

231/3 (b) Inst. Sc.  
BIOLOGY  
Paper 3  
PRACTICAL  
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THE KENYA NATIONAL EXAMINATIONS COUNCIL  
Kenya Certificate of Secondary Education  
BIOLOGY  
Paper 3  
PRACTICAL

#### INSTRUCTIONS TO SCHOOLS

*The information contained in this paper is to enable the head of the school and the teacher in charge of Biology to make adequate preparations for this year's Biology Practical examination.*

*NO ONE ELSE should have access to this paper or acquire knowledge of its contents. Great care MUST be taken to ensure that the information herein does NOT reach the candidate either directly or indirectly. The teacher or laboratory technician in charge of Biology should NOT perform any of the experiments or give any information related to these instructions to the candidates.*

**This paper consists of 4 printed pages.**

**1 Each candidate requires the following:**

- (a) 250 ml beaker;
- (b) four test tubes;
- (c) 6 cm<sup>3</sup> of solution **D**;
- (d) 4 cm<sup>3</sup> of solution **E**;
- (e) 6 cm<sup>3</sup> of solution **F**;
- (f) 2 cm<sup>3</sup> of solution **G** supplied with a dropper;
- (g) Stop watch or access to a wall clock;
- (h) Access to hot (boiling) water (one for not more than four candidates). Each candidate requires about 100cm<sup>3</sup>;
- (i) Five labels.

**2 Each examination centre is required to provide the following:**

- (a) Sodium carbonate anhydrous (1.0g per candidate);
- (b) Sodium citrate dihydrate (1.5g per candidate).

**3 PREPARATION OF SOLUTIONS**

**Read the procedures carefully before you start preparing the solutions.**

**3.1 Solution D (To be prepared using substance E supplied)**

- (a) To prepare solution **D**, dissolve the substance **E** supplied in boiling water to form a 1.0% solution;
- (b) The quantity of distilled water to be used will depend on the quantity of substance **E** supplied;
- (c) To determine the quantity of distilled water to be used, multiply the quantity of substance **E** supplied by 100.

**Example**

1. For 0.12g of substance **E** supplied;
  - a) Put the 0.12g of substance **E** supplied in a beaker;
  - b) Add little distilled water to make a smooth paste;
  - c) While stirring, top up with boiling distilled water to  $0.12 \times 100 = 12 \text{ cm}^3$ ;
  - d) Cool to room temperature;
  - e) Provide each candidate with **6 cm<sup>3</sup>** of the solution and label it **Solution D**.
2. For 1.5g of substance **E** supplied;
  - a) Put the 1.5g of substance **E** supplied in a beaker;
  - b) Add little distilled water to make a smooth paste;
  - c) While stirring, top up with boiling distilled water to  $1.5 \times 100 = 150 \text{ cm}^3$ ;
  - d) Cool to room temperature;
  - e) Provide each candidate with **6 cm<sup>3</sup>** of the solution and label it **Solution D**.

3.2 **Solution E (To be prepared using substance D supplied)**

- (a) To prepare solution E; dissolve the substance D supplied in distilled water to form a 1.0% solution;
- (b) The quantity of distilled water to be used will depend on the quantity of substance D supplied;
- (c) To determine the quantity of distilled water to be used, multiply the quantity of substance D supplied by 100.

**Example**

1. For 1g of substance D supplied;
  - (a) Put the 1g of the substance D supplied in a beaker;
  - (b) Add distilled water to  $1 \times 100 = 100 \text{ cm}^3$  and stir to dissolve;
  - (c) Provide  $4\text{cm}^3$  of the solution to each of the candidates and label it **Solution E**.
2. For 0.2g of substance D supplied;
  - a) Put the 0.2g of the substance D supplied in a beaker;
  - b) Add distilled water to  $0.2 \times 100 = 20\text{cm}^3$  and stir to dissolve;
  - c) Provide  $4\text{cm}^3$  of the solution to each of the candidates and label it **Solution E**.

- NOTE:**
1. Prepare solution D from the substance E supplied as specified in 3.1 above.
  2. Prepare solution E from the substance D supplied as specified in 3.2 above.

3.3 **Solution F (Benedict's Solution)**

- (a) Solution F (Benedict's solution) is prepared by mixing **Solution I** and **Solution II**.
- (b) **Solution I**.

Dissolve the substance F supplied in distilled water.

To determine the quantity of distilled water to use, multiply the quantity of substance F supplied by 11.6.

For Xg of substance F supplied, dissolve all of the substance F supplied in  $11.6X\text{cm}^3$  of distilled water.

- (c) **Solution II**

Prepare solution II by dissolving the sodium citrate dihydrate and sodium carbonate anhydrous procured by the school in warm distilled water.

For Xg of substance F supplied, dissolve  $10X\text{g}$  of sodium citrate dihydrate and  $\frac{10X}{1.73} \text{ g}$  of sodium carbonate anhydrous in  $\frac{10X}{1.73} \times 8\text{cm}^3$  of warm distilled water to aid in dissolution.

- (d) While stirring constantly, add **solution I** to **solution II** and allow to cool.

**Example**

1. For 10g of substance **F** supplied;
  - (a) Dissolve all the 10g of the substance **F** supplied in  $11.6 \times 10 = 116\text{cm}^3$  to form **Solution I**;
  - (b) Dissolve  $10 \times 10 = 100\text{g}$  of sodium citrate dihydrate and  $\frac{100}{1.73} = 57.8\text{g}$  of sodium carbonate anhydrous in  $57.8 \times 8 = 462.4\text{ cm}^3$  of warm distilled water to form **Solution II** ;
  - (c) While stirring constantly, add **Solution I** to **Solution II** and allow to cool;
  - (d) Provide each candidate with  $6\text{ cm}^3$  of the solution and label it **Solution F (Benedict's solution)**.
2. For 17.3g of substance **F** supplied;
  - (a) Dissolve all the 17.3g of the substance **F** supplied in  $11.6 \times 17.3 = 200.7\text{cm}^3$  of distilled water to form **solution I**;
  - (b) Dissolve  $10 \times 17.3 = 173\text{g}$  of sodium citrate dihydrate and  $\frac{173}{1.73} = 100\text{g}$  of sodium carbonate anhydrous in  $100 \times 8 = 800\text{ cm}^3$  of warm distilled water to form **solution II** ;
  - (c) While stirring constantly, add **solution I** to **solution II** and allow to cool;
  - (d) Provide each candidate with  $6\text{ cm}^3$  of the solution and label it **Solution F (Benedict's solution)**.

3.4 **Solution G (Iodine Solution)**

- (a) **Solution G (Iodine Solution)** is prepared by dissolving both substances **G** and **H** supplied in distilled water.
- (b) The quantity of distilled water required is determined by multiplying the quantity of Substance **G** supplied by **66.7**;
- (c) For  $Y\text{g}$  of Substance **G** supplied use  $66.7Y\text{cm}^3$  of distilled water; Dissolve all the substance **G** supplied in  $66.7Y\text{cm}^3$  of distilled water, add all the substance **H** supplied and stir to dissolve.
- (d) Store the solution in a dark container.

**Example**

1. For 1g of substance **G** supplied;
  - a) Dissolve all the 1g of the substance **G** supplied in  $1 \times 66.7 = 66.7\text{ cm}^3$  of distilled water;
  - b) Add all the substance **H** supplied and stir to dissolve;
  - c) Provide  $2\text{ cm}^3$  of the solution to each of the candidates and label it **Solution G (Iodine Solution)**.
2. For 0.2g of substance **G** supplied;
  - a) Dissolve all the 0.2g of the substance **G** supplied in  $0.2 \times 66.7 = 13.4\text{ cm}^3$  of distilled water;
  - b) Add all the substance **H** supplied and stir to dissolve;
  - c) Provide  $2\text{ cm}^3$  of the solution to each of the candidates and label it **Solution G (Iodine Solution)**.