

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

032/2B

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

Time: 2:30 Hours

Friday, 15th November 2013 a.m.

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 and calculators 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, Na = 23, Cl = 35.5, S = 32.
1 litre = 1 dm³ = 1000 cm³

1. You are provided with the following solutions:
T: Containing 1.825 g of hydrochloric acid in 0.50 dm³ of solution;
Z: Containing 3.575 g of pure hydrated sodium carbonate, Na₂CO₃.xH₂O per 0.25 dm³ of solution;
Methyl orange indicator.

Questions

- (a) Is the use of phenolphthalein indicator for this experiment as suitable as the methyl orange? Give a reason for your answer.
- (b) Titrate the acid (in a burette) against the base (in a conical flask) using two drops of indicator and obtain three titre values.
- (c) (i) _____ cm³ of acid required _____ cm³ of base for complete reaction.
(ii) With state symbols, write a balanced molecular equation and the corresponding ionic equation for the reaction between T and Z.
- (d) Showing your procedures clearly, determine the value of x in the formula Na₂CO₃.xH₂O and hence name the compound.
2. You are provided with the following:
P₁: 0.5 moldm⁻³ sodium thiosulphate;
P₂: 0.1 moldm⁻³ hydrochloric acid;
Distilled water;
Stop watch;
Plain paper.

The aim of this experiment is to investigate the effect of concentration on the rate of chemical reaction between sodium thiosulphate and hydrochloric acid.

Procedure

- (i) Write a clear letter X on a white piece of paper.
- (ii) Place a small beaker (100 cm³) on top of the letter X such that the letter is visible when viewed from above.
- (iii) Measure 30 cm³ of P₁ and put into the beaker in (ii) above.
- (iv) Measure 10 cm³ of P₂ and pour it into a beaker containing solution P₁ in (iii) above and simultaneously start the stop-watch/clock.
- (v) Swirl the reaction mixture only once and note the time taken for the letter X to disappear completely.
- (vi) Repeat procedure (ii) to (v) by varying the volume of P₁ and distilled water as indicated in Table 1.

Table 1

Experiment	Volume of P ₁ (cm ³)	Volume of water (cm ³)	Volume of P ₂ (cm ³)	Time t, for the cross to disappear (s)
1	30	0		
2	25	5	10	
3	20	10	10	
4	15	15	10	
			10	

Questions

- Complete Table 1.
- Why did the solution become opaque after mixing P₁ and P₂?
- With state symbols, write the ionic equation for the reaction.
- List four factors which can affect the reaction in (c).
- Plot a graph of volume P₁ against time.
- Inspect your graph and comment on the effect of concentration on the rate of chemical reaction.

Sample N contains one cation and one anion. Using systematic qualitative analysis procedures, record carefully your experiments, observations and inferences as indicated in Table 2 and finally identify the anion and cation in sample N.

Table 2

S/n	Experiment	Observation	Inference

Conclusion

- The cation present in sample N is _____.
- The anion present in sample N is _____.