

NAME ..... INDEX NO .....

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233/3

CHEMISTRY

PAPER 3

FORM 4

JULY 2017

TIME:  $2\frac{1}{4}$  HOURS

Kenya Certificate of Secondary Education

MURANG'A COUNTY MOCK

## END OF TERM II EXAMINATION QUESTIONS

**INSTRUCTIONS: Answer all the questions in the spaces provided**

1. You are provided with potassium manganate (VII) solution A

solution B, containing 6.3 g/litre of dibasic acid  $H_2X \cdot nH_2O$

Solution  $C_1$  containing 4.0g/litre of Sodium hydroxide solution.

You are required to determine :

- The value of n in  $H_2X \cdot nH_2O$
- How the rate of reaction of solution A with solution B varies with change in temperature.

### Procedure 1

Fill the burette with solution B . Pipette  $25\text{cm}^3$  of solution C into a conical flask and titrate solution B with

Solution C using phenolphthalein indicator.

Record your results in table I below and repeat the titration to obtain consistent results:

Table 1.

Burette readings	1	2	3
Final readings ( $\text{cm}^3$ )			
Initial readings ( $\text{cm}^3$ )			
Volume of solution B used ( $\text{cm}^3$ )			

a) Determine the average volume of solution B used . ( 1mk)

b) Calculate the concentration of solution C in moles per litre.  
(Na = 23.0, 16.0, H = 1.0) (1mk)

c) Given that the equation of the reaction taking place and R.F.M of X = 88



Calculate

i) The number of moles of the dibasic acid solution B that reacted (2mks)

ii) The number of moles of the dibasic acid solution B in 1000cm<sup>3</sup> of solution. (1mk)

iii) The R.F.M of the dibasic acid, hydrated. (1mk)

iv) The value of n in the formula of the hydrated acid. (O = 16.0 H = 1.0) (2mks)

### Procedure II

1. Using a measuring cylinder, place 10cm<sup>3</sup> portion of solution A into 5 test tubes placed in a test tube rack.

ii) Clean the measuring cylinder and use it to place 10.0 cm<sup>3</sup> of solution B into a boiling tube.

iii) Insert a thermometer in the solution B in the boiling tube and place the boiling tube in the water bath until it attains a temperature of 40° C.

IV) Remove the boiling tube from the water bath and place it in a test-tube rack and add the first portion of solution A. and at the same time start the stopwatch.

V) Record the time taken for the purple colour and the mixture to decolourise in table II

VI)) Repeat the experiment using 10cm<sup>3</sup> of solution B at 50° , 60° c, 70° c and 80°c. Record the time in the

Table. Complete the table by computing 1h/t sec -1.

Table II

Temperature of solution B	40	50	60	70	80
Time of colour to decolourise (seconds )					
1/t sec <sup>-1</sup>					

(5mrks)

a) Plot a graph of 1/t ( sec -1) against temperature. ( 3MKS)

b) From the graph , determine the time taken for decolourisation of the mixture, if the temperature of solution

B was 65°C ( 1 MK)

C) How does the rate of reaction of potassium manganite (VII) with oxalic acid vary with temperature. ( 1mk)

2. You are provided with solid Q . Carry out the tests below and record your observations and inferences

In the spaces provided.

a) Strongly heat a spatula - end full of solid Q in a dry test - tube.

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6.i) Place the remaining solid Q in a boiling tube. Add 10cm<sup>3</sup> of distilled water. Divide the solution into five portions.

Observations	½ mk		Inferences
½ mk			

ii) To the first portion, add aqueous lead (II) nitrate solution .

Observations		Inferences
1mk	1mk	

iii) To the second portion add dilute nitric ( V) acid followed by barium nitrate solution .

Observations		Inferences
1mk	1mk	

iv) To the third portion add a few drops of sodium hydroxide until in excess.

Observations		Inferences
1mk	1mk	

v) To the fourth portion add few drops of aqueous ammonia until in excess'

Observations		Inferences
½ mk	½ mk	

vi) To the fifth portion add few drops HCL acid. Warm the content

Observations	Inferences
$\frac{1}{2}$ mk	$\frac{1}{2}$ mk

3. You are provided with solid L. Carry out the tests and your observations and inferences.

a) Place about one third of solid L on a metallic spatula and burn it using Bunsen burner.

Observations	Inferences
$\frac{1}{2}$ mk	$\frac{1}{2}$
mk	

b) Place the remaining solid L in a test tube . Add about  $6\text{cm}^3$  of distilled water and shake well. Retain the mixture for use in tests ( C)

Observations
Inferences
$\frac{1}{2}$ mk

c.i) To about  $2\text{cm}^3$  of the mixture add a small amount of sodium hydrogen carbonate .

Observations	Inferences
1mk	1mk

ii) To about  $1\text{cm}^3$  of the mixture add  $1\text{cm}^3$  of acidified potassium dichromate (VI) and warm

Observations

1mk

Inferences.

1mk

ii) To about  $2\text{cm}^3$  of the mixture add two drops acidified potassium manganite (VII)

Observations

1mk

Inferences

1 mk