

Name.....

Index No...../.....

School.....

Candidates Signature.....

Date

233/2

CHEMISTRY

Paper 2

(Theory)

July/August 2009

2 Hours

KIRIMA JOINT EVALUATION TEST - 2009

Kenya Certificate of Secondary Education (K.C.S.E)

233/2

CHEMISTRY

Paper 2

(Theory)

July/August 2009

2 Hours

Instructions to candidates

- Answer **all** questions in the spaces provided
- Mathematical tables and electronic calculators may be used for calculations
- **All** working must be clearly shown where necessary

FOR EXAMINERS ONLY

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1	11	
2	16	
3	16	
4	15	
5	8	
6	14	
TOTAL SCORE	80	

This paper consists of 12 printed pages .Candidates should check the question paper to Ensure that all the pages are printed as indicated and no questions are missing

1. (a) Crude oil is a source of many compounds that contain carbon and hydrogen only.
- (i) Name the process used to separate the components of crude oil. (1mk)
-
-
- (ii) On what basis does separation occur (1mk)
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-
- (b) Under certain conditions, hexane can be converted to two products, one of them being butane.
- (i) Write the formula of the other product (1mk)
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-
- (ii) Describe a simple chemical test to show the differences between the two products formed in (b) above. (2mks)
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-
-
- (c) Ethyne is another compound found in crude oil. One mole of hydrogen chloride gas reacted with one mole of ethyne and a product P was formed. P was then reacted with excess hydrogen gas to form product Q.
- Draw the structure of P and Q (2mks)
- (d) Ethyne may be collected over water during preparation. Explain why this is possible. (1mk)
-
-

(e) (i) When one mole of ethyne is reacted with one mole of hydrogen, the product formed may undergo addition polymerization under suitable conditions. Write an equation for addition; polymerization of the product. (1mk)

.....

(ii) Give one disadvantage of the polymer in e(i) above (1mk)

.....

(f) State one commercial use of ethyne (1mk)

.....

2. The grid below represents part of the periodic table. Study it carefully and answer the questions that follow. (Letter do not represent the actual symbols of the elements)

				B			C
				D		E	
	F						
	G						

(a) Identify the family name to which elements F and G belong (1mk)

.....

(b) (i) Name the type of bond formed when C and F react. (1mk)

.....

(ii) Name two other types of chemical bonds (1mk)

.....

(c) Element D reacts with oxygen to form oxide of D. write the formula of the oxide (1mk)

(d) What type of oxide is formed in (c) above? (1mk)

.....

(e) Element X is in period 3 and forms an ion with the formula X^{3-} .

(i) Indicate its position on the grid (1mk)

(ii) Write the formula of its chloride (1mk)

(f) How many periods should be added to the grid to complete the periodic table? (1mk)

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.....

(g) (i) State two physical properties that copper and graphite share in common in relation to their structure and bonding. (2mks)

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.....

(ii) State two physical properties of simple molecular substances (2mks)

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.....

.....

(iii) Give one example of an element with a simple molecular structure and which is a simple molecular structure and which is a solid at room temperature. (1mk)

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(iv) Using water molecule as an example draw a simple diagram to explain the term “polar molecule”. (3mks)

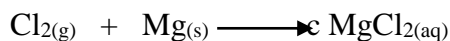
3. The standard electrode potentials for the elements chlorine and magnesium are:



- (a) (i) Which one of the two elements will act as an oxidizing agent? Explain your choice (1 ½ mks)

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- (ii) Calculate the electromotive force of a cell where the overall reaction is: (1mk)

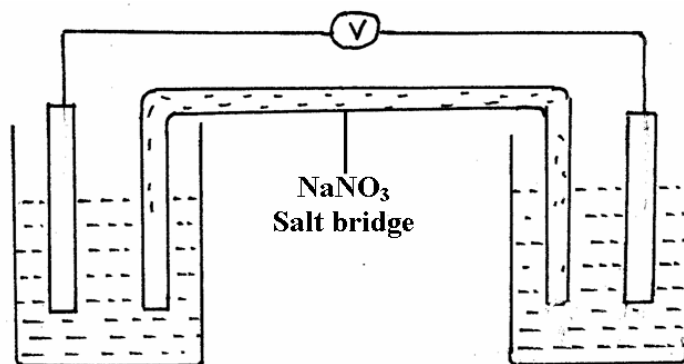


- (b) The table below gives the standard electrode potentials for divalent metals represented by the letters P, Q, R and S. (not their true element symbols). Use them to answer the questions that follow.

<u>Metals</u>	<u>E⁰ (volts)</u>
P	+1.50
Q	-0.44
R	+0.34
S	-0.76

- (i) Which one of the metals cannot be displaced from a solution of its ions by any of the other metals in the table. Explain (1 ½ mks)

- (ii) Metals P and Q were connected to a cell as shown in the diagram below.



- I. On the diagram, label the metals P and Q and indicate the ions in solutions. (2mks)

- II. Write half equations for the reactions taking place at the electrodes: (2mks)

P.....
 Q.....

III. State two functions of the salt bridge (1mk)

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.....

IV. What must be observed about the choice of the salt bridge? (1mk)

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V. Write a conventional representation of the cell. (1mk)

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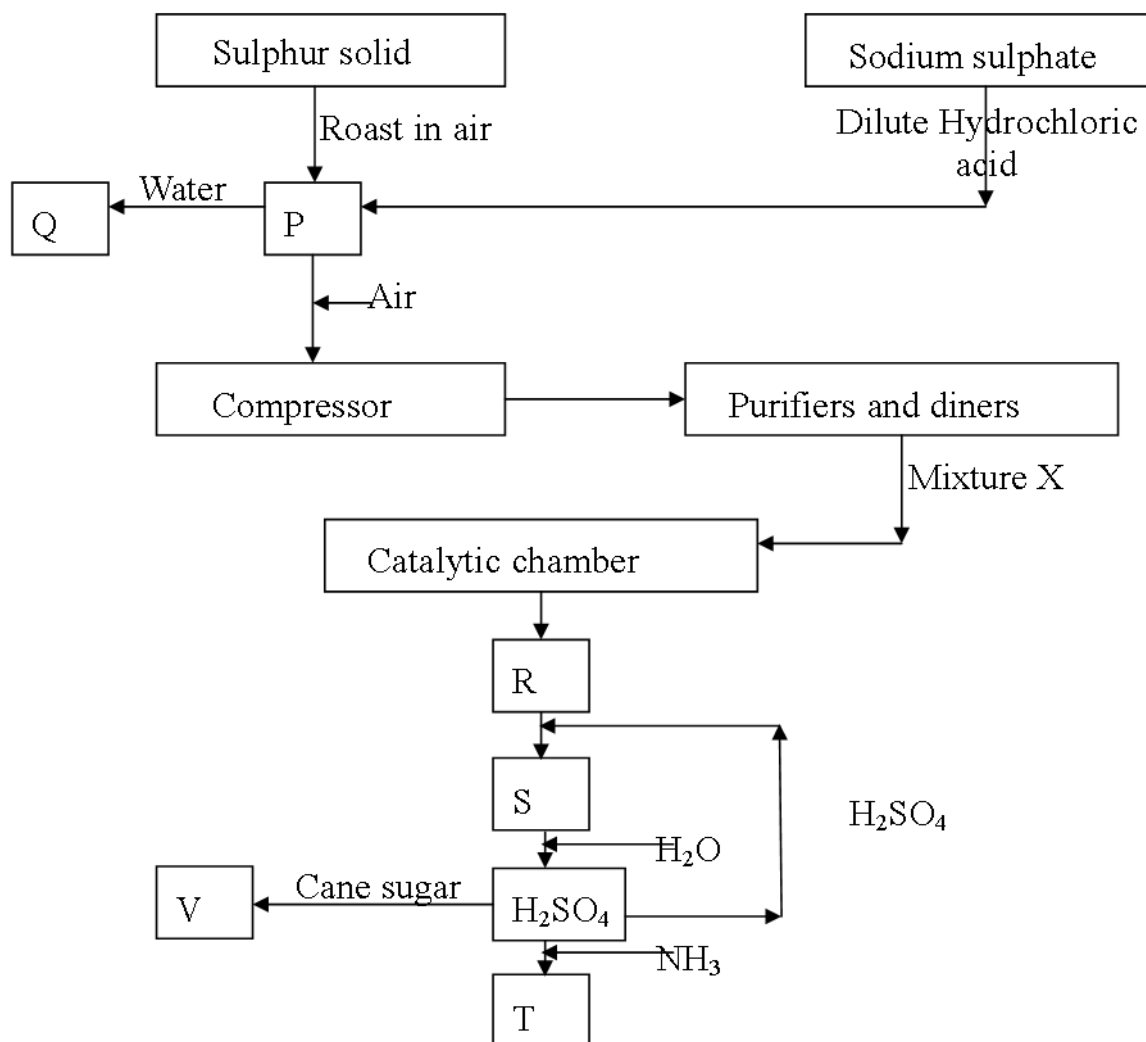
(iii) A metallic couple of the metal S and Z produced a voltage of +1.71V. (Assume that S has more negative Standard electrode potential)

I. Calculate the standard electrode potential (SEP) for metal Z (1mk)

II. Arrange the metals P, Q, R and Z in their decreasing order of reactivity (1mk)

(c) A nitrate solution of a certain metal x was electrolysed. 1.18g of metal x was deposited by a current of 4 amperes, flowing for 16 minutes. Determine the formula of the metal nitrate. (1F = 96,500, RAM X = 59) (3mks)

4. Below is a simplified diagram for the manufacture of sulphuric (VI) acid in large scale.



(a) Name the substances P, Q, R, S, T and V (3mks)

P..... S.....
 Q..... T.....
 R..... V.....

(b) (i) What is the use of the compressor? (1mk)

.....

(ii) What happens in the purification chamber? (1mk)

.....

(c) (i) State any two specific conditions for the formation of R (1mk)

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(ii) Write the chemical formula of the catalyst used in the catalytic chamber (1mk)

(iii) Write an equation for the formation of gases in the catalytic chamber (1mk)

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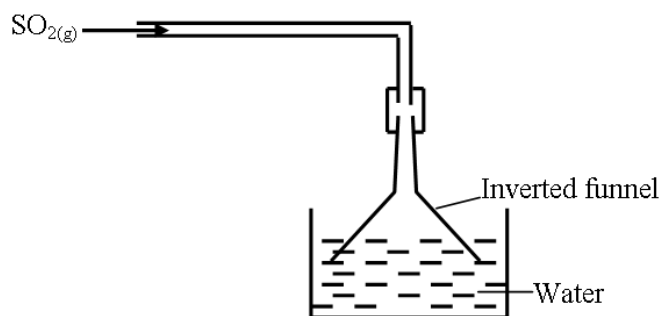
(d) Describe a chemical test to confirm the presence of P (1mk)

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.....

(e) One of the uses of sulphuric (VI) acid is 'pickling' metals. What does the term 'pickling' mean? (1mk)

.....
.....

(f) The following diagram represents the method of preparing sulphur (VI) oxide solution.



(i) Why is an inverted funnel used? (1mk)

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(ii) Explain the observation made when sulphur (IV) oxide gas is mixed with universal indicator (1mk)

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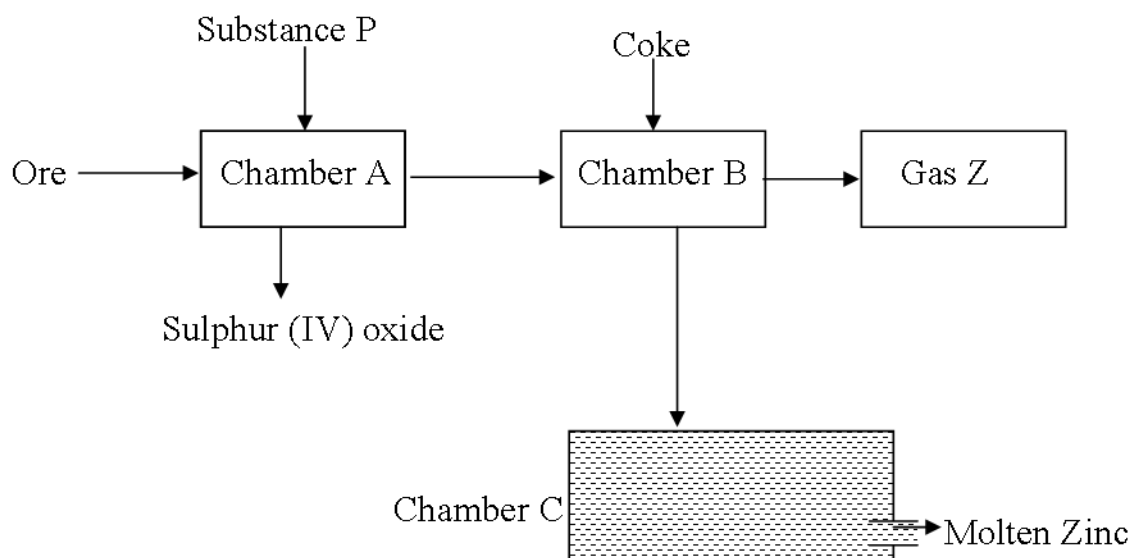
(g) State and explain what would be observed if concentrated sulphuric (VI) acid is added to cane sugar leading to formation of substance U. (2mks)

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.....

(h) How can the pollution of the atmosphere be minimized in contact process? (1mk)

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5. The flow diagram below shows the extraction of Zinc metal. Study it and answer the question that follow.



- (i) Name the ore used in this process (1mk)

.....

- (ii) Identify substances P and Z (2mks)

P.....
 Z.....

- (iii) State the function of coke in chamber B (1mk)

.....

- (iv) Write a chemical equation for the reaction between gas Z and calcium hydroxide solution. (1mk)

- (v) Explain why Zinc is preferred for coating iron to copper. (1mk)

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- (vi) Give two effects that this process could have to the environment (2mks)

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6. (I) (a) Seven portions each of 50cm^3 , 2M sodium hydroxide solution were placed in different insulated plastic beakers and the temperatures of each portion was noted to be 20°C various quantities of aqueous hydrochloric acid all at 20°C were added to each beaker and the temperatures were recorded as shown in the the table below.

Beaker	1	2	3	4	5	6	7
$\text{NaOH}_{(\text{aq})}(\text{cm}^3)$	50	50	50	50	50	50	50
$\text{HCl}_{(\text{aq})}(\text{cm}^3)$	20	40	60	80	100	120	140
Temperature ($^\circ\text{C}$)	23.0	25.0	26.5	28.5	30.0	30.0	30.0

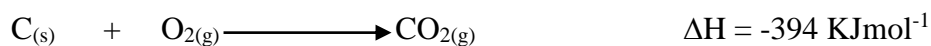
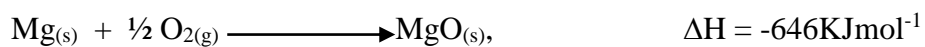
- (i) How many moles are there in 50cm^3 of 2.0M NaOH (1mk)

.....

- (ii) Calculate the concentration of the acid in moles per litre (2mks)

- (iii) Calculate the molar heat of neutralization ($C = 4.2\text{KJkg}^{-1}\text{K}^{-1}$, density of solution = 1g/cm^3) (3mks)

- (b) Use the following energies of formation to answer the questions that follow.



- (i) Write an equation for the formation of MgCO_3 from its constituent elements(1mk)
- (ii) Using the reaction above, draw an energy level diagram. (2mks)
- (iii) Calculate the enthalpy change of formation of MgCO_3 from its elements (2mks)

II. A hydrated salt has the following composition by mass. Iron 20.2%, oxygen 23.0%, sulphur 11.5%, water of crystallization 45.3%. Its relative molecular mass is 278. Determine the molecular formula of the hydrated salt. (3mks)

