NAME ..... ADM NUMBER .....

SIGNATURE .....

DATE .....

233/3
CHEMISTRY
PAPER 3
PRACTICAL
OCTOBER 2016
TIME: 2¼ HRS

KANDARA SUB-COUNTY SECONDARY SCHOOLS FORM 3 2016 JOINT EXAMINATION

Kenya Certificate of Secondary Education (KCSE)

CHEMISTRY

Paper 3
PRACTICAL
October 2016
Time: 2¼ hours

INSTRUCTIONS TO CANDIDATES

a) *Write your **name** and **Adm** number in the spaces provided above.*

b) *Answer **all** the questions in the spaces provided.*

d) ***All** working must be clearly shown where necessary.*

e) *Electronic calculators and mathematical tables may be used for calculations.*

f) *Candidate should confirm that all the questions and pages are present.*

FOR EXAMINERS USE ONLY

Questions	Max. Score	Candidate's Score
1	26	
2	10	
3	4	
TOTAL	**40**	

1. You are provided with;
   - Solution H, hydrochloric acid
   - Solution J, containing 8.8g per litre of sodium hydroxide
   - 0.6g of an impure metal carbonate, solid F with a formula M_2CO_3 where M is not the actual symbol of the metal.

   You are required to determine the;
   a) Concentration of solution H in moles per litre
   b) Percentage purity of the carbonate, solid F

   Procedure I
   Fill the burette with sodium hydroxide, solution J.
   Pipette 25.0cm^3 of hydrochloric acid, solution H into a conical flask. Add 2-3 drops of methyl/orange indicator and titrate until the colour changes from pink to yellow. Record your results in table 1 below. Repeat the titration two more times and complete the table.

   Table 1 (4 marks)

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution J used (cm^3)			

   a) i) Determine the average volume of solution J used. (1 mark)

   .....

   .....

   ii) Calculate the concentration of solution J in moles per litre. (*Na= 23, O = 16, H =1)* (2 marks)

   .....

   .....

   .....

   iii) Determine the number of moles of solution J used in the reaction. (2 marks)

   .....

   .....

   .....

   iv) Write a balanced equation of reaction between sodium hydroxide (solution J) and hydrochloric acid (Solution H) and use it to determine the number of moles of hydrochloric acid in 25cm^3 of the solution H used in the reaction. (2 marks)

   .....

   .....

   .....

   .....

b) Determine the concentration of solution H in moles per litre. (1 mark)

.....

.....

Procedure II

Using a measuring cylinder, measure out $100cm^3$ of solution H into a $250cm^3$ conical flask. Add all of solid F into the conical flask - containing solution H. Swirl the mixture and allow the reaction to proceed for about 2 - 4 minutes until the effervescence stops. Label the solution obtained here as solution A.

Fill the burette with sodium hydroxide, solution J. Pipette $25cm^3$ of solution A into a clean conical flask. Add 2-3 drops of methyl orange indicator and titrate. Record your results in table II below. Repeat the titration two more times and complete the table.

Table II

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution J used (cm^3)			

(4 marks)

a) i) Calculate the average volume of solution J used. (1 mark)

.....

.....

.....

ii) Calculate the number of moles of sodium hydroxide in solution J used in the reaction. (1 mark)

.....

.....

.....

iii) Calculate the number of moles of hydrochloric acid in $25cm^3$ of solution A used in the reaction. (1 mark)

.....

.....

.....

iv) Calculate the number of moles of hydrochloric acid in $100cm^3$ of solution A. (1 mark)

.....

.....

.....

v) Calculate the number of moles of hydrochloric acid in $100cm^3$ of solution H. (1 mark)

.....

.....

vi) Calculate number of moles of hydrochloric acid that were used up in the reaction with solid F, (M_2CO_3). (1 mark)

.....

.....

.....

vii) Calculate the number of moles of M_2CO_3 solid F that reacted with hydrochloric acid. (*Start with a balanced equation of reaction)* (2 marks)

.....

.....

.....

.....

b) Given that the relative formula mass (RFM) of the metal carbonate, M_2CO_3 is 106;
i) Calculate the mass of the metal carbonate that reacted. (1 mark)

.....

.....

.....

ii) Calculate the percentage purity of the metal carbonate M_2CO_3 (solid F) (1 mark)

.....

.....

.....

2. a) You are provided with solid T.
i) Place all solid T in a clean boiling tube. Add about $10cm^3$ of distilled water and shake.

Observations	**Inferences**
(1 mark)	***(1 mark)***

ii) Take a clean stirring rod and dip it in the resulting mixture in the boiling tube and then remove it. Burn the end of the string rod that is dipped in the mixture using a non-luminous flame.

Observations	**Inferences**
(1 mark)	***(1 mark)***

iii) To about $2cm^3$ of the resulting mixture in a test-tube, add about $1cm^3$ of lead (II) nitrate solution followed by about $2cm^3$ of dilute nitric (V) acid.

Observations	Inferences
(1 mark)	*(1 mark)*

b) You are provided with solid R. Place all solid R in a clean boiling tube. Add about $10cm^3$ of distilled water into the boiling tube containing solid R and shake.

i) To about $2cm^3$ of the resulting mixture in a test-tube, add ammonia solution dropwise until in excess.

Observations	Inferences
(1 mark)	*(1 mark)*

ii) To about $2cm^3$ of the resulting mixture in a test-tube, add about $1cm^3$ of lead (II) nitrate solution followed by about $2cm^3$ of nitric (V) acid.

Observations	Inferences
(1 mark)	*(1 mark)*

3. You are provided with solid P.
a) Place half of solid P on a clean dry spatula and burn it using non-luminous flame.

Observations	Inferences
(1 mark)	*(1 mark)*

b) Place all the remaining solid P in a clean boiling tube. Add about $10cm^3$ of distilled water and shake well to dissolve solid P.
i) To about $2cm^3$ of the resulting solution in a test-tube, add 2-3 drops of acidified potassium manganate (VII) solution.

Observations	Inferences
(1 mark)	*(1 mark)*