P525 / 3/ Inst. Sc.
CHEMISTRY
PRACTICAL
INSTRUCTIONS
July / Aug. 2022

UGANDA TEACHERS' EDUCATION CONSULT (UTEC)

Uganda Advanced Certificate of Education

PRACTICAL CHEMISTRY INSTRUCTIONS

(Paper P525/3)

CONFIDENTIAL:

Great care should be taken that the information given below does not reach the candidates either directly or indirectly.

INSTRUCTIONS FOR PREPARING APPARATUS

NB: The Head teacher must ensure that the teacher responsible for preparing the apparatus hands in his /her trial results properly sealed in a separate envelope and **firmly** fastened (attached) to the candidates' envelope(s)

- The description of the reagents and chemicals specified below does not necessarily correspond with the description in the question paper. Candidates must not be informed of the difference.
- Candidates are not allowed to use reference books during the examination.
- In addition to the fittings, apparatus and substances ordinarily contained in chemistry laboratory, each candidate will require;

  - 1 pipette (**20cm^3 or 25.0 cm^3**)
  - 1 burette (**50cm^3**)
  - 1 measuring cylinder (50cm3 or 100cm3)
  - Volumetric flask
  - Two empty clean beakers
  - 2 conical flasks
  - 6 test tubes
  - 1 boiling tube
  - 2 filter paper
  - **40**cm^3 of **FA1**
  - **100 cm^3 of FA2**
  - **2g of solid Q**
  - **3g** of **W**
  - 3g of **T**

Phenolphthalein indicator

Easy access to common laboratory reagents for identifying cations and anions

FA1 is 0.4 M hydrochloric acid

FA2 is sodium hydroxide solution

Solid **Q** is hydrated ethane-1,2-dioc acid (oxalic acid)

W is a mixture of Nickel acetate + Aluminum sulphate in a ratio of 2: 3 respectively

T is salicylic acid (4-hydroxy benzoic acid).

Candidate's Name.....

School:.....

P525/3
CHEMISTRY
(PRACTICAL)
Paper 3
July/Aug. 2022
3 ¼ hours

UGANDA TEACHERS' EDUCATION CONSULT (UTEC)

Uganda Advanced Certificate of Education

CHEMISTRY PRACTICAL

Paper 3

3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Answer **ALL** *questions.*

Record your answers on this question paper in the spaces provided.

Mathematical tables and silent non-programmable calculators may be used.

Reference books (i.e. text books, books on qualitative analysis, etc) should **not** *be used.*

Candidates are **not** *allowed to start working with apparatus for the first 15 minutes. This time is to enable candidates to read the question paper and make sure they have all apparatus and chemicals that they may need.*

1. **You are provided with the following;**

FA1, which is 0.4M hydrochloric acid

FA2, which is sodium hydroxide solution

Solid Q which in impure acid

You are required to

- *standardize FA2*
- *Determine the percentage purity of acid Q*

PART A

Procedure

Measure accurately 20 cm^3 of **FA1** into a 50 cm^3 measuring cylinder. Add distilled water carefully to make 50 cm^3 of the total solution. Transfer the solution into a clean beaker and label it **FA3.**

Questions:

(a) Calculate the,

(i) number of moles of the acid in 20 cm^3 of **FA1.** ***(1 ½ marks)***

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(ii) The molarity of hydrochloric acid in **FA3.** ***(02 marks)***

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PART B

Procedure

Pipette 20.0 or 25.0 cm^3 of **FA3** into a clean conical flask add 2-3 drops of phenolphthalein indicator. Titrate with **FA2** from the burette until the end point. Repeat the titration to obtain consistent results. Record your results in the Table 1 below.

Results:

Volume of pipette used..... cm^3 *(½ mark)*

	1	2	3
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of **FA2** used (cm^3)			

(4 ½ marks)

Titre values used to calculate average volume of **FA2** used *(½ marks)*

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Average volume of **FA2 used** .....cm^3. *(2½ marks)*

Questions

(a). Calculate the molar concentration of sodium hydroxide in **FA2.** *(5 marks)*

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PART C

Procedure

Weigh accurately about 1.6g of **Q** and place it in a beaker.

Add to it about 50 cm^3 of distilled water and stir to dissolve. Transfer the contents of the beaker into a 250 cm^3 volumetric flask. Add distilled water up to the mark. Label the resultant solution **FA4**.

Pipette 20.0 cm^3 (or 25.0 cm^3) of **FA4** into a conical flask. Add 2-3 drops of phenolphthalein indicator and titrate with **FA2** from the burette until the end point. Repeat the titration until you get consistent results. Record your results in Table 2.

Results:

Mass of Q and the weighing bottle.....g.

Mass of empty weighing bottle.....g.

Mass of Q used.....g.

Volume of pipette used.....cm^3 *(½ mark)*

	1	2	3
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of FA2 used (cm^3)			

(4 ½ marks)

Titre values used to calculate average volume of FA2 used *(1 ½ marks)*

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Average volume of **FA2 used** .....cm^3 *(2 ½ marks)*

Question

(a) Calculate the number of moles of;

(i) Sodium hydroxide that reacted *(2 marks)*

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(ii) Acid Q that reacted *(2 ½ marks)*

(1 mole of Q reacts with 2 moles of sodium hydroxide)

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(b) Determine the concentration of Q in FA4

(i) In $moldm^{-3}$

..... *(2 marks)*

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(ii) In grams per liter *(1 ½ marks)*

(1 mole of Q weigh 90 g)

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(c) Calculate the percentage purity of **Q**. *(1 ½ marks)*

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2. You are provided with substance **W** which contains **two** cations and **two** anions. Carry out the following tests on **W** to identify the cations and anion. Identify any gas (es) evolved. Record your observations and deductions in the Table **3.** *(30 marks)*

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Heat **two** spatula ends full of **W** strongly until there is no further change.		
(b) To one spatula ends full of **W** in a dry test tube add drops of concentrated sulphuric acid and warm		

(c) Dissolve three spatula ends full of W in about 5 cm^3 of water to make a solution (i) To 1 cm^3 of solution add iron (ii) chloride solution and heat.		
(ii) To the remaining solution of W add sodium hydroxide solution drop wise until there is no further change. Filter and keep both the filtrate and the residue.		
(d) Add dilute hydrochloric acid to the filtrate until the solution is just acidic. Divide the solution into four portions.		
(i) To the first portion of the acidic solution add sodium hydroxide solution drop wise until in excess.		
(ii) To the second portion, add potassium iodide solution		
(iii) To the third portion of acidic filtrate add 5 drops of litmus solution followed by dilute ammonia drop wise until in excess		
(iv) To the fifth portion of acidic filtrate add 2-3 drops Barium nitrate solution		
(e) Wash the residue and dissolve it in minimum dilute sulphuric. Divide the resultant solution into 3 portions		

i) To the **first** portion add sodium hydroxide solution drop wise until in excess.		
ii) To the third portion add ammonia solution drop wise until in excess.		
iii) Use the third portion to carry out a test of your own choice to confirm one of the anions.		

(e) (i) the cations in **W**:..... ..and .....

(ii) The anions in **W**:.....and .....

3. You are provided with organic substance **T**. You are required to determine the nature of **T**. Carry out the following tests on W and record your observations and deductions in Table 4 below. **(18 marks)**

TESTS	OBSERVATIONS	DEDUCTIONS
(a) Burn a small amount of T on a spatula end or on crucible lid.		
(b) Add half spatula end full of T to about 3 cm^3 of dilute sodium hydroxide and shake.		
(c) To a spatula end-ful of T in a test tube add 5 cm^3 of water. Shake vigorously and warm. Test the solution with litmus paper. Divide into three equal portions.		

(i) To the first portion of the solution add 2-3 drops of 2,4- dinitrophenyl hydrazine.		
(ii) To the second portion of the solution add 2-3 drops of neutral Iron(iii) chloride solution.		
(iii) To the 2 cm^3 of ethanol add a spatula end-ful of **T** and shake to desolve. Add 3-4 drops of conc sulphuric acid and warm the mixture.		

(b) Comment on the nature **T**.

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END