THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

732/2C **CHEMISTRY 2C**

(ACTUAL PRACTICAL 2C)

Time: 3 Hours **Year: 2022**

Instructions

1. This paper consists of **three (3)** questions.
2. Answer **all** questions.
3. Question number **one (1)** carries **twenty (20)** marks and the rest carry **fifteen (15)** marks each.
4. Cellular phones and any unauthorized materials are not allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet (s)

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1. You are provided with solution containing 6.3 g/dm^3 of oxalic acid as a primary standard solution denoted as TT; solution of sodium hydroxide of unknown concentration denoted as PP and POP (phenolphthalein indicator).

   The instruction are as follows:

   (i) Pipette 20 cm^3 (or 25 cm^3) of solution PP into a conical flask and add 2 to 3 drops of POP. Then transfer TT into the burette and take initial reading.

   (ii) Titrate TT against PP using two drops of the indicator to the end point. Repeat the procedure to obtain three more titre value and record the results in a tabular form.

   Questions:

   (a) (i) What is the volume of the pipette used?

   (ii) Present your results in an appropriate tabular form.

   (b) Why oxalic acid is considered as primary standard substance in this experiment?

   (c) In which part of the meniscus (lower or upper) of the solution TT in the burette will you read? Briefly, explain.

   (d) Why it is not advised to hold the pipette from its bulb?

   (e) What is the colour change of the indicator for the reaction between sodium hydroxide and oxalic acid.

   (f) Calculate the concentration of solution TT in mol dm3 .

   (g) Calculate the concentration of PP in mol dm^3

   .

2. Study the heat of reaction of different salts when dissolved in water. You are provided with the following materials:

   D1: 2.0 g of ammonium nitrate

   D2: 2.0 g of calcium chloride

   Distilled water

Thermometer 100 cm^3 plastic beaker

Perform the experiment through the given procedure and then answer the questions that follow. Procedure:

(i) Measure 50 cm^3 of distilled water and transfer it into a plastic beaker.

(ii) Insert a thermometer into the distilled water in the plastic beaker and record the temperature of the water.

(iii) Add D1 into the beaker containing distilled water and immediately start a stopwatch while stiring gently with your thermometer to dissolve the salt.

(iv) Record the temperature of the solution after every 30 seconds for four (4) minutes.

(v) Repeat steps (i) to (iv) except that instead of D1 in step (iii) use D2.

Questions

(a) Present the results in a tabular form.

(b) Calculate the heat of solution for 2 g of each salt in water (assume that no heat is lost to the surroundings).

(c) State whether the process of dissolving salt D1 or D2 is endothermic or exothermic. Give one reason to support your answer.

3. Perform a systematic qualitative analysis experiment to identify the cation and the anion present in the sample **Q**. Base your experiment on the listed tests and then answer the questions that follow:

(i) Appearance of sample Q.

(ii) Action of heat on sample Q in a test tube.

(iii) Action of dilute sulphuric acid on the solid sample.

(iv) Action of concentrated sulphuric acid on the solid sample.

(v) Flame test.

(vi) Solubility of the sample.

(vii) Confirmatory test for the anion.

(viii) Confirmatory test for the cation.

Questions

(a) Prepare a relevant Table showing the qualitative analysis results.

(b) What are the cation and anion present in the sample?

(c) Write the reaction equation to indicate what took place in test (iv).