

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

032/2A

CHEMISTRY 2A

ALTERNATIVE A PRACTICAL

(For Both School and Private Candidates)

TIME: 2½ Hours

Wednesday 15<sup>th</sup> October 2008 a.m.

**Instructions**

1. This paper consists of **three (3)** questions.
2. Answer **two (2)** questions including question number 1.
3. All questions carry equal marks.
4. Qualitative Analysis Guidance Pamphlets may be used after a thorough check by the supervisor.
5. Electronic calculators are **not** allowed in the examination room.
6. Cellular phones are **not** allowed in the examination room.
7. Write your **Examination number** on every page of your answer booklet(s).
8. The following constants may be used:

Atomic masses: H = 1, C = 12, O = 16, Na = 23, K = 39, S = 32, Cl = 35.5.

1 litre = 1 dm<sup>3</sup> = 1000 cm<sup>3</sup>.

1. You are provided with the following:
- Solution M containing 9.0 g of  $H_2X$  per  $dm^3$  of the solution.
  - Solution N containing 4.91 g of sodium hydroxide per  $dm^3$  of the solution.
  - Solution P is phenolphthalein indicator.

**Procedure**

Put solution M into the burette. Pipette 25  $cm^3$  (or 20  $cm^3$ ) of solution N into the titration flask. Put two to three drops of P into the titration flask. Titrate solution M from the burette against solution N in the titration flask until a colour change is observed. Note the burette reading. Repeat the procedure to obtain three more readings. Record your results as shown in Table 1.

**Results**

**Table 1: Burette readings**

Titration	Pilot	1	2	3
Final reading ( $cm^3$ )				
Initial reading ( $cm^3$ )				
Volume used ( $cm^3$ )				

- Give the volume of the pipette used.
- Give the volume of solution M needed for complete neutralization of solution N.
- Tell the colour change of the indicator at the end point of the titration.
- Write the balanced chemical equation for the reaction between solution M and N.
- Calculate the
  - molarity of solution M
  - molar mass of  $H_2X$
  - mass of X in  $H_2X$ .

Handwritten calculations:

$$\begin{array}{r} 39.07 \\ 19.07 \\ \hline 20.00 \end{array}$$

$$\begin{array}{r} 39.07 \\ 19.07 \\ \hline 20.00 \end{array}$$

Handwritten calculations:

$$\begin{array}{r} 29.07 \\ 19.07 \\ \hline 10.00 \end{array}$$

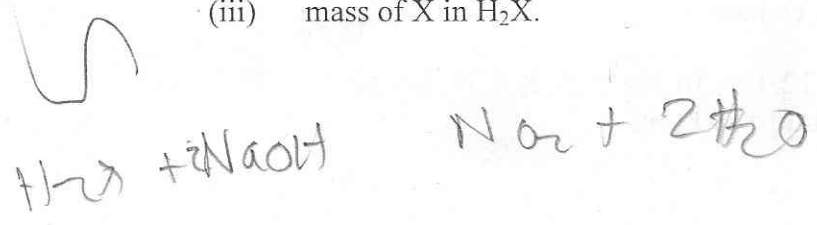
Handwritten calculations:

$$\begin{array}{r} 19.60 \\ 19.30 \\ \hline 38.90 \\ 19.20 \\ \hline 58.10 \\ \hline 3 \end{array}$$

Handwritten calculations:

$$\begin{array}{r} 19.366 \\ 3 \overline{) 58.10} \\ \underline{3} \\ 28 \\ \underline{27} \\ 1 \\ \underline{0} \\ 20 \\ \underline{18} \\ 20 \end{array}$$

(25 marks)



Handwritten calculations:

$$\begin{array}{r} 4.91 \\ \times 9 \\ \hline 44.19 \end{array}$$

Handwritten calculation:

$$\frac{9.0 \times 4.91}{25} \text{ mb}$$

Handwritten calculation:

$$\frac{9.0 \times 4.91}{25} = \frac{7}{2}$$

Handwritten calculation:

$$1 \times 2 = 2$$

Handwritten calculation:

$$\frac{39.10 - 19.30}{40} = \frac{M_A M_B}{V_A V_B}$$

Handwritten calculations:

$$\frac{M_A V_A}{M_B V_B}$$

$$M_A = 9.0$$

$$M_B =$$

$$M_A V_B = 4.91 \times 25$$

$$M_B = 4.91$$

2. Sample D is a simple salt containing one cation and one anion. Carry out carefully the experiments described below recording all your observations and appropriate inferences as shown in Table 2 to identify the cation and anion present in D.

**Table 2**

	Experiment	Observation	Inference
(a)	Observe the appearance of salt D.		
(b)	Put a little solid sample D in a clean and dry test tube and heat.		
(c)	Put a spatulaful of sample D in a test tube, add distilled water, stir and divide the obtained solution into four portions in different test tubes. To the		
	(i) first portion of the solution of sample D in a state tube add aqueous ammonia slowly till excess.		
	(ii) second portion of the solution of sample D in a test tube add aqueous ammonia slowly till excess.		
	(iii) third portion of the solution of sample D in a test tube add potassium hexacyanoferrate (II).		
	(iv) fourth portion of the solution of sample D in a test tube add dilute HCl followed by BaCl <sub>2</sub> solution.		

**Conclusion:**

The cation in sample D is \_\_\_\_\_ and the anion is \_\_\_\_\_.

The molecular formula of salt D is \_\_\_\_\_.

(25 marks)

39.20  
19.30  
18.90

3. Sample Y is a simple salt containing one anion and one cation. Using systematic qualitative analysis procedures carry out tests on sample Y and make appropriate observations and inferences to identify the cation and anion present in sample Y.

Experiment	Observation	Inference

19.10  
4.80  
0.80

**Conclusion:**

The cation in sample Y is \_\_\_\_\_ and the anion is \_\_\_\_\_. (25 marks)