



**"Investing in Africa's Future"**

**COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES**

**DEPARTMENT OF BIOMEDICAL AND LABORATORY SCIENCES**

**BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS**

**NSLS101: LABORATORY PRINCIPLES PRACTICAL**

**END OF SEMESTER EXAMINATIONS**

**NOVEMBER 2023**

**LECTURER: DR M. SALISSOU**

**DURATION: 3 HOURS**

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**INSTRUCTIONS**

1. Answer **all** questions in both sections A and B on separate answer sheets provided.
2. Mark allocation for each question is indicated at the end of the question.
3. Credit will be given for logical, systematic and neat presentations.

### **SECTION A: SPOT EXAM [20 Marks]**

**Answer all questions**

There are 10 stations which have been set up in the laboratory numbered 1 to 10. For each station (a) Name the item/s shown  
(b) State its/their use in the laboratory

### **SECTION B [80 Marks]**

**Answer all questions**

#### **Question 1**

You are provided with Sodium Chloride granules, 3.5% Sodium Hypochlorite solution and absolute ethanol. Use these provided chemicals to prepare the following solutions. Fully describe the method of preparation of each solution showing all the calculations, masses and volumes used. Label your solutions clearly showing your candidate number and the name of the solution. Submit the prepared solutions for marking.

- (a)** 200 ml of physiologic saline [10]
- (b)** 80ml of 1% Sodium hypochlorite solution using 3.5% Sodium hypochlorite solution [10]
- (c)** 80ml of 70% ethanol [10]
- (d)** State one laboratory use of each of the solutions which you have prepared [3]
- (e)** Describe how a balance can be maintained in good working condition [2]

TOTAL: 35 MARKS

## Question 2

You are provided with a urine sample **W** from a pregnant woman complaining of painful legs and lower abdominal pains. You are required to measure the amount of total protein in the urine using the Colorimetric trichloroacetic acid method.

### Procedure

#### A. Preparation of a calibration graph

1. You are provided with a protein standard labelled **P** and its protein concentration is 40g/l. Take 5 test tubes and number them S1 to S5. Pipette into each tube the volumes of physiologic saline and protein standard indicated in Table 1, to prepare protein standards S1 to S5

Table 1: Preparation of protein standards

	SI	S2	S3	S4	S5
Physiologic saline /ml	2.5	2.0	1.5	1.0	0.5
Protein standard <b>P</b> /ml	0.5	1.0	1.5	2.0	2.5

2. Mix thoroughly the contents of each test tube.
3. Take another set of 5 test tubes and number them ST1 to ST5. Pipette 2.4 ml of trichloroacetic acid into each numbered test tube
4. Add 0.8 ml of the protein standard solution S1 into the trichloroacetic acid in test tube numbered ST1. Do the same for standards S2 to S5.
5. Mix the contents of each test tube numbered ST1 to ST5 and leave for 5 minutes.
6. Remix each test tube and read the absorbance of each tube in a colorimeter at wavelength 450 nm. Zero the colorimeter with Trichloroacetic acid. Record the absorbances of each tube.

**B. Measuring the total protein concentration in the urine sample W**

1. Pipette 2.4 ml of trichloroacetic acid solution into a tube.
2. Add 0.8 ml of sample **W** to the tube and leave for 5 minutes.
3. Remix the contents of the tube and read the absorbance of the precipitated protein in a colorimeter at a wavelength of 450 nm. Zero the instrument with distilled water.
4. Read off the concentration of the urine protein in g/l from the prepared calibration graph.

**Results**

- a) Calculate the protein concentration of each of the standard solutions numbered S1 to S5. [10]
- b) Record the absorbance of each of the contents in tubes numbered ST1 to ST5. [10]
- c) Take a sheet of graph paper and prepare a calibration curve by plotting the absorbances of each of the solutions numbered ST1 to ST5 against the concentration of the corresponding protein standard. Draw a straight line passing through the points. [10]
- d) Record the absorbance of the urine sample **W** and use your calibration curve to determine the concentration of protein in the urine sample **W**. [10]
- e) Explain the principle of the trichloroacetic method. [5]

TOTAL: 45 MARKS