THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

032/2A

CHEMISTRY 2A
ACTUAL PRACTICAL A
(For Both School and Private Candidates)

Time: 2:30 Hours **Monday, 06th November 2017 a.m.**

CS17PREP

Instructions

1. This paper consists of **three (3)** questions. Answer **all** the questions.
2. Question 1 carries **twenty (20)** marks and the rest carry **fifteen (15)** marks each.
3. Qualitative Analysis Guidance Pamphlets may be used after a thorough check by the supervisor.
4. Cellular phones, calculators and any unauthorized materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. You may use the following constants:
   Atomic masses:
   H = 1, C = 12, O = 16, K = 39, S = 32, Cl = 35.5.
   1 litre = 1 dm^3 = 1000 cm^3.

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1. You are provided with the following:
   PP: A solution of 0.1 M hydrochloric acid;
   RR: A solution of 1.39 g of impure sodium carbonate anhydrous dissolved in 250 cm^3 of solution;
   MO: Methyl orange indicator.

   Questions
   (a) (i) Titrate solution **PP** against 20 cm^3 or 25 cm^3 of **RR** until the colour change. Record the burette readings. Repeat the procedure to obtain three accurate readings and record your results in a tabular form.
   (ii) Why did the colour of the solution changed.
   (iii) Determine the average titre volume.
   (iv) ___ cm^3 of solution **RR** required ___ cm^3 of solution **PP** for complete reaction.
   (v) Assume that sulphuric acid of the same molarity was used in the place of hydrochloric acid, would it be a difference in the titre volume used? Give reason.

   (b) (i) Name the apparatus you used for measuring volume of **PP**.
   (ii) Why the apparatus in (b) (i) is the best recommended for its function?

   (c) Write a balanced chemical equation of the reaction between the solutions **PP** and **RR**.

   (d) Calculate the following and write your answer in two decimal places.
   (i) molarity of **RR**.
   (ii) percentage purity of **RR**.

   (e) State two applications of volumetric analysis.

2. You are provided with the following:
   E: A solution made by dissolving 20 g of sodium thiosulphate in 1 dm^3 of the solution;
   F: A solution of 2 M nitric acid;
   G: Distilled water;
   Stop watch; a sheet of white paper and a thermometer.

   Procedure
   (i) Put a beaker (100 cm^3) on top of the cross drawn on the given sheet of paper.
   (ii) Measure 25 cm^3 of **E** using measuring cylinder and pour it into a beaker in (i).
   (iii) Using another measuring cylinder measure 5 cm^3 of **F** and pour it into a beaker containing **E** and instantly, start a stop watch.
   (iv) Stir the mixture with a glass rod while you keep on observing the cross from above; record the time taken for the cross to disappear.
   (v) Repeat the procedures for different concentrations of **E** by taking 20 cm^3, 15 cm^3, 10 cm^3 and 5 cm^3 of the original **E** and making the total volume up to 25 cm^3 by adding **G**. Record the results as shown in the Table 1.

   Table 1

Volume of E (cm^3)	**Volume of G (cm^3)**	**Time taken for the cross to disappear (sec.)**
25		
20		
15		
10		
5		

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Questions

(a) Complete filling the Table 1.

(b) (i) Using the data in the table, plot a volume – time graph (volume on the y-axis and time in second on the x-axis).

(ii) What does the shape of the graph indicate?

(c) Write down the ionic equation of the reaction between **E** and **F**.

(d) Why did the cross disappear?

(e) Write two uses of the product which obscured the cross.

3. Sample **Q** is a simple salt containing one cation and one anion. Carefully carry out all the experiments described in the Table 2. Record all your observations and make appropriate inferences to identify the ions present in sample **Q**.

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Table 2

S/n	Experiments	Observation	Inference
(a)	Observe sample **Q**.		
(b)	Put a spatulaful of sample **Q** in a test tube and add distilled water.		
(c)	Transfer 0.5 g of sample **Q** in a test tube, add dilute HCl.		
(d)	Transfer 0.5 g of sample **Q** in a test tube, add concentrated sulphuric acid.		
(e)	Dissolve sample **Q** then divide the resulting solution into three portions. (i) To the first portion add sodium hydroxide solution.		
	(ii) To the second portion add ammonia solution.		
	(iii) To the third portion add potassium ferricyanide solution $[K_3Fe(CN)_6]$.		
	(iv) To the fourth portion add lead acetate solution followed by acetic acid solution.		

Conclusion

(a) (i) The cation in sample **Q** is _____.

(ii) The anion in sample **Q** is _____.

(iii) The compound **Q** is _____.

(b) Write the reaction equation that took place at experiment (c).

(c) State three chemical properties of the metal in **Q**.

(d) State two uses of **Q**.

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