A REPORT ON

STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

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CERTIFICATION

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STUDENT DATE

_____ _____

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_____ _____

PROF R.A OLOWU DATE

HOD Chemistry.

DEDICATION

This work is dedicated to the almighty God for his love and mercy granted to me throughout the period of my Industrial Training, also to my parents for their love and support.

ACKNOWLEDGEMENTS

Praise be to the Almighty for His mercy and grace, for seeing me through the period of my Industrial Training and for the completion of the Training.

I am also thankful to my parents for their unending and unwavering support through the period of my training.

I am sincerely grateful to the staffs at the ULTIMATE LABORATORY CARE for the lessons, the advices, the trust they had in me to carry out tests, the corrections and the patience in putting me through the practical processes and their support.

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CHAPTER ONE

1.0. INTRODUCTION

The Student Industrial Work Experience Scheme {SIWES} is a special program designed to expose and prepare students of higher institutions of learning on practical aspects of their profession. This enables them acquire the basic skills and also get the needful experience, which is also necessary in awarding them degree in their various degree of study.

1.1. STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME {SIWES}

SIWES was established by industrial training fund {ITF} in 1973 to solve the problem of lack of adequate practical skills preparatory for employment in industries by Nigerian graduate of tertiary institutions. The scheme exposes students to industry-based skills necessary for a smooth transition from the classroom to the world of work. It affords students of tertiary institutions the opportunity to familiarize and exposed them to the needed experience in handling machinery and equipment which were usually not available in the education institution.

1.2. ABOUT THE ORGANISATION

Ultimate care medical laboratory is a clinical laboratory facility where medical professionals analyse and test body fluids, tissues and cells to diagnose and treat diseases. The laboratory consists of Clinical chemistry lab, Haematology lab, Microbiology lab, Molecular diagnostics lab, Pathology lab and medical records units. It is headed by a Medical Director with a background in public health with assistance of other qualified doctors and health workers. This facility cater for the general public.

CHAPTER TWO

2.0. THE LABORATOR

2.1. WHAT IS LABORATORY?

A Laboratory is a controlled environment where scientific experiments, researches and measurements are conducted. It is equipped with specialized instruments and equipment for carrying out various scientific investigations.

2.2. INTRODUCTION TO MEDICAL LABORATORY

A medical laboratory is a facility that provides controlled conditions in which science, technology research, experiments and measurement are performed.

A medical laboratory is where various tests diagnosed or prescribed by the doctor is carried out by laboratory scientists. These tests involve clinical specimens in order to obtain information about the health of a patient and to provide diagnosis, treatment and prevention of disease.

2.3. QUALITY CONTROL (QC).

Quality control measures are implemented to monitor and maintain the reliability and accuracy of laboratory results. Quality control ensures that analytical methods, instruments, and procedures are working as intended and producing valid and precise results. Here are some key aspects of Quality control:

a) Quality Control Samples: Quality control samples, also known as control samples, are prepared materials with known values or properties that closely resemble the samples being tested. These samples are analysed alongside the test samples to assess the performance of the analytical method and instrument.

b) Control Charts: Control charts are graphical tools used to monitor the performance of analytical methods over time. They plot the Quality control sample results against control limits, which are Statistical limits based on acceptable ranges. Control charts help identify any trends, shifts, or outliers in the data, indicating potential issues with the analytical process.

c) Calibration and Maintenance: Regular calibration and maintenance of laboratory equipment and instruments are essential for ensuring accurate and reliable measurements. Calibrations involve comparing the instrument's readings against known reference standards, while maintenance includes routine cleaning, verification, and adjustment of the equipment.

d) Proficiency Testing: Proficiency testing involves participating in external programs or inter laboratory comparisons to evaluate the laboratory's performance. It allows laboratories to compare their results with other laboratories and helps identify areas for improvement.

Documentation: Proper documentation of quality control activities is crucial. This includes recording all quality control results, deviations, troubleshooting steps, and corrective actions taken. Documentation enables traceability, allows for the identification of trends or recurring issues, and provides evidence of compliance with regulatory requirements. By implementing well-defined Standard Operating Procedures and stringent Quality Control measures, laboratories can enhance the accuracy, reliability, and reproducibility of their results, leading to improved data quality and confidence in the laboratory's work.

2.4. SAFE WORKING PRACTICES IN A MEDICAL LABORATORY

The following are some of the important points which apply when working w in ith infectious materials

- Wear personal protective equipment {PPE} e.g. gloves, lab coats while carrying out all the laboratory procedures and discard after use. When torn or contaminated wash hands and wear new ones.
- Do not leave the working place or walk around the laboratory with gloves hands.
- The laboratory benches and floors must be kept clean, near and free of extraneous materials at the end of each day's work, or after blood spillage, work surfaces should be disinfected.
- Do not touch eyes, nose or skin with gloves hands
- Do not recap used needles. Used needles and syringes and other sharp objects be put in a puncture resistant container.
- Centrifuge safely to avoid aerosols.

2.5. GENERAL LABORATORY EQUIPMENTS AND THEIR USES

THE LIGHT MICROSCOPE

A light microscope is a laboratory instrument or tool, that uses visible light to detect and magnify very small objects and enlarge them. They use lenses to focus light on the specimen, magnifying it thus producing an image.

GLASS SLIDE AND COVERSLIPS.

A **microscope slide** is a thin flat piece of glass, typically 75 by 26 mm and about 1 mm thick, used to hold objects for examination under a microscope. The purpose of a microscope slide is to act as the support for a sample or specimen which needs to be examined under a microscope. The most important aspects of any microscope slide are the clarity and quality of the glass and the nature of the light which can pass through it.

Coverslips are flat pieces of glass less than a millimeter thick and generally around 20 mm wide. A coverslip is placed over a specimen on a microscope slide, to hold the specimen in place and protect it from contamination from the environment.

ELECTROPHORESIS MACHINE.

Electrophoresis machine, otherwise known as genotype machine is a machine used in detecting the genotype of human being which basically is AA, AS, SS.

AUTOCLAVE.

An autoclave is a machine that uses steam under pressure to kill harmful bacteria, viruses, fungi, and spores on items that are placed inside a pressure vessel. An autoclave is basically a pressure chamber used to carry out any process that requires highly elevated temperature and pressure, such as medical waste disposal, and/or medical equipment sterilization.

CENTRIFUGE.

Microhematocrit Centrifuges are used for determination of volume fractions of erythrocytes (red blood cells) in blood and for separation of micro volumes of blood and solutions.

Bucket Haematospin Centrifuge are used in the separation of samples such as blood, urine and so on in their respective bottle or container.

HOT AIR OVEN.

A hot air oven is an essential laboratory equipment that uses to dry heat (hot air) to sterilize laboratory objects and samples. This type of sterilization is also known as dry heat sterilization. A pictorial representation of a hot air oven is shown at Figure 4.

INCUBATOR.

An incubator is a device used to grow and maintain microbiological cultures or cell cultures. The incubator maintains optimal temperature, humidity and other conditions such as the CO_2 and oxygen content of the atmosphere inside.

REFRIGERATOR.

Refrigerators are equipment used in the laboratory with the function of refrigerating, preserving and storing reagents, culture media, biological and bacterial samples, among others.

NEEDLE AND SYRINGE.

A medical instrument for injecting or drawing off liquid, consisting of a hollow cylinder with a plunger inside and a thin hollow needle attached.

PIPETTE.

A **pipette** is a type of laboratory tool commonly used in chemistry and biology to transport a measured volume of liquid, often as a media dispenser.

TEST TUBES.

A test tube is a relatively slim glass or plastic vessel with a rounded bottom. They are designed to hold small quantities of chemicals and feature a flared lip to make pouring easier. In experiments that require heating of the test tube, a test tube holder allows the user to move or hold the test tube safely.

COTTON WOOL.

Cotton wool consists of silky fibers taken from cotton plants in their raw state. Impurities, such as seeds, are removed and the cotton is then bleached using hydrogen peroxide or sodium hypochlorite and sterilized. It is also a refined product (*absorbent cotton* in U.S. usage) which has medical, cosmetic and many other practical uses.

SAMPLE BOTTLES.

For collection of samples. Anti-coagulant bottles; Green and purple bottles contains ethelynediamminetetraacetate (EDTA) while the yellow bottlle contains fluoride oxalate.

Universal bottle; the bottle is red in colour.

CHAPTER THREE

3.0. WORK EXPERIENCE AT PLACE OF ATTACHMENT

3.1. VARIOUS SECTIONS OF THE LABORATORY

3.1.1PHLEBOTOMY SECTION.

PHLEBOTOMY- The functions of the phlebotomy include collection and preparation of blood for testing so it can be analysed in the medical laboratory. The phlebotomist attends to the patient based on the request of test to be done sent by the doctor through the EMR {Electronic medical record}. The phlebotomist keeps record of each test done by each patient, labels each bottle i.e., Heparinized bottle also the microbiological samples. Listed below are a few steps to followin order to collect blood sample:

1. ASSEMBLE EQUIPMENT: A sterile glass, gloves, tourniquet, Alcohol hand rub, 70% alcohol swab, cotton wool, writing forms and a puncture resistant sharps container.
2. IDENTIFY AND PREPARE PATIENT: Introduce yourself, ask for patients full name, check that the laboratory form matches the patients identity, ask the patient for previous allergies or phobias during injections or blood draws and make the patient comfortable in a supine position.
3. SELECT THE SITE OF PUNCTURE: Extend the patient's arm and inspect the antecubital fossa or forearm, locate a straight, clear and visible vein without applying the tourniquet, apply the tourniquet about 4-5 finger widths above the venipuncture site and re-examine the vein.
4. PERFORM HAND HYGIENE AND PUT ON GLOVES: Clean hands with alcohol rub, use 3ml of alcohol rub on the palm of hands, and rub it into the fingertips, back of hand and all over the hands until dry. After performing hand hygiene, put on well fitting, non-sterile gloves
5. DISINFECT THE ENTRY SITE: Clean the site with a 70% alcohol swab and allow to dry. Start from the center of venipuncture site and work downward and outwards to cover an area of 2cm or more. Do not touch the cleaned site.
6. TAKE BLOOD: Ask the patient to form a fist so the veins are more prominent. Enter the vein swiftly at 39 degree angle or less, continue to introduce the needle along the vein at the easiest angle of entry. Once sufficient blood has been collected, release the tourniquet before withdrawing the needle. Withdraw the needle gently and apply gentle pressure to the site with a clean cotton wool. Ask the patient to hold the cotton in place with the arm extended and raised.

3.1.2. HAEMATOLOGY SECTION.

This section has various test such as genotype, blood grouping, Packed Cell Volume, Erythrocytes Sedimentation Rate and WBC**.**

3.1.3. MICROBIOLOGY SECTION.

This section contains test such as WIDAL reaction test, Hepatitis B and C, Urine Microscopy, Culture and Sensitivity and Helicobacter pylori test

3.1.4. CLINICAL CHEMISTRY SECTION:- Includes test such as Urine analysis, glucose analysis, EU/Cr test.

3.2. TEST CARRIED OUT IN THE MEDICAL LABORATORY.

MICROBIOLOGY SECTION.

This section contains test such as Widal Reaction Test, Hepatitis B and C, Helicobacter Pylori Test.

3.3.1 *MALARIA PARASITE TEST*

This is a test carried out for ascertaining the presence or absence of malaria parasite in the blood. Malaria is a very important tropical disease. Malaria is caused by protozoa of the Plasmodium sp.

METHOD:-

Field's Stain Method for Thick Blood Films

Red blood cells are lysed during this procedure. Diagnosis is based on the appearance of the parasite. The parasites appear more concentrated (denser under the microscope) in thick blood films as compared to thin blood films.

MATERIALS REQUIRED

Whole blood collected in an EDTA bottle, Sterilized slide, Applicator stick, Field stain A and B, Immersion oil, Microscope.

PRECAUTION: It is necessary to be very careful while collecting and preparing blood samples. A number of parasitological, bacterial and viral diseases can be transmitted through blood. Blood film should be prepared preferably within one hour of collection.

PROCEDURE:

1. I collected the patient's blood sample in an heparinized bottle.
2. I made a thick film on the slide from a well-mixed whole blood collected in an heparinized bottle.
3. I allowed the slide to air dry then dip the slide into field's stain A for few minutes
4. I removed the slide from the field stain A then dip the slide into distilled water.
5. I removed the slide from the distilled water and dip the slide into field stain B for myfew minutes
6. After the staining is done, I left the slide to air dry, and then i added a drop of oil immersion to the smear and observed under ×100 objective lens of a compound microscope.

3.3.2. HEPATITIS B RDT TEST:-

Hepatitis B is an infection of the liver caused by the hepatitis B virus. The infection can be acute (short and severe) or chronic (long term). Hepatitis B can cause a chronic infection and puts people at high risk of death from cirrhosis and liver cancer. It can spread through contact with infected body fluids like blood, saliva, vaginal fluids and semen. It can also be passed from a mother to her baby.

Aim:- To test for the presence of Hepatitis B surface Antigen in the patient's blood

Materials needed:- HBsAg kit, Whole Blood, Buffer(HBsAg), Pipette.

Procedure:-

1. The patient's blood is collected at the phlebotomy section and sent to the microbiology section of the laboratory where the test is done
2. A RDT strip for the test is brought to room temperature, removed from its pouch and placed on a flat surface.
3. A pipette is used to drop a drop of whole blood on the absorbent part of the strip and buffer is added for easy migration to the test area.
4. Migration occurs and the result is read after 10-15 minutes.

Result

- Only the controls line signifies a negative result
- Both the control line and test line signifies a positive result
- No line or only test line signifies invalid

3.3.3 HEPATITIS C RDT TEST

Hepatitis C is a viral infection that affects the liver. It can cause both acute (short term) and chronic (long term) illness. It can be life-threatening. Hepatitis C is spread through contact with infected blood. This can happen through sharing needles or syringes, or from unsafe medical procedures such as blood transfusions with unscreened blood products.

AIM:- To test for the presence of Hepatitis C Virus Antigen in the patient's blood

MATERIALS NEEDED:-

HCV kit(strip), Whole Blood, Buffer(HCV), Pipette.

PROCEDURE:-

1. The patient's blood is collected at the phlebotomy section and sent to the microbiology section of the laboratory where the test is done
2. A RDT strip for the test is brought to room temperature, removed from its pouch and placed on a flat surface.
3. A pipette is used to drop a drop of whole blood on the absorbent part of the strip and buffer is added for easy migration to the test area.
4. Migration occurs and the result is read after 10-15 minutes.

3.3.4 WIDAL RDT TEST

Typhoid fever is an infectious disease caused by the Salmonella typhi, it is diagnosed by Widal test which employs an antigen-antibody reaction to screen for the presence of *Salmonella typhi* and *para typhi* antibodies in the sample serum.

AIM:- To test for the presence of a bacteria which cause Typhoid Fever called *Salmonella typhi*

MATERIALS NEEDED:-

Widal RDT cassette, Whole Blood, Bucket Centrifuge, Micropipette.

PROCEDURE:-

1. The patient's blood is collected at the phlebotomy section and sent to the microbiology section of the laboratory where the test is done
2. The whole blood collected in an EDTA bottle is place in a bucket centrifuge and the centrifuge is balanced. It is spinned for 2-3 minutes to separate the red blood cell and plasma into layers.

3. The RDT cassette is removed from its pouch and placed on a flat surface.A pipette is use to pick the plasma from the EDTA bottle and 2-3 drops is added into the sample well of the cassette.
4. Migration occurs and the result is read after 15 minutes

RESULT:

The cassette consists of three lines which are the control line, IgG line and IgM line

- Only the control line means negative test
- Control line and IgM means early primary infection
- Control line and IgG means late stage or Latent infection
- Control line, IgM and IgG means Active primary, repeat infection
- No line or both IgM and IgG means Invalid

3.3.5 H. PYLORI RDT TEST:-

H. *pylori* is a type of bacteria that can infect the stomach and cause various digestive issues, like ulcers.

AIM:- To determine the presence of a bacteria called *Helicobacter pylori* which causes ulcer

MATERIALS NEEDED:-

a) *H. pylori* RDT kit, Whole Blood, Buffer, Micropipette .

PROCEDURE:-

1. The patient's blood is collected at the phlebotomy section and sent to the microbiology section of the laboratory where the test is done.
2. A RDT cassette for the test is removed from its pouch and placed on a flat surface.
3. A pipette is used to drop a drop of whole blood on the sample well of the cassette and buffer is added for easy migration to the test area.
4. Migration occurs and the result is read after 10-15 minutes.

RESULT:-

- Only the controls line signifies a negative result
- Both the control line and test line signifies a positive result
- No line or only test line signifies invalid

3.4. CLINICAL CHEMISTRY SECTION OF THE LABORATORY

3.4.1. URINANALYIS (UA)

A urinalysis (also known as a urine test) is a test that examines the phyiccal, chemical and microscopic aspects of a urine sample.

In general, laboratory technician can examine a urinalysis urine sample for the following broad aspects:

- Color and appearance [Physical properties]
- Chemical properties.
- Microscopy.

URINE COLOR AND APPEARANCE

For most urinalysis tests, a laboratory technician examines how the urine sample looks to the "naked eye." They check if it's clear or cloudy and if it's pale, dark yellow or another color.

Normal urine color is usually some shade of yellow and can range from colorless or pale yellow to deep amber, depending on how concentrated or diluted (watery) your urine is.

Many things can affect the color of your urine, including certain medications and supplements and certain foods you eat, such as beets. However, an unusual urine color can also be a sign of disease. For example, red-colored urine can happen when blood is present in your urine and can be an indicator of disease or damage to a part of your urinary system.

Cloudy urine doesn't always indicate unhealthy urine. For example, sperm and skin cells are harmless and could make your urine appear cloudy.

URINE CHEMICAL PROPERTIES

To examine chemical aspects of a urine sample, healthcare providers or lab technicians often use special test strips called dipsticks to test for certain chemical substances in the urine sample. The strips have pads of chemicals that change colour when they come in contact with specific substances.

The degree of colour change on the dipstick can give an estimate of the amount of substance present. For example, a slight colour change in the test pad for protein may indicate a small amount of protein present in the urine sample, whereas a deep colour change may indicate a large amount.#

3.4.2. GLUCOSE ANALYSIS

Glucose Analysis Tests: Glucose analysis tests measure glucose levels in blood, urine, or interstitial fluid. They help diagnose and monitor diabetes, prediabetes, and hypoglycaemia.

Types of Glucose Tests:

1. Fasting Plasma Glucose (**FPG**)
2. Oral Glucose Tolerance Test (**OGTT**)
3. Random Plasma Glucose
4. Urine Glucose
5. Glycated Hemoglobin (**HbA1c**)
6. Continuous Glucose Monitoring (**CGM**)

PROCEDURE: -

Fasting Plasma Glucose (FPG)

1. Patient preparation:
- Fast for 8-12 hours
- No calorie intake, only water
- Avoid strenuous exercise

2. Blood collection:
- Venipuncture (venous blood sample)
- Use a sterile needle and syringe
- Collect 5-10 mL blood in a tube containing anticoagulant (e.g., EDTA)

3. Sample processing:
- Centrifuge to separate plasma
- Aliquot plasma into tubes
- Store at 2-8°C

4. Analysis:
- Automated analyzer (e.g., Beckman Coulter, Roche)
- Enzymatic assay (e.g., hexokinase)
- Measure glucose concentration (mg/dL)

5. Result interpretation:
- <100 mg/dL: normal
- 100-125 mg/dL: prediabetes
- ≥126 mg/dL: diabetes

Oral Glucose Tolerance Test (OGTT)

1. Patient preparation:
- Fast for 8-12 hours
- No calorie intake, only water
- Avoid strenuous exercise

2. Baseline blood collection:
- Venipuncture (venous blood sample)
- Collect 5-10 mL blood

3. Glucose ingestion:
- Consume 75g glucose solution within 5 minutes

4. Blood collection:
- Venipuncture at 1, 2 hours post-glucose ingestion
- Collect 5-10 mL blood each time

5. Sample processing and analysis:
- Same as FPG

6. Result interpretation:
- <140 mg/dL: normal
- 140-199 mg/dL: prediabetes
- ≥200 mg/dL: diabetes

Random Plasma Glucose

1. Blood collection:
- Venipuncture (venous blood sample)
- Collect 5-10 mL blood

2. Sample processing and analysis:
- Same as FPG

3. Result interpretation:
- <140 mg/dL: normal
- ≥140 mg/dL: hyperglycemia

Urine Glucose

1. Urine collection:
- Midstream urine sample
- Collect 10-20 mL urine

2. Dipstick testing:
- Use a glucose dipstick
- Compare color change to reference chart

3. Result interpretation:
- Negative: normal
- 1+ to 4+: glycosuria

Glycated Hemoglobin (HbA1c)

1. Blood collection:
- Venipuncture (venous blood sample)
- Collect 5-10 mL blood

2. Sample processing:
- Centrifuge to separate erythrocytes
- Wash and lyse erythrocytes

3. Analysis:
- Chromatography (HPLC) or spectrophotometry
- Measure HbA1c percentage (%)

4. Result interpretation:
- <5.7%: normal
- 5.7-6.4%: prediabetes
- ≥6.5%: diabetes

Continuous Glucose Monitoring (CGM)

1. Device insertion:
- Insert CGM device under skin
- Calibrate device according to manufacturer's instructions

2. Data collection:
- CGM measures glucose continuously
- Data transmitted to receiver or smartphone

3. Data analysis:
- Review glucose trends and patterns
- Identify hypoglycemic/hyperglycemic episodes

Please note that these procedures may vary depending on the institution, equipment, and specific testing requirements.

3.4.3. EU/Cr TEST

A creatinine blood test measures the level of creatinine in the blood. Creatinine is a waste product that forms when creatine, which is found in your muscle, breaks down. This test tells your doctor how well your kidneys are working.

Each kidney has millions of small blood-filtering units called nephrons. The nephrons constantly filter blood through a very tiny cluster of blood vessels known as glomeruli. These structures filter waste products, excess water, and other impurities out of the blood. The toxins are stored in the bladder and then removed during urination.

Creatinine is one of the substances that your kidneys normally eliminate from the body. Doctors measure the level of creatinine in the blood to check kidney function. High levels of creatinine may indicate that your kidney is damaged and not working properly.

Creatinine blood tests are usually performed along with several other laboratory tests, including a blood urea nitrogen (BUN) test and a basic metabolic panel (BMP) or comprehensive metabolic panel (CMP). These tests are done during routine physical exams to help diagnose certain diseases and to check for any problems with your kidney function.

Instruments:

1. Beckman Coulter AU 680
2. Roche Cobas U 701
3. Siemens Clinitek Status+
4. BioRad D-10
5. Thermo Scientific Indiko

Procedures:

Electrolyte Analysis (E)

1. Ion-Selective Electrodes (ISE):
- Measure sodium, potassium, chloride

2. Chromatography:
- High-Performance Liquid Chromatography (HPLC)
- Ion Chromatography (IC)

Creatinine Analysis (Cr)

1. Spectrophotometry:
- Jaffe reaction (chemical method)
- Measure creatinine concentration

2. Enzymatic assay:
- Creatinine kinase method

Microscopic Examination

1. Centrifuge urine sample (5-10 minutes)
2. Examine sediment:
   - Microscopy (e.g., leukocytes, erythrocytes, casts)
   - Phase contrast microscopy

Quality Control

1. Regular calibration of instruments
2. Use of control materials (e.g., urine controls)
3. Proficiency testing (e.g., **CAP, EQA**)
4. Regular quality assessment

Precautions and Interferences

1. Contamination avoidance
2. Medications (e.g., diuretics, antibiotics)
3. Food intake (e.g., high-protein diet)
4. Dehydration
5. Exercise
6. Pregnancy

Result Interpretation

1. Compare results to reference ranges
2. Consider patient's medical history and symptoms
3. Consult with healthcare professional for diagnosis and treatment

Reference Ranges:

1. Electrolytes:
- Sodium: 40-220 mmol/L
- Potassium: 25-120 mmol/L
- Chloride: 110-250 mmol/L

2. Creatinine:
- Male: 60-120 mg/dL

- Female: 40-100 mg/dL

3. Urinalysis:

- pH: 4.5-8.0
- Protein: negative or trace
- Glucose: negative
- Ketones: negative
- Blood: negative

Reference ranges may vary depending on the institution and specific testing requirements.

3.5 HAEMATOLOGY SECTION OF THE LABORATORY

3.5.1 ABO Blood group Test and Rh factor Test:-

Blood groups are determined by the presence or absence of certain antigens on the surface of red blood cells. The most well-known blood group systems are ABO and Rh. The ABO system classifies blood into four types: A, B, AB, and O, based on the presence or absence of A and B antigens. The Rh system determines whether a person is Rh positive or Rh negative.

AIM:- To determine the ABO blood group of patients by the reaction of specific antibodies with the anti sera to give an agglutination reaction.

MATERIALS NEEDED:-

Ceramic tiles, Anti sera A,B and D, test tube, cotton wool, patient's whole blood collected in an EDTA bottle

PROCEDURE

1. Using a micropipette, a drop of whole blood is dropped in three different wells of the ceramic tile labelled A,B and D.
2. A drop of Anti sera A,B and D is also dropped accordingly into the ceramic tiles.
3. Mix the whole blood and Anti sera using a clean test tube base. Rock the ceramic tiles clockwise or anti clockwise and watch out for agglutination

INTERPRETATION OF RESULTS

- Agglutination on well A and D means A+
- Agglutination on well A only means A-
- Agglutination on well B and D means B+
- Agglutination on well B only means B-
- Agglutination on well A,B and D means AB+
- Agglutination on well A and B only means AB-
- Agglutination on well D only means O+
- No Agglutination on well A,B and D means O-

Note:- + and - is the Rhesus factor

3.5.2 GENOTYPE TEST:-

Genotype refers to the genetic make up of an individual.Very small samples of haemolysates from whole blood are added to the acetate paper. The haemoglobin in the sample are separated by electrophoresis using an alkaline buffer (pH 8.2-8.6). The patterns of the bands are determined using the controls.

Aim:- To determine the genotype of an individual using the electrophoresis machine in which blood migrates from its anode to cathode

Materials and Equipments needed:-

Electrophoresis machine, acetate or genotype paper, applicator, salt solution, tissue paper patient's whole blood collected in an EDTA bottle, control sample(known AS genotype)

Procedure:-

1. Drops of patient's blood and the control sample are dropped in the wells of plastic tiles and drops of sterile water is added to prevent lysing of the red blood cells
2. The acetate paper is removed from the salt solution and place on a tissue paper to make it moist not wet.
3. The applicator is used to pick a portion of the control and place on the left side of the acetate paper and the remaining samples follow the control sample
4. The acetate paper is placed inside the electrophoresis machine for 20 minutes and migration occurs from the anode to the cathode. Based on the speed of migration, the genotype is read in term of A,S and C

RESULT INTERPRETATION

A migrates faster than S and S also migrates faster than C

Depending on the migration the result is read as AA, AS, SS, AC, SC, CC.

3.5.3 PACKED CELL VOLUME (PCV) OR HAEMATOCRIT (HCT)

Haematocrit (HCT) is the calculated volume percentage of red blood cells (erythrocytes) in your blood. Haematocrit is also called packed cell volume (PCV) or erythrocyte volume fraction.

Human blood contains red blood cells, white blood cells, and platelets suspended in a liquid called plasma. The word haematocrit means to separate blood. In a haematocrit test, the red blood cells are separated from the rest of your blood cells and plasma.

EQUIPMENTS*:* Anti coagulated whole blood (normally in EDTA), Clay sealer, PCV reader (card or Hawksley model), Microhaematocrit Centrifuge, Capillary tubes, Disposable gloves, Tissue paper, Sharps container, Clinical waste bin and Refuse bin

PROCEDURES

This test measures the proportion of red blood cells/corpuscles (RBCs) in a centrifuged blood sample. It is useful in the diagnosis and management of anaemia, dehydration and other conditions.

1. Don gloves onto clean and dry hands.
2. Mix the sample thoroughly by inverting it gently at least five times. Remove two capillary tubes from the container.
3. Open the blood sample and place the capillary tubes in it. Tilt the sample to about 45 degrees to assist filling of the tubes.

4. Once the tubes are about 2/3 full, place your finger over the open end before removing them from the blood sample (this helps to prevent air bubbles forming in the other end of the tube).
5. Keep your finger over the end of the tubes while wiping their exterior free of blood and sealing the ends that were placed in the sample by pressing them into the sealant. Once the tubes are sealed you can take your finger off the other end.
6. Place both tubes in the centrifuge grooves directly opposite one another, this ensures the centrifuge is balanced. Ensure the clay seals are towards the outside. Screw the centrifuge cover into place and close the lid. Spin at 10,000rpm for five minutes (the speed and time may vary on some models).
7. Once the centrifuge has completed its spin remove a capillary tube and examine it visually.
8. To obtain the PCV reading place the capillary tube either onto a reader card or into the tube holder on a Hawksley haematocrit reader.

CHAPTER FIVE

4.0 RECOMMENDATIONS

- I recommend that more time should be given to the students of chemistry for SIWES activities.
- I recommend that more preference should be given to the power sector so as to provide adequate light to various medical laboratories in the country.
- I recommend that the government should look into the matter of discrimination among chemistry and medical laboratory students.
- I recommend that all institutions or bodies involve in Student Industrial Working Experience Scheme, should provide places for industrial attachment for Student Industrial Training Fund and also pay some allowances to students and the company should provide more safety equipment to prevent further environmental and health hazards.

4.1 CONCLUSION

One of the most intriguing, successful, illuminating, and educational experiences of my life was the three months I spent on an industrial attachment with the Lagos State University Primary Healthcare Centre. Through this training, I have developed my practical skills and obtained new perspective and a more thorough understanding of the actual industrial working conditions and practices.

Not only did I directly participate in tasks to get these invaluable experiences and knowledge, but I also participated in other training activities like work observation, supervision, and interactions with coworkers, supervisors, superiors, and other professionals in the area. It also made me aware of some specific aspects of the medical setting. And based on my experiences, I can confidently say that the industrial training program's main goal has been accomplished.