



# MANGU HIGH SCHOOL

233/3

CHEMISTRY

PAPER 3

PRACTICAL

JULY 2016

TIME: 2¼ HOURS

NAME: \_\_\_\_\_

ADM NO: \_\_\_\_\_

INDEX NO. \_\_\_\_\_

CLASS: \_\_\_\_\_

**Kenya Certificate of Secondary Education**  
**Mock Examinations**  
**Chemistry**  
**Paper 3**  
**Practical**  
**2 ¼ Hours**

- Write your Name, Adm. No., Index No. and Class in the spaces provided above.
- Answer **ALL** the questions in the spaces provided in the question paper.
- You are **NOT** allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need.
- All working **MUST** be clearly shown where necessary.
- Mathematical tables and electronic calculators may be used.

**For Examiner's Use Only**

| Question           | Max. Score | Score |
|--------------------|------------|-------|
| 1                  | 12         |       |
| 2                  | 13         |       |
| 3                  | 15         |       |
| <b>Total Score</b> | <b>40</b>  |       |

This paper consists of 7 printed pages.  
Make sure that all the pages are printed and that no page is missing.



1. You are provided with;

- Solution A, pure hydrated copper (II) sulphate solution
- Solution B containing 24.8g of sodium thiosulphate ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ ) in one litre of solution
- Potassium iodide solution C
- Starch solution D

You are required to determine the concentration of copper (II) sulphate solution A. Fill the burette with sodium thiosulphate solution B. Using a pipette and pipette filler place  $25\text{cm}^3$  of solution A into a conical flask and add  $10\text{cm}^3$  of potassium iodide solution C into a conical flask. Swirl for one minute and then add  $2\text{cm}^3$  of starch solution D. Titrate with sodium thiosulphate solution until a blue black colour appears and continue titrating the blue black colour just disappears. Record your results in the titration two more time and complete the table.

Table 1

|                                   | I | II | III |
|-----------------------------------|---|----|-----|
| Final burette reading             |   |    |     |
| Initial burette reading           |   |    |     |
| Volume of A( $\text{cm}^3$ ) used |   |    |     |

1. a) Calculate the

i) Average volume of solution B (1mk)

ii) Moles of B used (2mks)

b) Using the following equation, calculate the moles of iodine that reacts with sodium thiosulphate (2mks)

c) Using the following equation, calculate the moles of  $\text{Cu}^{2+}$  that reacts with iodine ions to form the moles of iodine obtained above (2mks)

d) Determine the concentration of  $\text{Cu}^{2+}$  ions in the solution (2mks)

2. You are provided with

- 2M sodium hydroxide solution E
- Solution of acid F

You are required to determine the enthalpy of neutralization of sodium hydroxide. Label six test tubes 1-6. Fill the burette with solution E. From burette, place  $2\text{cm}^3$  of E in test tube number 1. From the same burette place  $4\text{cm}^3$  of solution E in test tube number 2. Repeat the processes for test tubes 3, 4 and 5. (see table 2). Clean the burette and fill it with solution F. From the burette place  $14\text{cm}^3$  of F into a boiling tube. Measure the initial temperature of F and record it in table 2 below. Add the content of test number 1 to the boiling tube containing F.



Stir the mixture gently with the thermometer. Record the highest temperature reached in table 2 below. Repeat the process upto test tube 6.

Table 2

| Test tube No.                                 | 1  | 2  | 3  | 4 | 5  | 6  |
|---|----|----|----|---|----|----|
| Vol. of solution E (cm <sup>3</sup> )         | 2  | 4  | 6  | 8 | 10 | 12 |
| Vol. of solution F (cm <sup>3</sup> )         | 14 | 12 | 10 | 8 | 6  | 4  |
| Initial temp of F (cm <sup>3</sup> )          |    |    |    |   |    |    |
| Highest temp of the mixture (C <sup>0</sup> ) |    |    |    |   |    |    |
| Change in temp (C <sup>0</sup> )              |    |    |    |   |    |    |

a) On the graph paper, draw a graph of change in temperature  $\Delta T$  against volume of solution E. (3mks)

b)i) Determine the maximum change in temperature (1mk)

ii) Determine the volume of solution E required to give maximum change in temperature (1mk)

c) Calculate

i) The heat change for the reaction (1mk)  
(S.H.C = 4.2Jg/1<sup>0</sup>C, density/ gcm<sup>-3</sup>)

ii) Number of moles of sodium hydroxide required to give the maximum change in temperature (1mk)

iii) The molar heat of neutralization of sodium hydroxide solution (1mk)

3. a ) You are provided with solid X. Carry out the tests below and write your observations and inferences in the spaces provided.

i) Place the all the provided solid X in a boiling tube. Add about 10cm<sup>3</sup> of distilled water and shake well. Retain the mixture for tests below:

| Observations | inferences |
|--------------|------------|
| 1mk          | 1mk        |

ii) To about 2cm<sup>3</sup> of the solution, add sodium hydroxide solution dropwise until in excess.

| Observations | inferences |
|--------------|------------|
| 1mk          | 1mk        |

iii) To about 2cm<sup>3</sup> of the solution add ammonia solution dropwise until in excess

| Observations | inferences |
|--------------|------------|
| 1mk          | 1mk        |



iv) To about  $2\text{cm}^3$  of the solution add about  $1\text{cm}^3$  of sodium sulphate solution

| Observations | inferences |
|--------------|------------|
| 1mk          | 1mk        |

v) To about  $2\text{cm}^3$  add three drops of barium nitrate solution followed by about  $1\text{cm}^3$  of dilute nitric (V) acid.

| Observations | inferences |
|--------------|------------|
| 1mk          | 1mk        |

b) You are provided with solid W you are required to carry out the tests below and write your observations and inferences in the spaces provided below.

i) Using a clean metallic spatula, heat about one third of solid W in a Bunsen burner flame.

| Observations | inferences |
|--------------|------------|
| 1mk          | 1mk        |

ii) Dissolve the remaining portion of solid W into about  $8\text{cm}^3$  of distilled water and divide the solution into two portions.

I. To the first portion, add two drops of acidified potassium manganate (VII) solution

| Observations | inferences |
|--------------|------------|
| 1mk          | 1mk        |

II. To the second portion add three drops of universal indicator and determine the PH of the solution

| Observations | inferences |
|--------------|------------|
| 1mk          | 1mk        |