MUTITO SUB-COUNTY KCSE REVISION MOCK EXAMS 2015

233/3
CHEMISTRY
PAPER 3
(PRACTICAL)
TIME: $2\frac{1}{4}$ HOURS

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NAME _____ INDEX NO. _____

SCHOOL _____ SIGNATURE _____

DATE _____

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MUTITO SUB-COUNTY FORM FOUR JOINT EVALUATION TEST, 2015

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

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INSTRUCTIONS

- Write your name, school and index number in the spaces provided above.
- Answer **ALL** questions in the spaces provided.
- You are **NOT** allowed to start working with the apparatus for the first 15minutes of the $2\frac{1}{4}$ hours allowed for this paper. This time will enable you read through the question paper and make sure you have all the chemicals and apparatus required.
- Mathematical tables and electronic calculators may be used.
- All working **must be** clearly shown where necessary.
- Candidates may be penalized for not following the instructions in this paper.

FOR EXAMINER'S USE ONLY

Question		Maximum score	Candidate's score
1	A	19	
	B	07	
2	A	08	
	B	06	
Total score		40	

This paper consists of 8 printed pages
Candidates should check to ensure that all pages are printed as indicated and no questions are missing

1. A) You are provided with:

- Solution D_1 ethanoic acid
- Solution D_2 aqueous potassium permanganate (VII)
- Solution D_3 0.1M Ammonium iron (II) sulphate
- 1M sulphuric acid

You are required to:

– Standardize D_2 and D_3

– Determine the solubility of D_1 at room temperature.

Procedure I

Fill the burette with solution D_2. Pipette $25cm^3$ of D_3 into a conical flask. Add $2.0cm^3$ of 1M sulphuric acid using a measuring cylinder. Titrate solution D_3 with solution D_2 until a permanent pink colour just appears. Repeat the procedure and complete the table A below.

Table A (4 marks)

Experiment	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of D_2 used (cm^3)			

a) Calculate the average volume of D_2 used. (1 mark)

b) Given $MnO^-_{(aq)} + 5Fe^{2+}_{(aq)} + 8H^+_{(aq)} \rightarrow Mn^{2+}_{(aq)} + 5Fe^{3+}_{(aq)} + 4H_2O_{(l)}$

i) Calculate the number of moles of D_3 used. (1 mark)

ii) Calculate the number of moles of D_2 used. (1 mark)

iii) Calculate the number of moles of D_2 per litre. (1 mark)

Procedure II

Measure $25cm^3$ of solution D_1. Pour it into a conical flask and dilute it by adding $75cm^3$ of distilled water, label the solution D_4. Fill the burette with D_2. Pipette D_4 into a conical flask. Add $2.0cm^3$ of 1M sulphuric acid using a measuring cylinder. Heat the solution to about 70°C and titrate while hot with D_2 until a permanent pink colour just appears. Record your results in table B below. Repeat the procedure to fill the table.

Table B (4 marks)

Experiment	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of D_2 used (cm^3)			

c) i) Calculate the average volume of D_2 used (1 mark)

ii) Given the reaction between manganese (VII) ions and ethanedioate is

$2MnO^-_{4(aq)} + 5C_2O_4^{2-}{}_{(aq)} + 16H^+_{(aq)} \rightarrow 2Mn^{2+}_{(aq)} + 10CO_{2(g)} + 8H_2O_{((l)}$

Calculate the number of moles of MnO^-_4 ions in the average volume of D_2 used. (1 mark)

iii) Calculate number of moles of ethanedioate ions in $25cm^3$ of solution D_4. (1 mark)

iv) Calculate number of moles of ethanedioate ions in $100cm^3$ of solution D_4 (1 mark)

v) How many moles of ethanedioate ions were in $25cm^3$ of solution D_1 used (1 mark)

vi) Given molecular formula of ethanedioic is $H_2C_2O_4$. Calculate its solubility in grams per 100g of water at room temperature. (2 marks)

B) You are required to find out the effect of concentration of solution D_2 on rate of reaction.

Procedure II

Using a burette, place $5cm^3$ of solution D_2 into a boiling tube. To this solution add $5cm^3$ of solution D_1 using a measuring cylinder and immediately start a stopwatch. Shake the mixture and place the boiling tube on a test tube rack. Note and record time taken for the purple colour of mixture to disappear. Repeat the procedure using volumes of solution D_2 and distilled water as indicated in table III below. (4 marks)

Volume of D_2 in cm^3	Volume of water added in cm^3	Volume of D_1 in cm^3	Concentration of D_2 in moles/cm^3	Time for colour change in seconds
5.0	0.0	5.0		
4.0	1.0	5.0		
3.0	2.0	5.0		
2.0	3.0	5.0		
1.0	4.0	5.0		

Use the results to plot a graph of concentration in moles per litre of D_2 used against time taken for colour change. (3 marks)

2. A) You are provided with solid P. carry out the tests below and record your observations and inferences in the spaces provided.

Test for any gases produced.

a) Put half spatula endful of solid P into a test-tube, heat gently and then strongly.

Observations	Inferences
(1 mark)	(1 mark)

b) Put the remaining solid P into a test-tube, add about $5cm^3$ of distilled water and shake thoroughly and divide it into three portions.

i) To the first portion add ammonium hydroxide solution dropwise till in excess.

Observations	Inferences
(1 mark)	(1 mark)

ii) To the second portion add about $2cm^3$ of barium nitrate solution followed by about $1cm^3$ of dilute nitric acid.

Observations	Inferences
(1 mark)	(1 mark)

iii) To the third portion add $1cm^3$ of sodium chloride solution. Heat the product formed and allow it to cool.

Observations	Inferences
(1 mark)	(1 mark)

B) You are provided with $2cm^3$ of liquid Q.

a) Dip 2cm long strip of paper into the fluid and hold the strip of paper against a flame.

Observations	Inferences
(1 mark)	(1 mark)

b) Divide liquid Q into two portions.

i) To the first portion add 2-3 drops of bromine water.

Observations	Inferences
(1 mark)	(1 mark)

ii) To the second portion add 2-3 drops of acidified potassium manganate (VII) solution.

Observations	Inferences
(1 mark)	(1 mark)