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Total Score

Name.....

School.....

Roll No.....

Republic of Somaliland

Somaliland National Examination Board

Form Four

Chemistry Examination

June 2009

TIME 2 HOURS

Plus 10 minutes for reading through the paper

INSTRUCTIONS TO CANDIDATES

This paper consists of 18 printed pages

Count them now. Inform the invigilator if there are any missing

There are three parts:

PART 1:	20 Multiple Choice Questions	20 Marks
PART 2:	7 Structured Questions	70 Marks
PART 3:	1 Extended Question	10 Marks
	TOTAL	100 Marks

- Answer all questions in part 1 and 2 and one in part 3.
- No extra paper is allowed

PART 1: MULTIPLE CHOICE QUESTIONS (20 MARKS)

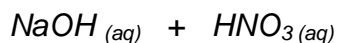
Instructions for this section:

- Answer all questions in this section.
- For each question in this section, circle the correct answer.

1. Atoms can form ions with a single negative charge. To do this the atom must,

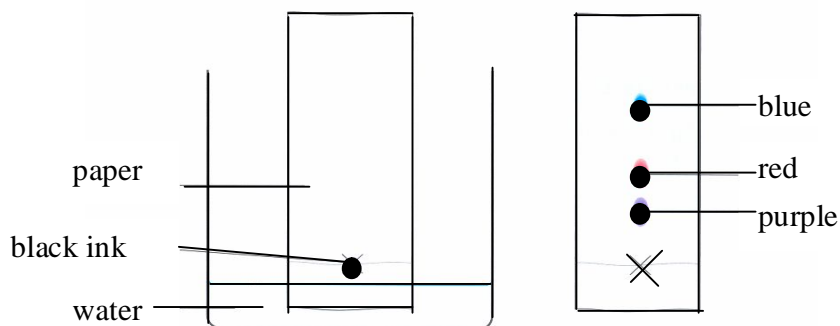
- A gain a proton
- B gain an electron
- C loose a proton
- D loose an electron.

2. What are the products of the following reaction?



- A Salt and water.
- B Hydrogen and salt.
- C Water only.
- D Hydrogen, water and salt.

3. Identify the following experimental technique.



- A Evaporation
- B Chromatography
- C Distillation
- D Filtration

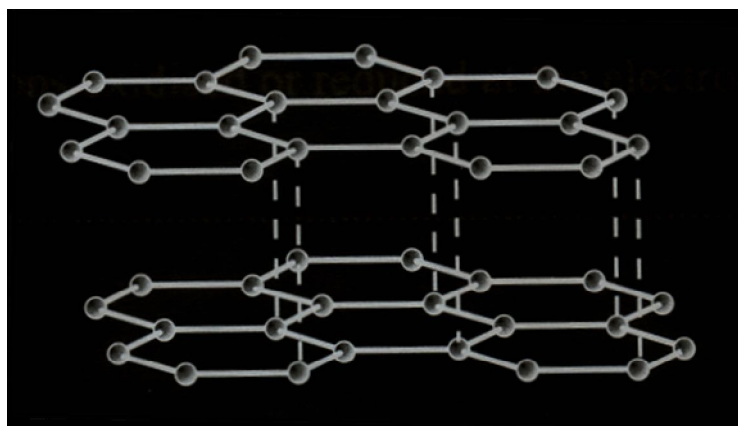
4. When salt is added to water, a solution is formed as shown in the diagram below.



What term is used to describe the water?

- A Solid
 - B Solute
 - C Solvent
 - D Solution
5. Which of the following is **NOT** a natural polymer?
- A Protein
 - B Cellulose
 - C Rubber
 - D Nylon
6. Element P is in group one and period 3 of periodic table. What is its configuration?
- A 2 : 8 : 1
 - B 2 : 8 : 8 : 1
 - C 2 : 8 : 8 : 2
 - D 2 : 1
7. Which of the following is the odd one out?
- A Bromine
 - B Chloride
 - C Fluorine
 - D Helium

8. Calculate the number of moles of carbon atom contained in 6 grams. **(C=12)**
- A 0.5
 - B 72
 - C 5.0
 - D 120.0
9. What type of bond occurs when there is sharing of a pair of electrons?
- A Ionic bond
 - B Metallic bond
 - C Hydrogen bond
 - D Covalent bond
10. In which of the following is hydrogen **NOT** used?
- A Manufacture of ammonia
 - B Manufacture of hydrochloric acid
 - C Coolant and heat exchanger in different manufacturing processes
 - D Manufacture of margarine
11. The diagram below shows one of the main allotropes of carbon. Identify it.

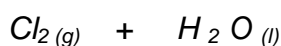


- A Graphite
- B Diamond
- C Sulphur
- D Copper

12. A pure substance that cannot be chemically decomposed is called?

- A A compound
- B An isotope
- C An element
- D A mixture

13. What are the major products of the following reaction?



- A $\text{HCl}_{(aq)}$ + Dye + Oxygen
- B $\text{HCl}_{(aq)}$ acid only
- C $\text{HCl}_{(aq)}$ + $\text{HOCl}_{(aq)}$
- D $\text{HOCl} + \text{H}_2\text{O}$

14. Iron is extracted from

- A Bauxite
- B Haematite
- C Pyrite
- D Anglesite.

15. What is an isotope?

- A Atoms of same element with same atomic number but different mass number
- B Element with the same mass number
- C Element existing in two or more different forms in the same physical state
- D Element with the different atomic number.

16. Which of the following methods is **NOT** used to remove water hardness?

- A Boiling.
- B Distillation.
- C Filtration.
- D Addition of washing soda.

17. Which of the following methods **CANNOT** be used to prevent rusting?

- A Electroplating
- B Oxidizing in the presence of moisture
- C Galvanizing
- D Painting

18. An ion bond is always formed with some covalent character, when

- A the electrons are not equally shared
- B there is a degree of electron transfer
- C the electron transfer is complete
- D there is a degree of electron sharing

19. Washing powders have the following molecule to remove oil stains.



What does the term hydrophilic mean?

- A Waterless
- B Water liking
- C Water hating
- D water full

20. The symbol for an ion of oxygen is represented as:

- A. O^-
- B. O^{2-}
- C. O_2
- D. O^{2+}

PART 2

Question 1

(7 marks)

The grid below represents part of the periodic table. Use it to answer the questions that follow. The letters do not represent the actual symbols of elements.

					D		
	A					E	
G					F		

i. Which element belongs to the group of alkaline earth metals? (1mark)

.....

ii. Which element is a noble gas (1mark)

.....

iii. Element Q has atomic number 15. Mark its position on the grid. (1mark)

iv. What is formed when elements D and F react with metals? (1mark)

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v. Explain how the atomic radii of A and C compare. (2 mark)

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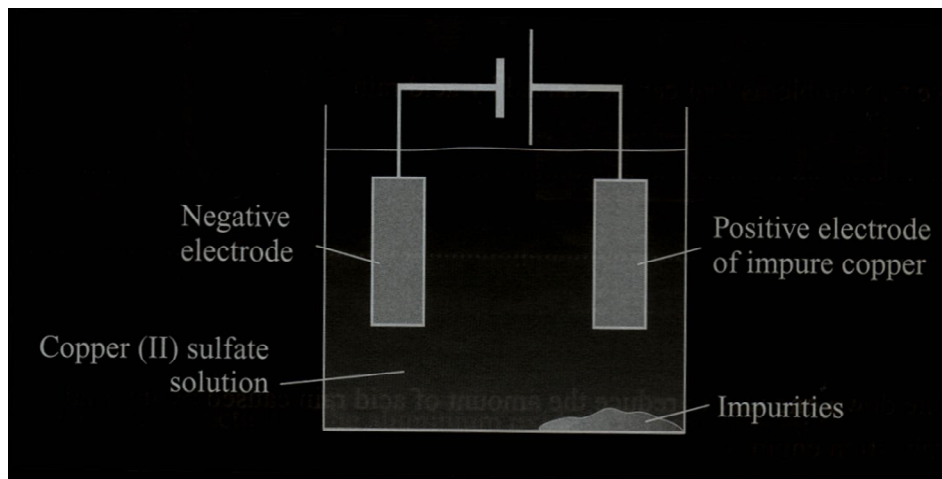
vi. Write down the formula of the compound formed between G and F. (1mark)

.....

Question 2

(7 marks)

a) Copper can be purified using electricity as follows;



i. By what process is copper normally extracted from its ore? (1 mark)

.....

ii. What is the name given to the electrical process by which copper is purified? (1mark)

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iii. State two other applications of the process in (ii) above. (2 marks)

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.....

iv. Give one advantage of using purified copper instead of impure copper. (1mark)

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b) Magnesium sulphate solution was electrolyzed using platinum electrodes. Give the products at the cathode and anode. (2 marks)

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Question 3

(10 marks)

a) The table below shows the composition of the mixture of the gases coming from a typical car exhaust.

Gas	% of the gas in the exhaust fume
Carbon dioxide.	9
Carbon monoxide	5
Oxygen	4
Hydrogen	2
Hydrocarbons	0.2
Nitrogen oxide	0.2
Sulphur dioxide	Less than 0.008
Gas X	79.6

i. State the name of the gas X (1mark)

.....

ii. Complete the word equation for the complete combustion of Octane. (2 marks)

Octane + Oxygen \longrightarrow

iii. Which two chemical elements are present in hydrocarbons? (2 marks)

.....

iv. To which homologous series of hydrocarbons does octane belong? (1mark)

.....

b) Compound W is a saturated hydrocarbon. Its composition by mass is known to be: **C= 85.72** and **H =14.28**. Calculate the empirical formula of compound W.

(4 marks)

.....

Question 4

(10 marks)

a) Define Boyle's law

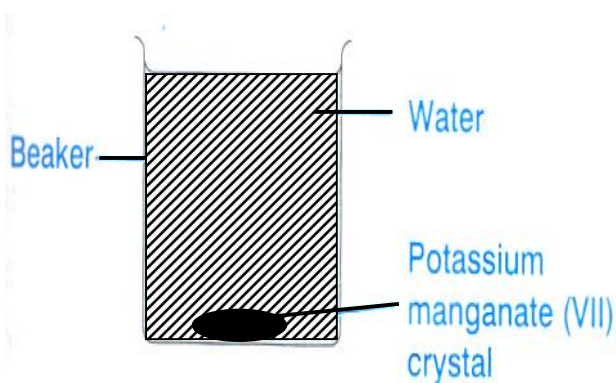
(2 marks)

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b) A certain gas occupies 5 dm^3 at 24°C and 15 cm Hg . Calculate the pressure of the gas if the volume is halved and the temperature is raised to 200°C . (4 marks)

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c) A crystal of potassium manganate (VII) was carefully dropped into a beaker containing water, as shown below.



i. Explain what will be observed after ten (10) minutes. (2 marks)

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ii. Explain why the process above is faster in a vacuum than in air. (2 marks)

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Question 5 (12 marks)

a) Name the method you would use in each case to separate the following mixtures:

i. A solution of water and ethanol (1 mark)

.....

ii. Sugar solution (1 mark)

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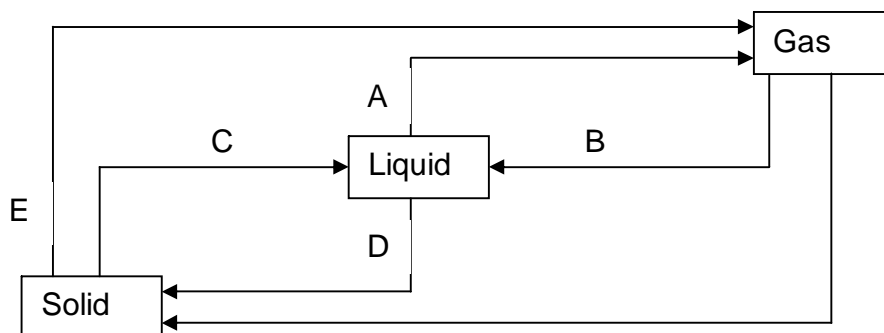
iii. An immiscible mixture of oil and ethanol (1 mark)

.....

iv. Mixture of sand and water (1 mark)

.....

b) The following diagram shows the effects of heat on the physical state of a substance.



i. Identify the processes represented by letters A, B, C, D and E. (5 marks)

- A
- B
- C
- D
- E

c) From the list below

Sodium, Potassium, Sulphur Dioxide, Ammonia

i. Name the elements (1 mark)

.....

ii. Name the compounds (1 mark)

.....

iii. Write the chemical formulae for one gas in the list (1 mark)

.....

Question 6 (11 marks)

a) i. Why is chlorine added in water purification? (1 mark)

.....

ii. After chlorination, the water is acidic. A small amount of slaked lime is added to the acidic water. Explain why slaked lime is added. (2 marks)

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iii. Write down the chemical formula and the chemical name of slaked lime. (2 marks)

Chemical formula

Chemical name

b) (i) State the boiling point of water (1 mark)

(ii) Describe a chemical test for water (2 marks)

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(iii) State one use of water in the home (1 mark)

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c) Potassium reacts violently with water. Write a balanced chemical reaction of this reaction.

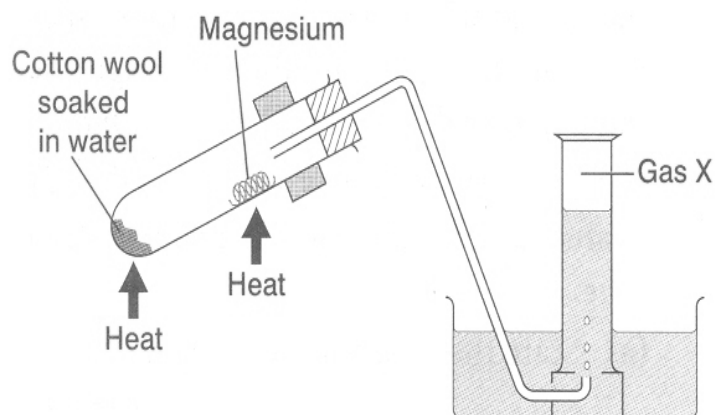
(2 marks)

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Question 7

(6 marks)

a) The set up in the diagram below shows a reaction between a magnesium ribbon and steam.



i. Identify gas X. (1 mark)

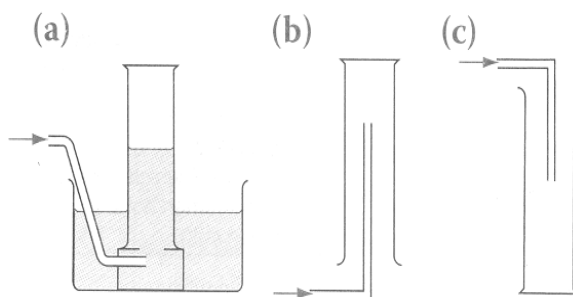
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ii. Name two physical properties of gas X. (2 marks)

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.....

b) The diagrams below show three methods of collecting gases in the laboratory.



Identify each method.

(3 marks)

(a).....

(b).....

(c).....

Question 8

(7 marks)

Solutions A, B, C and D have the pH values, shown in the table below.

Solutions	A	B	C	D
PH	3	7	6	13

a) Which solution is likely to be;

i. Rain water collected from an industrial area.

(1 mark)

.....

ii. Potassium chloride solution.

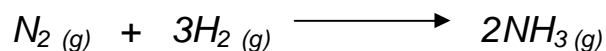
(1 mark)

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PART 3: EXTENDED QUESTION (10 MARKS)

Answer one question only

1. Ammonia gas is produced for commercial purposes in industry by the Haber process; see the equation.



The following two tables show the enthalpy change for reaction of making ammonia in the Industry.

Enthalpy change from bond breaks in the reactants;

Bonds	Bond enthalpy (Kj mol)	Number of bonds broken	Total enthalpy input (Kj mol)
$N \equiv N$	945	_____	945
$H - H$	436	3	_____
			2253

Enthalpy change from bond formed in the products;

Bonds	Bond enthalpy (Kj mol)	Number of bonds broken	Total enthalpy input (Kj mol)
$N - H$	391	_____	2346

a) i. Calculate the missing values and fill in the table.

(3 marks)

ii. Use the information in the above tables to calculate the total enthalpy change (Kj mol) of the reaction of formation of ammonia. (3 marks)

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.....iii. Is the reaction of making ammonia in industry exothermic or endothermic? (1 mark)

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b) i. Why is concentrated sulphuric (VI) acid a weaker acid than dilute sulphuric (VI) acid? (2 marks)

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ii. What is the catalyst used in the conversion of sulphur (IV) oxide to sulphur (VI) oxide in the Contact Process? (1 mark)

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OR

2. Sodium thiosulphate solution reacts with dilute hydrochloric acid according to the following equation:

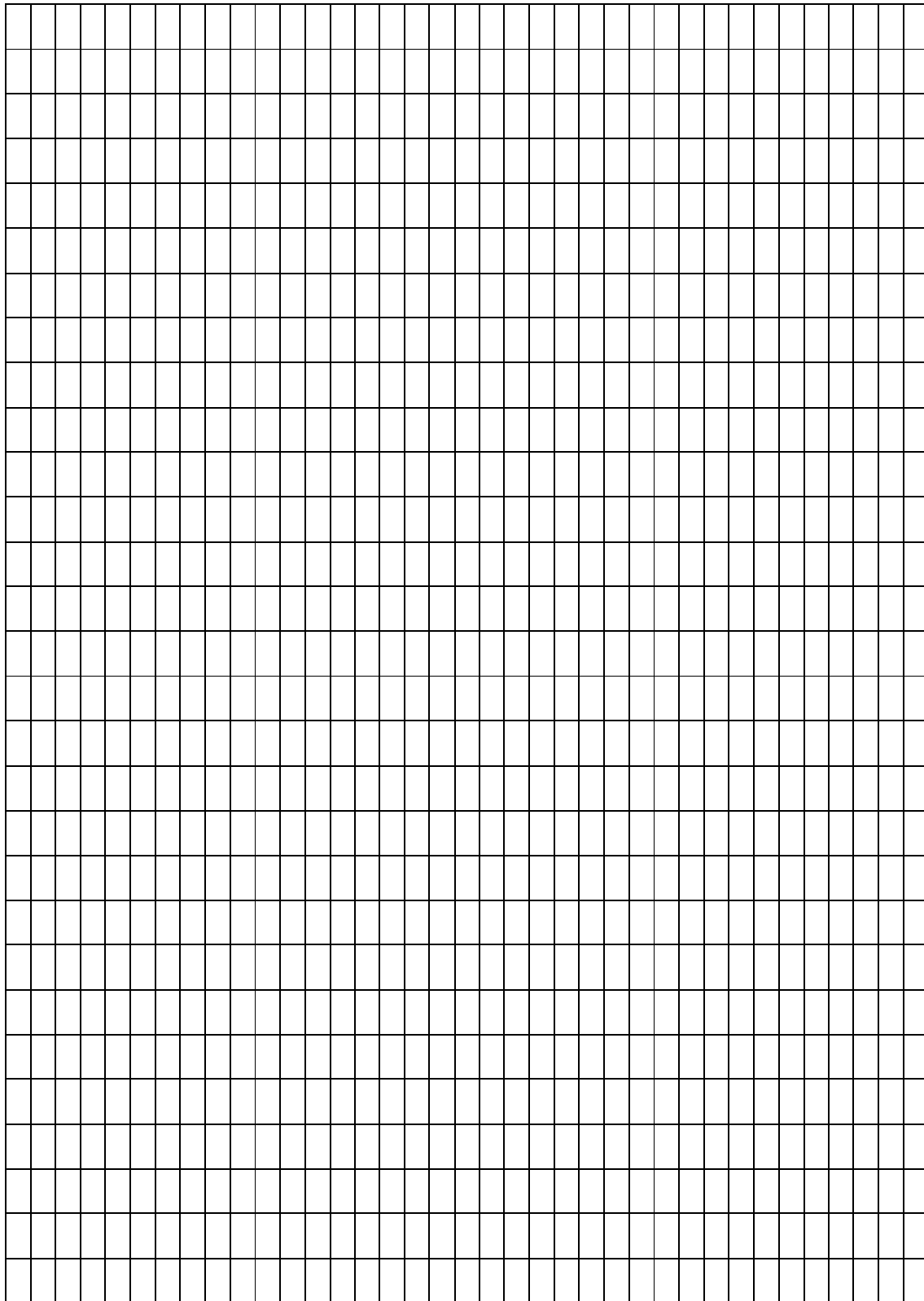


In an experiment to study how the rate of reaction varies with concentration, 10cm³ of 0.4M Sodium thiosulphate was mixed with 10cm³ of 2M Hydrochloric acid in the flask was then placed on a white paper marked with a cross (**x**).

The time taken for the cross to disappear when viewed from above was noted and recorded in the table below. The experiment was repeated three times at the same temperature using the volumes in the table and the results recorded are shown in the table below.

Experiment	Volume of 0.4m thiosulphate	Volume of water	Volume of HCl acid	Time
1	10	0	10	16
2	7.5	2.5	10	23
3	5.0	5.0	10	32
4	2.5	7.5	10	72

a) i. On the graph paper provided, plot a graph of the volume of thiosulphate (Vertical column) against time taken for the cross to disappear. (4 marks)



ii. From the graph, determine how long it took for the cross to disappear in experiment (1).
(1 mark)

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b) From the graph in a (i), what conclusion can be drawn on the relationship between concentration and rate of a reaction? (2 marks)

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c) i. State four the factors that influence the rate of a reaction. (2 marks)

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ii. Explain why the time taken for the cross to disappear becomes longer in experiment 4.
(1 mark)

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END