NAME: …….. INDEX NO: ……

SCHOOL: ……..…… DATE : ……..

STUDENT'S SIGNATURE:…….

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CHEMISTRY PRACTICAL

PAPER 3 2020

PRACTICAL

2 ¼ HOURS

Instructions to Candidates

- Write your name and admission number in the spaces provided.
- Answer all the questions in the spaces provided.
- You are not allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ 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.
- Mathematical tables and electronic calculators can be used.

For Examiner's Use Only

Question	Maximum Score	Candidate's Score
1	26	
2	14	
Grand Total		

1. You are provided with:
    - Aqueous hydrochloric acid solution A.
    - Solution B containing 6.3g of dibasic acid, $H_2C_2O_4.2H_2O$ in 500cm^3 of solution.
    - Aqueous sodium hydroxide solution C.
    - Phenolphthalein indicator.

    You are required to;
    - Standardize the sodium hydroxide solution C.
    - Use the standardized solution C to determine the concentration of solution A.

PROCEDURE I

- Fill a burette with solution B.
- Pipette 25.0cm^3 of solution C into a conical flask.
- Titrate using phenolphthalein indicator.
- Record your results in table I below.

Table 1	**1st**	**2nd**	**3rd**
Final burette reading			
Initial burette reading			
Titre (cm^3)			

(4 Marks)

i) Calculate the average volume of solution B used. (1 Mark)

ii) Calculate the concentration of the dibasic acid in mols per litre. (C=12, H=1, O=16) (2 Marks)

iii) How many moles of dibasic acid solution B neutralized 25cm^3 of sodium hydroxide, solution C. (1 Mark)

iv) Write an equation for the reaction that took place. (1 Mark)

v) How many moles of solution C reacted with the dibasic acid. (1 Mark)

vi) Calculate the molarity of solution C. (2 Marks)

vii) Calculate the concentration of solution C in g/l. (Na=23, O=16, H=1). (1 Mark)

PROCEDURE II

- Using a 100cm^3 measuring cylinder, measure 90cm^3 of distilled water and place it into a 250cm^3 beaker. Add 10.0cm^3 of HCl solution A using a 10.0cm^3 measuring cylinder, mix the solution well and label it solution D.

  Fill a burette with solution D. Pipette 25.0cm^3 of the solution C into conical flask. Titrate using phenolphthalein indicator.

  Record your results in Table II below.

Table 1	**1st**	**2nd**	**3rd**
Final burette reading			
Initial burette reading			
Titre (cm^3)			

(4 Marks)

i) Calculate the average volume of solution D used. (1 Mark)

ii) Calculate the mols of sodium hydroxide solution C used. (1 Mark)

iii) Write an equation for the reaction that took place. (1 Mark)

iv) Calculate the number of moles of hydrochloric acid solution D contained in the average titre used. (1 Mark)

v) How many moles of hydrochloric acid were present in $100cm^3$ of solution D. (1 Mark)

vi) Calculate the molarity of the original solution A used. (2 Marks)

2. You are provided with solid M, which is a mixture of two compounds. You are required to;
   a) Carry out the experiment described below.
   b) Record your observations and inferences accordingly.
   c) Identify any gas(es) evolved.

PROCEDURE

i) Put about 2 spatula end full of the mixture in a boiling tube. Add distilled water to 3^{rd} full and shake well.

Observation	Inference
(1 Mark)	(1 Mark)

Filter the mixture, wash the residue by adding about $1cm^3$ distilled water into the filter paper with the residue, and keep both the residue and the filtrate.

ii) Divide the filtrate into three portions. Add acidified barium chloride solution to the 1^{st} portion.

Observation	Inference

(1 Mark)	(1 Mark)

iii) Add sodium hydroxide solution dropwise to the 2nd portion until excess.

Observation	Inference
(1 Mark)	(1 Mark)

iv) Add ammonia solution to the 3rd portion dropwise until excess.

Observation	Inference
(1 Mark)	(1 Mark)

v) Scrape the solid residue from the filter paper in step (i) above and transfer it into a boiling tube. Add some dilute nitric acid until all the solid dissolves.

Observation	Inference
(1 Mark)	(1 Mark)

Divide the solution in (v) above into three portions.

vi) Add sodium hydroxide solution to the 1st portion dropwise until excess.

Observation	Inference

(1 Mark)	(1 Mark)

vii) Add ammonia solution to the 2nd portion dropwise until excess.

Observation	Inference
(1 Mark)	(1 Mark)

viii) Add 2 drops of hydrochloric acid, solution A to the 3rd portion. Warm the mixture and allow to cool.

Observation	Inference
(1 Mark)	(1 Mark)