

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

032/2

CHEMISTRY 2
ALTERNATIVE TO PRACTICAL
(For both School and Private Candidates)

Time: 2: 30 Hours

Tuesday, 12th October 2010 a.m.

Instructions

1. This paper consists of five (5) questions.
2. Answer all questions.
3. Qualitative analysis Guidance Pamphlets are allowed after a thorough check by the Supervisor.
4. Calculators and cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. The following constants may be used:

Na = 23, C = 12, O = 16, H = 1, S = 32, Cl = 35.5, I = 127, K = 39, Ca = 40.

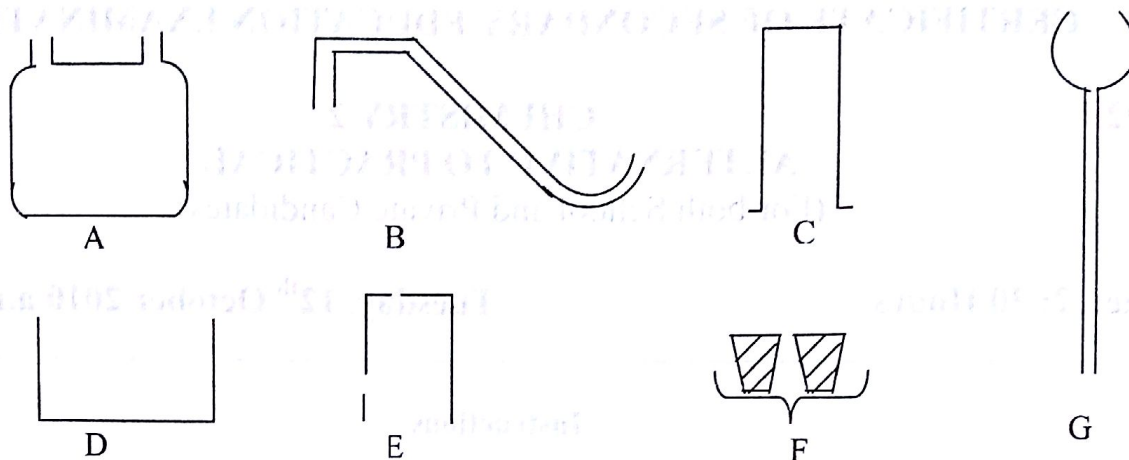
1 F = 96500 coulombs.

GMV at s.t.p. = 22.4 dm^3 .

1 litre = $1 \text{ dm}^3 = 1000 \text{ cm}^3$.

This paper consists of 4 printed pages.

1. The following are some drawings of pieces of apparatus. The pieces, if correctly assembled together, can form the apparatus for the preparation of hydrogen gas.



- Name each piece of apparatus A - G.
 - Draw a neat diagram of the apparatus for the preparation of hydrogen using the pieces of apparatus above.
 - Label the hydrogen gas collected and any other substances involved in the preparation of hydrogen using such apparatus.
 - The piece of apparatus marked A can be replaced by another relatively simpler piece of apparatus. Name and draw the alternative piece of apparatus which can take the function of apparatus A. (10 marks)
2. In a practical examination, a student was given the following solutions for titration:

Solution QP containing 4.0g/dm^3 of MOH

Solution LL containing $0.1\text{M H}_2\text{SO}_4$.

Methyl orange (MO) indicator.

On titrating 20cm^3 of solution QP with $0.1\text{M H}_2\text{SO}_4$ acid, the following titre values were obtained:

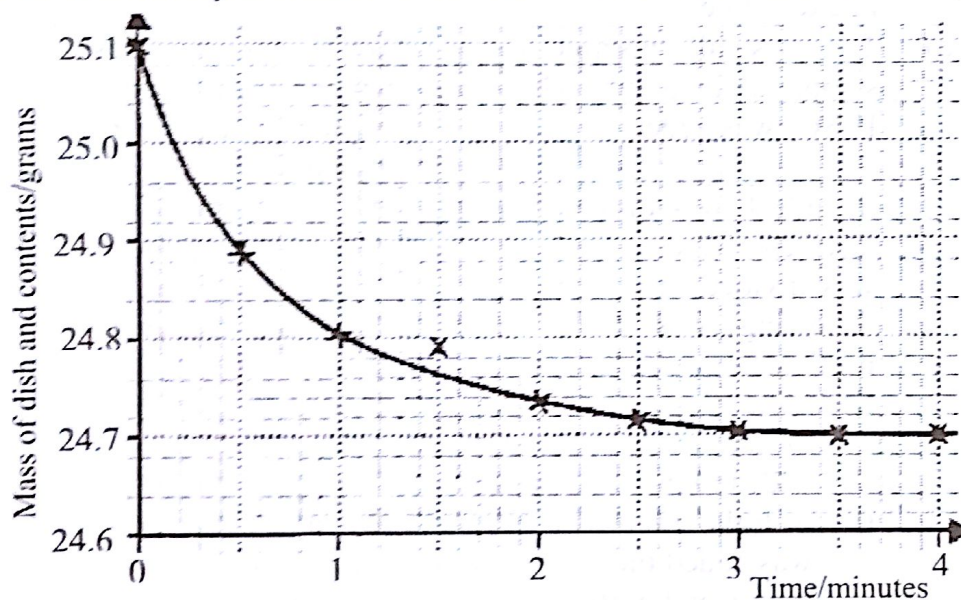
| Burette reading | Pilot | 1 | 2 | 3 |
|-------------------------------|-------|-------|-------|-------|
| Final volume/ cm^3 | 10.00 | 20.00 | 30.00 | 40.00 |
| Initial volume/ cm^3 | 0.00 | 10.00 | 20.00 | 30.00 |
| Volume used / cm^3 | | | | |

- Use the above information to calculate;
 - the molarity of solution QP (MOH)
 - the molecular weight of MOH
 - the atomic mass of M.

- Name the element M. (10 marks)

- (a) Define the terms oxidizing agent and a reducing agent.
- (b) Write molecular equations for the oxidation of copper metal by concentrated
 - (i) sulphuric acid
 - (ii) nitric acid.
- (c) Draw a labeled diagram of voltameter for the electrolysis of potassium iodide solution. Indicate the movement of ions towards electrodes in your diagram.
- (d) If a current of 2A was passed for 1 hour, calculate the mass of iodine liberated. (10 marks)

A small quantity of hydrochloric acid was added to a large quantity of marble in an evaporating dish, which was placed on the pan of a balance. The mass of the dish and its contents was recorded every half minute. The results are shown in the following graph:



- (a) Why does the curve slope down?
- (b) What was the mass of the evaporating dish and contents at the
 - (i) start of the experiment
 - (ii) end of the experiment?
- (c) What mass of carbon dioxide was produced?
- (d) How long did the reaction last?
- (e) Which result would seem to be incorrect? Give reasons. (10 marks)

5. An unknown sample P was analyzed and found to contain one cation and one anion. Complete the table and identify the cation, anion and write the formula and the name of the compound.

| S/N | Experiments | Observations | Inferences |
|-----|---|--|------------|
| (a) | Appearance of sample P | White deliquescent crystals | |
| (b) | Sample P was heated in a test tube. | White acidic fumes which turned dense white fumes with ammonia. The residue was white when cold and yellow when hot. | |
| (c) | Dilute HCl acid was added to the small portion of the sample in a test tube. | No gas was evolved. | |
| (d) | To a small portion of the sample P in a test tube conc. H_2SO_4 was added. | White acidic fumes which turned dense white fumes with ammonia. | |
| (e) | Sample P was dissolved in the distilled water. The solution was divided into three and the following was done to the portions: (i) dilute silver nitrate followed by ammonia solution were added to the first portion. | White precipitate was formed which dissolved in excess ammonia solution to form a clear solution. | |
| | (ii) a little ammonia solution was added then in excess to the second portion. | White gelatinous precipitate was formed which was soluble in excess ammonia. | |
| | (iii) potassium hexacyanoferrate (II) solution was added to the third portion. | A white precipitate was formed. | |

Conclusion

- (i) The cation is _____.
- (ii) The anion is _____.
- (iii) The molecular formula of compound P is _____.
- (iv) Name of compound P is _____.

(10 marks)