MASENO SCHOOL MOCK – 2022

Kenya Certificate of Secondary Education

233/3 **Paper 3**

CHEMISTRY

Sept. 2022 – 2¾ hours

Name ……..…Admission Number ……

Class ……Date ……...Candidate's Signature……....

Instructions to candidates

a) Write your name, Index number, signature, and date in the spaces provided.
b) Answer ALL the questions in the spaces provided in the question paper.
c) You are not allowed to start working with the apparatus for the first 15 minutes of the $2^1/_4$ hours allowed for this paper. This time is to enable you read the question paper and make sure you have all the chemicals and apparatus that you may need.
d) All working MUST be clearly shown where necessary.
e) Mathematical tables and silent electronic calculators may be used.
f) This paper consists of 6 printed pages

For Examiner's Use Only

Question	Maximum Score	Candidate Score
1	23	
2	11	
3	06	
Total score	40	

1. **You are provided with:**

- Solution A, 2M Hydrochloric acid
- Solution B; 0.15 sodium Thiosulphate
- Solution C; Sodium Carbonate

Procedure 1

Measure $20cm^3$ of 0.15M Sodium thiosulphate (Solution B) into a $250cm^3$ conical flask. Place the beaker on a white piece of paper with the ink **mark 'X'** on it. Measure $20cm^3$ of 2M Hydrochloric acid (Solution A) using a $50cm^3$ measuring cylinder. Put the acid into the conical flask containing sodium thiosulphate and immediately start off the stop watch. Determine the time taken for the **mark 'X'** to become invisible/obscured when viewed from above. Repeat the procedure by measuring different volumes of the acid and adding the volumes of the distilled water to complete Table I below.

Table I

Volume of acid (cm^3)	Volume of water (cm^3)	Volume of sodium thiosulphate (cm^3)	Time taken for mark X to be invisible (seconds)	Reciprocal of time (sec^{-1}) $^1/_t$
20	0	20		
18	2	20		
16	4	20		
14	6	20		
12	8	20		
10	10	20		

a) Complete the table above. (6 marks)
b) Plot a graph of 1/t (rate of reaction) against volume of acid used. (3marks)
c) Explain the shape of the graph. (1 mark)

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d) From the graph determine
i) Time taken for the cross (X) to be obscured/invisible when the volume of the acid is
a) $15cm^3$ (1mark)

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b) $8cm^3$ (1 mark)

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ii) The volume of the acid used if the time taken for the cross (x) to be obscured/invisible is:

a) 40 seconds (1 mark)

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..……..

b) 43 seconds

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Procedure 2

Using a $10cm^3$ measuring cylinder, place $10cm^3$ of solution A into 250ml volumetric flask. Add about $200cm^3$ of distilled water, shake well. Add more distilled water to top up to the mark. Label this solution D. fill the burette with solution D using a pipette and pipette filter, pipette $25cm^3$ of solution C into a conical flask. Add 3 drops of phenothalene indicator and titrate with solution D Record your results in the table 2. Repeat the titration two more times and complete table 2.

Table 2

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

(4 marks)

a) Determine the

i) Average volume D used (1 mark)

ii) Moles of the acid in the average volume of solution D used. (2marks)

iii) Concentration of solution C in the moles per liter. (2 marks)

2. You are provided with solid E. carry out the following tests and record the observation and inferences in the spaces provided.

a) Place about one third of solid E in a dry test-tube. Heat the solid strongly and test any gas produced with both blue and red litmus papers.

Observations	Inferences
(1 mark)	(1 mark)

b) Place the remaining amount of solid E in a boiling tube. Add about $15cm^3$ of distilled water and shake. Divide the mixture into four test-tubes each containing about $2cm^3$

i) To the first portion, add three or four drops of dilute hydrochloric acid.

Observations	Inferences
(1 mark)	(1 mark)

ii) To the second portion, add two or three drops of aqueous barium nitrate.

Observations	Inferences
(1 mark)	(1 mark)

iii) To the third portion add aqueous sodium hydroxide drop wise until in excess.

Observations	Inferences
(1 mark)	(1 mark)

iv) To the fourth portion, add aqueous ammonia drop wise until in excess

Observations	Inferences
(1 mark)	(1 mark)

3. You are provided with solid F. Carry out the test below and record your observations and inferences in the spaces provided.
   i) Place one third on a metallic spatula. Burn it in a non-luminous flame of the Bunsen burner.

Observations	Inferences
($^1/_2$ mark)	($^1/_2$ mark)

ii) Place the remaining solid F in a boiling tube. Add about $10cm^3$ of distilled water and shake the mixture well. Retain the solution for the next procedure.

Observations	Inferences
($^1/_2$ mark)	($^1/_2$ mark)

iii) To about $2cm^3$ of the solution, add 2 drops of acidified potassium manganate(VII) and warm.

Observations	Inferences
($^1/_2$ mark)	(1mark)

iv) To about $2cm^3$ of the solution, add 3 drops of acidified potassium dichromate (VI) and warm.

Observations	Inferences
($^1/_2$ mark)	($^1/_2$ mark)

v) To about $2cm^3$ of the solution. Add 0.5g of sodium hydrogen carbonate.

Observations	Inferences
($^1/_2$ mark)	($^1/_2$ mark)