

⇒ DOMINION -

## MBC 291 QUESTIONS AND ANSWERS

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### QUESTION 1

List five (5) instruments and five (5) equipments and their uses in medical Biochemistry Laboratory.

### ANSWERS

FIVE (5) INSTRUMENTS AND THEIR USES IN THE  
MBC LAB.

- (i) Spatula ⇒ for transferring and mixing substances.
- (ii) Pipette ⇒ Accurately measuring & transferring small volumes of liquids.
- (iii) Beaker ⇒ storing, holding, measuring & mixing liquids.
- (iv) Glass flask ⇒ storing and holding chemicals or solutions.
- (v) funnels ⇒ prevent spills while transferring chemicals or samples.

FIVE (5) ~~EQUIPMENTS~~ AND THEIR USES IN MBC LAB.

- (1) Water bath ⇒ used to heat up samples to a temperature.
- (2) Autoclave ⇒ used for sterilisation.
- (3) Incubator ⇒ used to grow media or culture materials.
- (4) Centrifuge ⇒ used to separate fluids based on their density.
- (5) Microscope ⇒ used to view and enlarge specimen.

## QUESTION 2

List five (5) Precautions taken in the medical biochemistry laboratory.

## ANSWER

- (i) Ensure that laboratory coats are worn in the laboratory.
- (ii) Ensure that every sample are well labelled.
- (iii) Every electrical appliances must be put off after every practical in the laboratory.
- (iv) Acids must be poured directly into water and not water into acids.
- (v) Ensure to use hand gloves while performing any experiments.
- (vi) Wash your hands before leaving the laboratory.
- (vii) Handle every apparatus in the laboratory gently and carefully.

## EXPERIMENT - 1 (MOLISCH TEST)

Title → Molisch Test

Aim → To identify Carbohydrates in a given sample.

APPARATUS → Test tube, Test tube rack, Pipette, dropper, beaker

PRINCIPLE → When sugars or Carbohydrates are made to react with strong mineral acids (Conc  $H_2SO_4$ ), they undergo partial dehydration to form furfuraldehyde or their derivatives which then condense with  $\alpha$ -

naphthol to form Coloured Compounds (Violet or Purple Compounds)

Reagents used are → - Conc  $H_2SO_4$   
-  $\alpha$ -naphthol  
- Sample A, B, C and D

## EXPERIMENT 4 - CLINISTIX TEST

TITLE ⇒ Clinistox test for glucose

AIM ⇒ To Identify the Presence of glucose in biological fluids e.g. Urine.

Apparatus ⇒ Test tube, Test tube rack, Beaker

Reagent ⇒ Strip of Cellulose paper with one of its end with glucose-oxidase, enzyme peroxidase and o-toluidine.

PRINCIPLE OF CLINISTIX TEST FOR GLUCOSE

### QUESTION 3

State the Principle of Clinistox test

### ANSWER

Clinistox is a strip of Cellulose paper with one of

its end embedded with buffered mixture of Glucose ~~oxidase~~, enzyme Peroxidase and O toluidine.

In the Presence of Glucose Oxidase, Glucose is oxidized to **Gluconic acid** and **hydrogen Peroxide** ( $H_2O_2$ ). The hydrogen peroxide ( $H_2O_2$ ) liberated is acted upon by the enzyme peroxidase to liberate molecular oxygen which is acted upon by O toluidine to give Colours ranging from light green to blue black depending on Glucose Concentration.

#### QUESTION 4

What is the Clinical Significance of glucose in Urine.  
or

What is the Clinical Significance of <sup>Glucosuria</sup> ~~glucose in urine~~.

#### ANSWER

Glucosuria is a medical condition that denotes the presence of glucose in urine.

The Clinical Significance is to determine the high level of blood glucose, which is a sign of diabetes.

#### QUESTION 5

State two conditions in which glucose appear in urine

ANSWERS  $\Rightarrow$  (i) Glucosuria.

(ii) Hyperglycaemia.

## EXPERIMENT 2 - SELIWANOFF'S TEST

TITLE  $\Rightarrow$  Selivanoff's test for ketohexoses

AIM  $\Rightarrow$  To distinguish/differentiate between ketohexose and aldo hexose.

APPARATUS  $\Rightarrow$  Test tube, Test tube rack, dropper, Beaker

PRINCIPLE  $\Rightarrow$  When Sugars or Carbohydrate are treated with Conc mineral acids (e.g.  $H_2SO_4$ ) they undergo partial dehydration to form a 5-Carbon Compound and furfuraldehyde or their derivatives which reacts with resorcinol to form a brick red colouration.

REAGENTS USED  $\Rightarrow$  Sample A, B, C, D  
- Selivanoff's reagent (Resorcinol)

### QUESTION 6

Selivanoff's test is used to test for which sugar?

ANSWER

Ketohexoses or ketohexoses or ketoses

### QUESTION 7

Name the test that is used to differentiate aldose sugar from ketose sugar

ANSWER

Selivanoff's Test

## QUESTION 8

State the Principle of Selwanoff's test

## ANSWER

Principle is stated Above.

**NOTE**  $\Rightarrow$  In Selwanoff's test If a faint pink colour is observed then it is an **Allose** sugar. But If a **Brick red** colouration is observed then it is a **ketose** sugar.

## EXPERIMENT 3 $\Rightarrow$ BENEDICT TEST

**TITLE**  $\Rightarrow$  Benedict Test for reducing sugar

**AIM**  $\Rightarrow$  To determine the presence of reducing sugar in a given solution

**APPARATUS**  $\Rightarrow$  Test tube, Test tube rack, Pipette, dropper, stop watch, beaker.

**REAGENT**  $\Rightarrow$  Sample A, B, C, D  
Benedict solution.

**PRINCIPLE**  $\Rightarrow$  Free aldehyde or ketone groups in sugar will undergo enolization or tautomerization under high alkaline medium to form a strong reducing compound enediols. Enediols will reduce  $\text{Cu}^{2+}$

Sulphate to Cuprous ion. At the end of this experiment a brick red colouration is observed

### QUESTION 9

State the Principle of Benedict test

### ANSWER

State Above.

### QUESTION 10

~~State~~ What is the colour of a glucose positive in Benedict's Solution.

### ANSWER

Brick Red

## SUMMARY OF EXPERIMENT 1-4

- ⇒ MOLISCH TEST ⇒ TO test for the presence of Carbohydrates or Sugars in a given sample.
- ⇒ SELIWANOFF TEST ⇒ TO ~~test~~ differentiate between ketose sugar and aldose sugar.
- ⇒ Benedict TEST ⇒ TO test for the presence of Reducing Sugars in a given solution.
- ⇒ CLINISTIX TEST ⇒ TO test for the presence of Glucose in urine.

## EXPERIMENT 5 - ~~QUALITATIVE DIGESTION OF STARCH~~ SOLUBILITY TEST FOR LIPIDS

TITLE  $\Rightarrow$  Solubility test for lipids

AIM  $\Rightarrow$  To determine the solubility of lipids in various solvents.

APPARATUS  $\Rightarrow$  Test tube, Test tube rack, dropper, Pipette

REAGENT  $\Rightarrow$  Ethanol, water, Acetone, Diethyl ether, Olive oil, palm oil, Groundnut oil.

PRINCIPLE  $\Rightarrow$  Lipids are macromolecules with very long carbon chain which makes them insoluble in polar solvents ~~but~~ soluble in non polar solvent.

### QUESTION 11

State two (2) sample of polar solvents and non polar solvents

### ANSWER

$\rightarrow$  Polar solvents are: (i) water (ii) Ethanol

$\rightarrow$  Non polar solvents  $\rightarrow$  (i) Chloroform (ii) Diethyl ether  
(iii) Benzene



## QUESTION 12

State the Methods used in Identifying lipids in the Laboratory.

- (1) Gas Chromatography
- (2) Thin Layer Chromatography
- (3) High Pressure Lipid Chromatography
- (4) Mass Spectrometry.

## EXPERIMENT 6 - SALIVARY DIGESTION OF STARCH

TITLE  $\Rightarrow$  Salivary digestion (Partial hydrolysis) of Starch.

AIM  $\Rightarrow$  To determine the hydrolytic power action of Salivary amylase on Starch.

APPARATUS  $\Rightarrow$  Test tubes, test tube rack, water bath, pipette, Beaker, Gas Cylinder, Stop watch.

REAGENTS : Normal Saline, 0.1N Iodine Solution, diluted Saliva Solution, Cold Cooked Starch.

PRINCIPLE : Saliva contains electrolytes such as  $\text{Na}^+$ ,  $\text{HCO}_3^-$ ,  $\text{K}^+$ ,  $\text{Ca}^{++}$ ,  $\text{PO}_4^{--}$ ,  $\text{Cl}^-$ ,  $\text{I}^-$  and  $\text{Mg}^{++}$  in trace amounts. Apart from water, the two other <sup>main</sup> constituents of Saliva are

mucois and Salivary amylase. This  $\alpha$ -glycosidic enzyme initiates starch digestion in the mouth.

### QUESTION 13

State the Constituent of Saliva.

### ANSWER

The Constituents of Saliva are:

- (i) Water (99%)
- (ii) Electrolytes ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{HCO}_3^-$ ,  $\text{PO}_4^{3-}$ ,  $\text{Cl}^-$ ,  $\text{I}^-$ )
- (iii) Amylase enzyme or Ptyalin
- (iv) Mucous
- (v) Antimicrobial agents such IgA

### QUESTION 14

Why is the salivary digestion of starch done at  $37^\circ\text{C}$ .

### ANSWER

Salivary digestion of starch is done at  $37^\circ\text{C}$  because the enzyme amylase involved in the breaking down of starch into simple sugars work best at  $37^\circ\text{C}$  being the optimal temperature of the enzyme activity. If not at that

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temperature (either high or low) the enzymes become inefficient or denatured and they would not be able to digest starch.

### QUESTION 15

Why is Cold Cooked Starch used in determining the action of salivary amylase on starch.

### ANSWER

This is because starch is insoluble in water at room temperature. ~~Starch~~ Starch granules are quite resistant <sup>not</sup> penetrated by solutions of water and hydrolytic enzymes, this is due to the formation of hydrogen bonds with the same molecules and other neighbouring molecules. **(not easy)**

However, when they are heated the inter and intra hydrogen bonds become weak thereby allowing the starch to be penetrated by water molecules as well as hydrolytic enzymes digesting them.

## STEPS IN REPORTING EXPERIMENT

- Title
- Aim
- Apparatus
- Reagent
- Principle
- Procedure
- Result
- Discussion
- Biomedical Importance
- Precaution
- Conclusion

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