1408/315
SCIENCE LABORATORY PRACTICE
(PRACTICAL)
June/July 2011
Time: 4 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

SCIENCE LABORATORY TECHNOLOGY CRAFT

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(PRACTICAL)

4 hours

This paper consists of 4 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

Turn over

1. (a) You are provided with:

- 10 cm^3 measuring cylinder;
- 250 cm^3 volumetric flask;
- White tile;
- Table salt;
- 0.01M EDTA solution;
- Buffer solution of pH 10;
- Eriochrome Black T indicator;
- 500 cm^3 of de-ionized water;
- Other titration apparatus.

(b) You are required to determine the concentration of Calcium in the table salt sample, in parts per million (ppm).

Proceed As Follows

I Weigh 11.96 g of the table salt provided and transfer into a clean 250 cm^3 volumetric flask.

II Add small amounts of the de-ionized water while shaking until the salt completely dissolves and then top-up to the mark.

III Fill the burette with the EDTA solution

IV. Pipette 25 cm^3 of salt solution and add 4 cm^3 of the buffer solution followed by three drops of the indicator

V. Titrate the salt solution with the EDTA until a faint bluish colouration appears. Repeat the experiment three more times and tabulate the results. (8 marks)

VI. Write and ionic equation of the reaction taking place. (2 marks)

VII. Calculate the:

(a) Moles of EDTA used. (2 marks)

(b) Moles of Calcium used. (2 marks)

(c) Moles of Calcium in the 250 cm^3 solution. (2 marks)

(d) Mass of Calcium in the 250 cm^3 solution. (Ca = 40) (3 marks)

(e) Concentration of Calcium in the salt sample in parts per million (ppm). (4 marks)

VIII (a) State **one** use of Calcium in the human body. (1 mark)

(b) State the effect of Calcium deficiency in young children. (1 mark)

IX. List **four** types of EDTA titrations. (4 marks)

X. State **four** ways of increasing the selectivity of EDTA. (4 marks)

2. You are provided with three solutions **A**, **B** and **C**. You are required to carry out a test for reducing and then non-reducing sugar in order to identify the given solutions.

Proceed as follows:

Add 2cm^3 of each solution to separate test tubes. In the test tube with solution A, label it **A**. Repeat for **B** and **C**. Add 2 cm^3 of Benedicts solution. Shake and bring gently to boil while you observe. Repeat the above procedure, but add 1 cm^3 of hydrochloric acid before adding benedicts reagent. Boil. Add Sodium hydrogen carbonate solution to neutrality. Add 2cm^3 Benedicts solution. Shake and bring gently to the boil. Make observation.

I. Tabulate your results of observatons and inferences. From your observations identify the solutions A, B, and C. (22 marks)

II. Explain your results. (6 marks)

III. Explain the basis of the Benedicts reagent as used in the test. (4 marks)

IV. Describe the proper way of disposing the reagents used in this practical. (1 mark)

3. (a) You are provided with the apparatus listed below. Use the apparatus to conduct the following experiment.

(b) **Apparatus**

- Ammeter (0 - 1 A);
- Voltmeter (0 - 5 V);
- Two dry cells;
- Cell holder;
- Constantan wire of at least 80 cm long fixed on a support graduated in centimeters;
- A switch;
- Micrometer screw gauge;
- 3 crocodile clips.

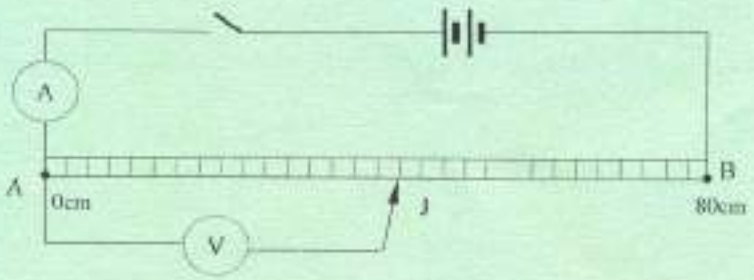

Figure 1.

Connect the circuit as shown in Figure 1.

I. (i) Record the current (I) passing through the ammeter when the switch is closed. (1 mark)

(ii) Record the reading of the Voltmeter when J is at point A. (1 mark)

(iii) Repeat (ii) above in steps of 10 cm from point A up to point B.

(iv) Record your readings in table 1 (copy and complete table 1).

(v) Measure the diameter (t) of the wire. (1 mark)

II. Table 1.

Length in cm	0	10	20	30	40	50	60	70	80
Potential difference in Volts									

(9 marks)

(ii) Draw a graph of potential difference in volts against length of the wire in centimeters. (9 marks)

(iii) Calculate the: (I) gradient (g) of the graph (2 marks)

(II) V_T given that $V_T = g \times L_o$ (2 marks)

(iv) Determine X_A where $X_A = \pi \left(\frac{t}{2}\right)^2$. (2 marks)

(v) Calculate X_R where $X_R = \frac{V_T}{I}$. (2 marks)

(vi) Evaluate $e = \frac{X_A X_R}{L_o}$ (2 marks)

(vii) State the physical quantities represented by:

(i) V_T; (1 mark)

(ii) X_A; (1 mark)

(iii) X_R; (1 mark)

(iv) e. (1 mark)