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)

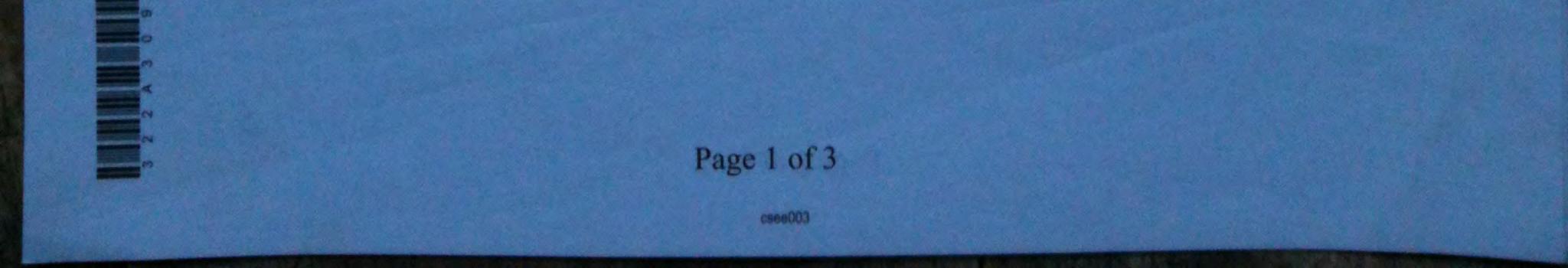
Time: 2:30 Hours

Tuesday, 12th 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, S= 32, K = 39. 1 litre = 1 dm³ = 1000 cm³.



You are provided with the following solutions:

JJ: Containing 3.0 g of acetic acid in 0.50 dm³ of solution;

KK: Containing 1.5 g of impure potassium hydroxide in 250 dm³ of solution; Phenolphthalein indicator.

Questions

- (a) Is the use of methyl orange indicator in this experiment as suitable as phenolphthalein? Give a reason for your answer.
- (b) Titrate the acid (in a burette) against the base (in a conical flask) using two drops of your indicator and obtain three titre values.
- (c) (i) cm³ of JJ required cm³ of KK for complete reaction.
 (ii) Write a balanced chemical equation for the reaction between JJ and KK.
- (d) Showing your procedures clearly, calculate the percentage purity of potassium hydroxide.
- 2. You are provided with the following:
 - L₁: 0.50 M sodium thiosulphate; L₂: 0.10 M hydrochloric acid; Distilled water;

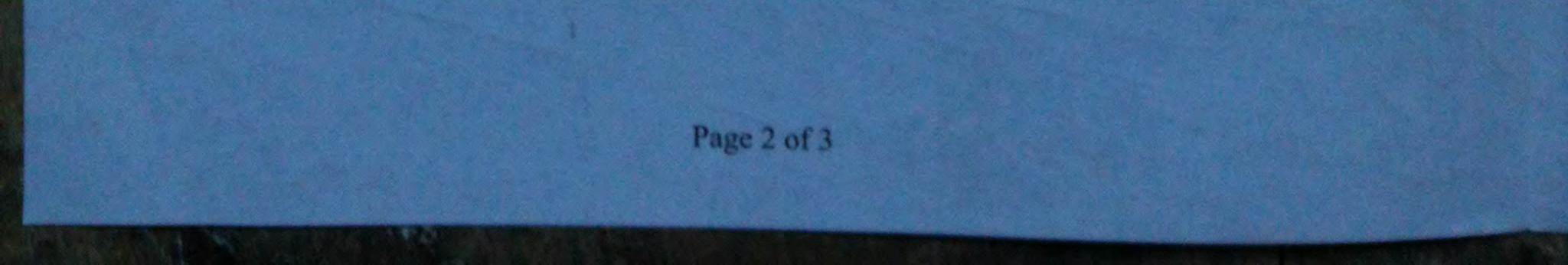
Stop watch; Plain paper.

Theory

When a solution of sodium thiosulphate is mixed with hydrochloric acid, they react quantitatively and gradually the solution becomes opaque.

Procedure

- (i) Write a clear letter X on a white piece of paper.
- (ii) Place a 100 cm³ beaker on top of letter X, such that the letter X is visible when viewed from above.
- (iii) Using a measuring cylinder, measure 25 cm³ of L_1 and pour into the 100 cm³ beaker in (ii) above.
- (iv) Measure 25 cm³ of L_2 and pour it into the beaker containing solution L_1 in (iii) above and immediately start the stop watch/clock.
- (v) Shake the reaction mixture only once and record the time taken for the letter X to disappear completely.
- (vi) Repeat steps (ii) to (v) by varying the volume of L_1 and distilled water as indicated in Table 1.



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Volume of L ₁ in cm ³	Volume of water in cm ³	Volume of L ₂ in cm ³	Time (t)/s	Rate of reaction $\frac{1}{-}(s^{-1})$
25	0	25		
20	5	25		
15	10	25		
10	15	25		
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Questions

- (a) What is the aim of this experiment?
- (b) Complete Table 1.
- (c) Write the electronic configuration of the product which causes the solution to cloud letter X.
- (d) With state symbols, write the ionic equation for the reaction between L_1 and L_2 .
- (e) Plot a graph of volume of L_1 against rate of reaction.
- (f) What can you conclude from the graph?
- 3. Sample U contains one cation and one anion. Using systematic qualitative analysis procedures, record carefully your experiments, observations, inferences and finally identify the anion and cation present in sample U. Record your work in a tabular form as Table 2 shows.

S/n	Experiment •	Observation	Inference	
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Table 2: Table of results

Conclusion

- (i) The cation in sample U is _____.
- (ii) The anion in sample U is _____.

