1408/315
SCIENCE LABORATORY PRACTICE
(PRACTICAL)
June/July 2009
Time: 4 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

SCIENCE LABORATORY TECHNOLOGY CRAFT

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(PRACTICAL)

4 hours

This paper consists of 5 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. You are provided with the following:

Microscope
Four slides
Cover slips
Scapel
Three petri-dishes
Sterilised spatula/clean wooden splint
Distilled water
Methylene blue stain
Filter papers
Solution II
Solution I
Onion bulb
Forceps
dropper

You are required to perform the following:

PROCEDURE I

Strip off three pieces of the epidermal layer of an onion bulb using a pair of forceps.
Mount one piece of the epidermal layer on a microscope slide labelled **A** and pour four drops of solution **I** on it.
Mount the second piece on a microscope slide labelled **B** and pour four drops of solution **II** on it.
Leave the two mounts to stand for 10 minutes. For each of the mounts, cover with a coverslip and drain off the excess liquid using a filter paper.

(a) Observe each of the slides under the microscope and make labelled diagrams of your microscope observations. (10 marks)

(b) Explain the observations of each of the slides in Procedure I above. (4 marks)

PROCEDURE II

Gently scrape the inside of your cheek cells using a sterilised spatula or clean wooden splint.
Mount the scrapings in a drop of distilled water on a clean microscope slide and cover with a coverslip.
Pour two drops of methylene blue stain against the side of the coverslip. Draw the stain across the slide by withdrawing the fluid from one side of the coverslip using filter paper.
Using the microscope, locate a single cell and examine it under the X40 objective.

(a) Draw the cell and label the observed organelles. (6 marks)

(b) Describe the procedure for lowering the coverslip on a microscope slide. (3 marks)

(c) State the importance of using a coverslip on microscope slides. (3 marks)

(d) State **five** observable differences between the cells in Procedures I and II above. (5 marks)

(e) Describe the disposal of the solutions used in procedures I and II above. (1 mark)

2. You are provided with the apparatus listed below. Use these apparatus to conduct the following experiment.

APPARATUS

- 1 metre rule
- 1 candle
- 1 lens holder
- 1 screen (white cardboard with support frame)
- 1 convex lens
- 1 match box.

Arrange the apparatus as shown in figure 1

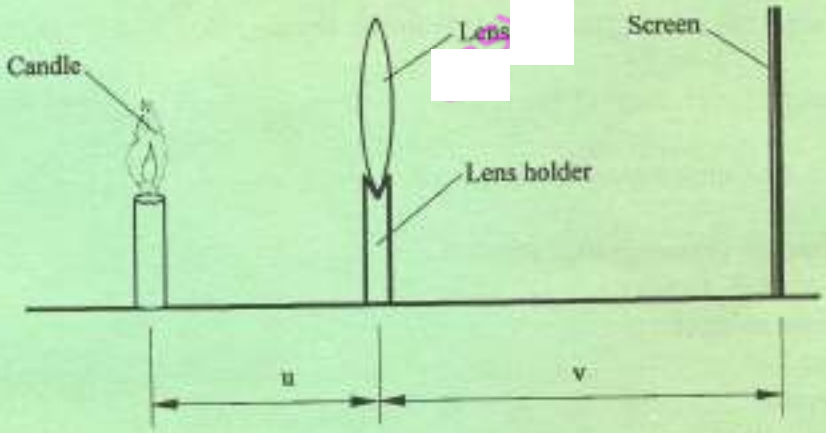

Figure 1

(a) Place the candle at a distance of 33 cm from lens and vary the distance **v** (by moving the screen) until a clear image of the candle is focussed on the screen.

(i) Record the values **u** and **v** in centimetres.

(ii) Vary the distance **u** to 40 cm, 50 cm, 60 cm ,70 cm, 80 cm and obtain corresponding values of **v**, when the image is well focussed on the screen, copy and complete table 1 for your set of readings.

Table I

u(cm)	v(cm)	1/u (cm^{-1})	1/v (cm^{-1})
33			
40			
50			
60			
70			
80			
	6 marks	6 marks	6 marks

(b) (i) Plot a graph of **1/u** against **1/v**. (8 marks)

(ii) Record x_1, the intercept of graph on 1/v axis . (½ mark)

(iii) Calculate $1/x_1$. (1 mark)

(iv) Record y_1 the intercept of graph on **1/u** axis. (½ mark)

(v) Calculate $1/y_1$. (1 mark)

(vi) Calculate average of $1/x_1$ and $1/y_1$. (1 mark)

(vii) State what the value obtained in (vi) above, represents. (1 mark)

(viii) Determine the gradient of the graph. (2 marks)

3. You are provided with the following materials:

- Acidified potassium permanganate solution
- Sodium oxalate (A.R, Grade)
- Iron (II) sulphate solution
- Sulphuric acid 2 M
- Titration apparatus
- Thermometer (0-100°C)
- Bunsen Burner.
- Tripod stand
- Weighing balance (To be shared)
- Distilled water in a wash bottle.
- Beaker.

You are required to:

I Standardize the potassium permanganate solution using sodium oxalate.

II Determine the concentration of the Iron (II) Sulphate solution.

PROCEDURE I

(a) Calculate the mass of sodium oxalate ($Na_2C_2O_4$) required to prepare 0.06 M sodium oxalate in 250 cm^3. (Na = 23, C = 12, 0 =16). (3 marks)

Weigh the calculated amount in (a) above, dissolve and make a solution in a 250 cm^3 volumetric flask with distilled water. Label it 0.06 M $Na_2C_20_4$. Fill the burette with potassium permanganate solution to the Zero mark. Pipette 25.0 cm^3 of the sodiumoxalate solution into a conical flask. Add 15 cm^3 of 2 M sulphuric acid and heat the mixture to 70°C. Titrate the solution with potassium permanganate solution when **hot**, until a pink colour is observed.

(i) Repeat the titration two more times and record the results. (6 marks)

(ii) Write a balanced ionic equation for the reaction taking place. (2 marks)

(iii) Calculate the number of moles of sodium oxalate in 25.0 cm^3. (2 marks)

(iv) Calculate the number of moles of potassium permanganate that reacted with sodium oxalate. (3 marks)

(v) Calculate the molarity of potassium permanganate. (2 marks)

PROCEDURE II

(b) Pipette 25.0 cm^3 of the iron (II) sulphate solution provided into a conical flask. Add 15 cm^3 of 2 M sulphuric acid solution. Titrate with potassium permanganate until a pink colour is observed.

(i) Repeat the titration two more times and record the results. (6 marks)

(ii) Write an ionic equation for the reaction taking place. (2 marks)

(iii) Calculate the number of moles of Fe^{2+} ions in 25.0 cm^3 (2 marks)

(iv) Calculate the concentration of Fe^{2+} ions in solution in grammes per litre. (R.A.M of Fe = 56). (2 marks)

(v) Describe how a stain of potassium permanganate in glass is cleaned. (2 marks)