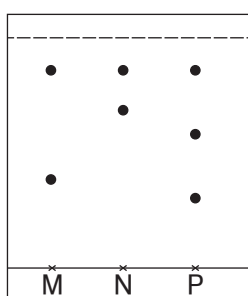
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22. The spots in the diagram below represent a paper chromatogram for three brands of soda suspected to contain unwanted food additives.



Brands of soda

The results showed the presence of unwanted food additives in **N** and **P** only on the chromatogram.

- (a) Label solvent front and base line. (2 marks)

(b) State one use of chromatography.

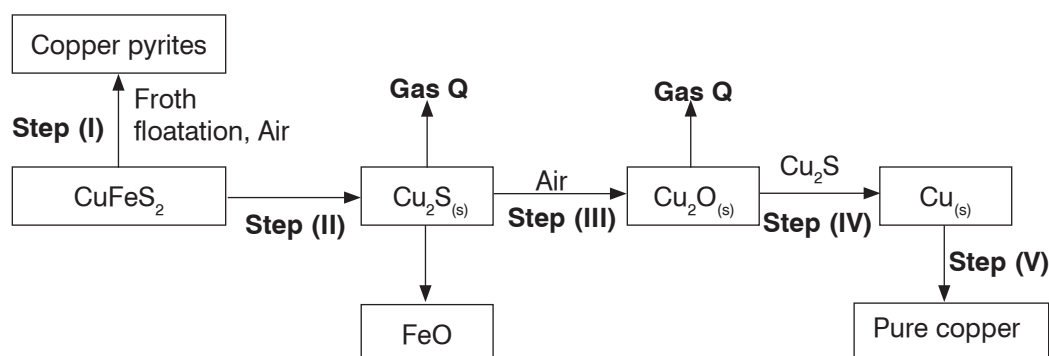
(1 mark)

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23. When blue litmus paper is dipped in a solution of aluminium chloride it turns red. Explain. (2 marks)

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24. Study the flow chart below and answer the questions that follow.



(a) Name gas Q.

(1 mark)

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(b) With the help of a diagram, describe how step (V) is carried out.

(2 marks)

25. Use the information given below to answer the questions that follow.

Solution	G	H	I	J	K
pH	1.5	6.5	13.0	7.0	8.0

(a) Which of the solutions would be used to relieve a stomach upset caused by indigestion? (1 mark)

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(b) Which solution is likely to be:

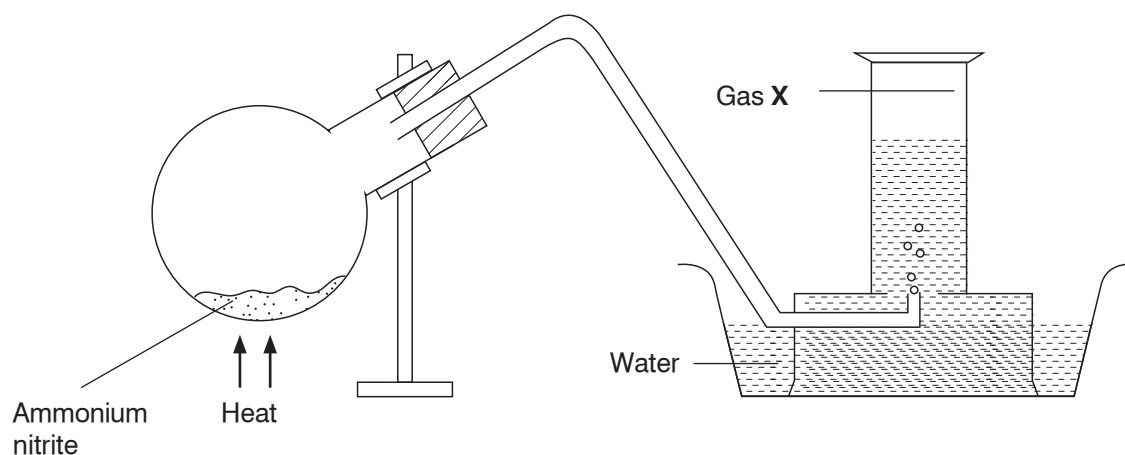
(i) dilute sulphuric acid? (½ mark)

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(ii) sodium hydroxide solution? (½ mark)

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26. The diagram below is used in preparation of a gas in the laboratory. Answer the questions that follow.



(a) Name gas X. (1 mark)

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(b) State one physical property which makes it possible for the gas to be collected as shown. (1 mark)

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(c) State one commercial use of gas X. (1 mark)

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27. Carbon (IV) oxide is prepared in the laboratory through reacting marble chips and dilute hydrochloric acid.

- (a) Write a balanced chemical equation for this reaction. (1 mark)

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- (b) Explain why dilute sulphuric (VI) acid cannot be used instead of dilute hydrochloric acid. (1 mark)

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- (c) When carbon (IV) oxide was passed over heated solid X, a colourless neutral gas Y was formed. Identify solid X and gas Y.

Solid X (½ mark)

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Gas Y (½ mark)

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28. (a) State Gay-Lussac's Law. (1 mark)

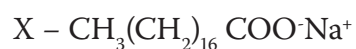
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- (b) 10 cm<sup>3</sup> of carbon (II) oxide gas was exploded with 20 cm<sup>3</sup> of oxygen gas under the same conditions of temperature and pressure. Calculate the volume of the residual gas. (2 marks)

29. (a) Which of the following cleaning agents is the best in water containing magnesium sulphate? Explain. (1 mark)



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- (b) Give one advantage of using hard water for domestic use. (1 mark)

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