A

TECHNICAL REPORT

ON

STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES*)*

UNDERTAKEN AT

THE FEDERAL MINISTRY OF HEALTH, SECRETARIAT CENTRAL AREA ABUJA AND NIGERIA BIOSAFETY MANAGEMENT AGENCY, LUGBE ABUJA.

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DEDICATION

This report is dedicated to GOD for his mercy and protection, to my parents for making sure I get educated and to myself for my hard work.

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I wish to show my utmost gratitude to GOD for his guidance and grace through my life.

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ABSTRACT

The student industrial work experience scheme report enables the student put the knowledge gained in a textual form, by illustrating and detailing the various project initiated during the attachment. This report contains all history, organizational structure and knowledge gained during my attachment period.

Emphasis are laid in certain areas. Students projects during the training are summarized as exercises and practicals are not excluded. Languages used in this report are drawn from various medical fields.

This report has been compiled in a manner which is very clear to any reader.

# TABLE OF CONTENT

Title page

Dedication

Acknowledgment

Abstract

Table of content

Chapter one

1. Introduction
2. Brief history of siwes

Chapter two

1. About FMOH
2. About NBSMA

Chapter three

1. Training experience in FMOH
2. Rules and regulation
3. The other departments under food and drugs
4. Registry and delivery (incoming and outgoing files and mails)
5. Policies and mandates (examples, implementation strategies and guidelines)
6. First exercise (zero water campaign)
7. Types of contamination
8. Interactive with the staff on the ban of sniper and carbide
9. Pharmacy and pharmacist unit
10. Toxicovigilance (environmental and medical toxicology)
11. Drug information
12. Second exercise (gene therapy relating to cancer)
13. Pharmacognosy
14. Third exercise (effect of combined treatment of artemether and lumefantrine for malaria)
15. Drug abuse and pharmacovigilance

Chapter four

1. Training experience in NBSMA
   1. First practical (using a ph. meter)
   2. Second practical (making distilled water)
   3. Third practical (using an automatic and a manual centrifuge to get plasma)
   4. EDTA as anti-coagulant and for removing toxic metal
   5. First exercise (differences between ionized water, deionized water and distilled water)
   6. Second exercise (genome editing technologies and regulatory processes)
   7. Plasmids and its applications
   8. Gel electrophoresis and PCR
   9. Blue biotechnology
   10. Third exercise (golden rice and its socio-economic importance)
   11. Fourth exercise (cry gene: -types and uses)
   12. Ending project (pharmacogenomics and pharmacogenetics)
   13. Last practical (how to operate an electronic weigh balance)

Observation

Conclusion

Challenges encountered during period of training

# CHAPTER ONE

INTRODUCTION

BREIF HISTORY OF SIWES

The Student Industrial Work Experience Scheme (SIWES) was initiated in 1973 by the Industrial

Training Fund (ITF). This was to update practical knowledge of students in the Universities,

Polytechnics and Colleges of Technology. It was aimed at bridging the gap between the theoretical

knowledge acquired in classes and technical knowledge in the industry by providing students with the

opportunities to apply their educational knowledge in real work situations.

Over the years, SIWES has contributed immensely to building the common pool of technical and

allied skills available in the Nigeria economy which are needed for the nation’s industrial

development.

Furthermore, the place and relevance of SIWES is underscored by the fact that the scheme contributes

to improving the quality of technical skills generally available in the pool from which employers

source technical manpower

Its gives student the opportunity to blend the theoretical knowledge acquired in the classroom and with

practical hands on application of knowledge required to perform work in the industry. Also, it prepares

students for employment and makes the transition from school to the world of work easier after

graduation.

# CHAPTER TWO

Federal ministry of health

The Federal Ministry of Health is one of the Federal Ministries of Nigeria concerned with the formulation and implementation of policies related to health. It is headed by two Ministers appointed by the President, assisted by a Permanent Secretary, who is a career civil servant. The current Minister of Health is Osagie Ehanire. The current Minister of State for Health is Olorunimbe Mamora.

Departments

The Ministry has several departments specializing in different aspects of health care. The Family Health department is concerned with creating awareness on Reproductive, Maternal Neonatal and Child Health, ensuring sound nutrition including infant and young child feeding, and care of the elderly and adolescents. The department of Public Health coordinates formulation, implementation and evaluation of public health policies and guidelines. It undertakes health promotion, surveillance, prevention and control of diseases.

Functions of the department of Planning Research and Statistics include developing plans and budgets and monitoring their implementation, serving as Secretariat to the National Council on Health, conducting health research in collaboration with other departments and agencies, institutions and parastatals, conducting operational research and data collection, and performing various coordination functions.

The department of Hospital Services supervises 53 Federal Tertiary Hospitals – Nigeria's Teaching hospitals, Orthopaedic Hospitals Federal Medical Centres and National Eye Centres. The department processes appointment of Chief Medical Directors and Medical Directors, supervises oral health research, develops policies on nursing, coordinates training programmes for nurses and monitors the midwifery service scheme in collaboration with NPHCDA.

The department of Food and Drugs Services formulates national policies, guidelines and strategies on food and drugs, and ensures ethical delivery of pharmaceutical services nationwide. The department sponsors the National Institute for Pharmaceutical Research and Development and the National Agency for Food and Drug Administration and Control, and acts as regulator through the Pharmacists Council of Nigeria, the Institute of Chartered Chemists of Nigeria and the Institute of Public Analyst of Nigeria.

The Nigeria Centre for Disease Control is a federal agency under the Ministry

NBSMA

The National Biosafety Management Agency (NBMA) was established by the National Biosafety Management Agency Act 2015, to provide regulatory framework to adequately safe guard human health and the environment from potential adverse effects of modern biotechnology and genetically modified organisms, while harnessing the potentials of modern biotechnology and its derivatives, for the benefit of Nigerians. The Act came into force in April 2015, with the appointment of a Director General and Chief Executive Officer. The UN international agreement known as Cartagena Protocol on Biosafety which Nigeria signed is an environment protocol and it requires members to domesticate the agreement through a law. The Biosafety Act is therefore to domesticate the Protocol and address our National Biosafety requirements.

The Agency’s mandate is to ensure adequate level of protection in the field of safe transfer, handling and use of genetically modified organisms (GMOs) resulting from modern biotechnology that may have adverse effects on conservation and sustainable use of Biodiversity taking into account risks to human health, animals, plants and environment.

# CHAPTER THREE

Training experience

(FMOH)

Rules and regulations: In the federal ministry of health work starts by 8am in the morning, it is mandatory to put your name down in the attendance book upon arrival.

The office should be kept clean, permission is to be taken before leaving the office and work ends by 4pm.

Other departments under food and drugs

Drug and vaccine development (DVD)

Pmei

Water resources

REGISTRY AND DELIVERY OF INCOMING AND OUTGOING FILES AND MAILS

Each office has a file which is how they communicate, if a file comes from another office its an incoming file and when a file leaves your office its an outgoing file. All files must be registered in the offices book. A mail is a letter is usually letters of invitation or recommendation or request E.T.C, as with the files the mails follow the same process. Files are registered with the names of the office while mails are registered with their reference numbers. When delivering a file or a mail to another office it is mandatory to sign on their office register to show that you delivered the file or mail.

POLICIES AND MANDATES

A policy is a course or principle of action proposed by an organization or individual. A mandate is an authority to carry out a policy.

FMOH MANDATE

The Federal Ministry of Health (FMOH) The ministry is responsible for the: i. Formulation of national policies and implementation guidelines on food safety; ii. Monitoring of its implementation; iii. Nutritive value of food, prevention and control of food-borne diseases, the safety of portable water; iv. All national and international matters relating to food.

The food safety law is one of the policies of the FMOH, it is a number of routines to be followed when handling food to avoid potentially severe health hazards.

The guidelines to food safety

Prevent contaminating food with pathogens spreading from people, pets, and pests.

Separate raw and cooked foods to prevent contaminating the cooked foods.

Cook foods for the appropriate length of time and at the appropriate temperature to kill pathogens.

Store food at the proper temperature.

Use safe water and safe raw materials.

National drug policy is another example of the policies under the federal ministry of health’s mandate, The central aim of any national drug policy is to ensure access to and rational use of drugs which are safe, effective and of good quality.it tackles the misuse of drugs and aims to provide top quality drugs for effective therapeutic use.

First exercise

Zero water campaign

The two-year campaign is to educate Nigerians on the need to give babies only breast milk for at least six months. The National Zero Water Campaign is also aimed at changing the narratives of nutrition in Nigeria. The first breastmilk, which is colostrum, is highly nutritious and it contains antibodies that protect the new born from diseases. Late initiation of breastfeeding is one major reason for introduction of prelacteal feeds which are potentially harmful to the new born.

Objective of zero water campaign

i. Increase the proportion of infants put to breastmilk within an hour at birth;

ii. Increase the proportion of infants exclusively breastfed for six months; and

iii. Create enabling and supportive environment for the promotion of exclusive breastfeeding.

Types of contaminations

Contamination is the action or state of making or being made impure by polluting or poisoning.

Types: -

Biological contamination: bacteria, virus, parasites, fungi and toxins

Physical contamination: foreign objects like dirt, broken glass, metal and bones

Chemical contamination: cleaners, sanitizers, polishes etc.

Ban of sniper and carbide (office discussion)

The Nigerian government has placed a ban on the manufacturing of small bottles of ‘Sniper’, an agro-chemical that has increasingly become a choice killer for persons contemplating suicide. Sniper is a dichlorovinyl dimethyl phosphate (DDVP) Which is an organophosphate.

Mode of action

acts on acetylcholinesterase, associated with the nervous systems of insects. Evidence for other modes of action, applicable to higher animals, have been presented. It is claimed to damage DNA of insects.

Carbide is used in the forced ripening of fruit; it is also harmful so we had a discussion on banning its use because Contact can severely irritate and burn the eyes with possible permanent damage (corneal opacities). Exposure can irritate the mouth, nose and throat. Inhaling Calcium Carbide can irritate the lungs causing coughing and/or shortness of breath.

PHARMACY AND PHARMACISTS UNIT

Pharmacy is the health science that links medical science with chemistry and it is charged with the discovery, production, control, disposal, safe and effective use of drugs. The practice of pharmacy requires excellent knowledge of drugs, their mechanism of action, side effects, interactions, mobility and toxicity. At the same time, it requires knowledge of treatment and understanding of the pathological process. Some specialties of pharmacists, such as that of clinical pharmacists, require other skills, e.g. knowledge about the acquisition and evaluation of physical and laboratory data.

Pharmacist unit is the place a pharmacist works, Pharmacists practice in a variety of areas including community pharmacies, hospitals, clinics, extended care facilities, psychiatric hospitals, and regulatory agencies. Pharmacists themselves may have expertise in a medical specialty.

Pharmacists equipment’s

Baskets

Drug Denaturing Kits

Measure Racks

Prescription Alert Sticker Rolls

Record Keeping Register

Repeat Prescription Cabinets

Tablet Bottles

Tablet Cartons

Tablet Counters

material safety data sheets

pharmaceutical quality refrigerator etc

TOXICOVIGILANCE

Toxicovigilance is the active process of identifying and evaluating the toxic risks existing in a community, and evaluating the measures taken to reduce or eliminate them. It involves the analysis of poisons centre enquiries to identify whether there are specific circumstances or agents giving rise to poisoning, or certain populations suffering a higher incidence of poisoning. Toxicovigilance can also reveal whether there is an emerging toxicological problem resulting from, for example, the reformulation of a product or a change to its packaging or labelling, the availability of a new drug of abuse, or an environmental contamination.

Toxicovigilant activities

Reformulation of a waterproofing spray, resulting in lung damage in users

Ambiguous label information resulting in overdose

Hazardous cosmetic products etc

Environmental toxicology: Environmental toxicology is a multidisciplinary field of science concerned with the study of the harmful effects of various chemical, biological and physical agents on living organisms. Ecotoxicology is a subdiscipline of environmental toxicology concerned with studying the harmful effects of toxicants at the population and ecosystem levels.

Medical toxicology is a subspecialty of medicine focusing on toxicology and providing the diagnosis, management, and prevention of poisoning and other adverse effects due to medications, occupational and environmental toxicants, and biological agents.

DRUG INFORMATION

drug information provides an overview of topics of current relevance relating to drug development and regulation.

Second exercise

GENE THERAPY RELATING TO CANCER

Gene therapy implies any procedure intended to treat or alleviate a disease by genetically modifying the cell of a patient. The material to be transferred into patient cells may be genes, gene segments, or oligonucleotides. Gene transfer therapy can be conducted either as in vivo or ex vivo approaches. In the in vivo approach, targeted cells are approached directly, such as the intradermal injection of a metastatic nodule, or intravesical therapy for superficial bladder cancer. In the ex vivo approach, targeted cells from a tumour are selected, then collected, grown in culture media at a controlled microenvironment, manipulated genetically by the insertion of a new gene or protein (transgene) in the cell genome, then introduced back into the host. The ex vivo approach is much simpler to achieve as it is easier to manipulate target cells externally.

Concerning cancer, initial efforts to deactivate oncogenes and replace non-functioning tumour suppressor genes were barely successful. Subsequently, new approaches have been developed to transfer genetic materials (transgenes) directly into target cells aiming to transiently or permanently change their phenotypes. Target cells may be normal cells, cancerous cells, immune mediated cells, or pluripotent stem cells. Once the transgene enters a cancer cell, it can then assist in its death or restore normal cellular functions, whereas for normal cells, the transgene can protect them from drug-induced toxicities, or activate an immune cell to get rid of the cancer cell. Gene and vector-based molecular therapies for cancer comprise a wide range of treatment modalities to modify cancer cells, normal cells, and/or a tumour microenvironment.

PHARMACOGNOSY

Pharmacognosy is the study of plants or other natural sources as a possible source of drugs. The American Society of Pharmacognosy defines pharmacognosy as "the study of the physical, chemical, biochemical and biological properties of drugs, drug substances or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources.

Method of extraction

The general techniques of medicinal plant extraction include maceration, infusion, percolation, digestion, decoction, hot continuous extraction (Soxhlet), aqueous-alcoholic extraction by fermentation, counter current extraction, microwave-assisted extraction, ultrasound extraction (sonication), supercritical fluid extraction, and distillation techniques (water distillation, steam distillation, phytonic extraction (with hydro fluorocarbon solvents).

Third exercise

EFFECT OF COMBINED TREATMENT OF ARTEMETHER AND LUMENFANTRINE FOR MALARIA

The drug combination is highly efficacious against sensitive and multi drug resistant falciparum malaria. It offers the advantage of rapid clearance of parasites by artemether and slower elimination of residual parasite by lumefantrine.

DRUG ABUSE

Drug abuse is the use of a drug in amounts or by methods which are harmful to the individual or others.

PHARMACOVIGILANCE

Pharmacovigilance (PV or PhV), also known as drug safety, is the pharmacological science relating to the collection, detection, assessment, monitoring, and prevention of adverse effects with pharmaceutical products. The etymological roots for the word "pharmacovigilance" are: pharmakon (Greek for drug) and vigilare (Latin for to keep watch). As such, pharmacovigilance heavily focuses on adverse drug reactions, or ADRs, which are defined as any response to a drug which is noxious and unintended, including lack of efficacy (the condition that this definition only applies with the doses normally used for the prophylaxis, diagnosis or therapy of disease, or for the modification of physiological disorder function was excluded with the latest amendment of the applicable legislation). Medication errors such as overdose, and misuse and abuse of a drug as well as drug exposure during pregnancy and breastfeeding, are also of interest, even without an adverse event, because they may result in an adverse drug reaction.

# CHAPTER FOUR

TRAINING EXPERIENCE

(NBMA)

FIRST PRACTICAL

HOW TO USE A PH METER

The first step is to switch it on and calibrate it

The measurement mode should be ph.

Only fresh unused ph. buffer should be used and buffer should be the same temperature with testing solution

Ph electrode should be rinsed with distilled water and then buffer being used for calibration

Dip electrode in neutral ph. buffer and press the Cal button to select calibration function. Set the buffer ph. value to 7.00.

When reading is stable press enter to accept. Repeat 2 more times. Ph should be calibrated every day before being used for measurements and should be repeated 3 or more times for precise measurements

The second step is the ph. measurements

Confirm that the meter is on the ph. measurement mode

Rinse electrode with distilled water between measurements to prevent contamination of testing solution. Blot electrode gently on lab cleaning tissue to remove excess water

Dip ph. electrode in a testing solution. Stir the solution with magnetic bar for 30 secs

Ph is completed when reading is stable

Then record your reading and carry out other tests.

SECOND PRACTICAL

MAKING DISTILED WATER

Partly fill a pot with water

Set a collection bowl in the pot

Cover the pot and start boiling

Put ice on the lid of the pot

When done turn off the heat and use care to remove the bowl of distilled water.

Alternatively use a water distiller.

THIRD PRACTICAL

HOW TO USE A CENTRIFUGE

Inspect centrifuge bottles or tubes for cracks before use

Cap tubes with proper lid

Disinfect the outside of the tube before placing it in the centrifuge

Label tubes for Identification

Make counterbalance for centrifuge tube you want to put in the centrifuge

Place centrifuge on a firm level surface

Choose proper rotor for appropriate speed

Load tubes opposite each other in the centrifuge

Impute speed

Keep safe distance

Remove tubes after the centrifuge stops

Wipe after each use

Precaution – turn of if centrifuge is shaking and do not open when centrifuge is active

EDTA AS AN ANITI COAGULANT AND FOR CLEANING TOXINS FROM THE BODY

An ethylenediamine tetra acetic acid (EDTA)anticoagulant, therefore, uses this type of acid to stop the clotting process. The EDTA anticoagulant is often used in laboratory diagnostic tests, such as the complete blood count (CBC), because it retains the original shape and size of the cells. This is because the EDTA anticoagulant can bind with the calcium present in blood, thus preventing the start of the coagulation cascade, which is the process by which blood clot formation occurs.

EDTA is sometimes prescribed by doctors to clean toxic metals, such as lead, from the blood. Doctors have used the molecule for decades to treat heavy metal poisoning. In those cases, it is given through an IV.

FIRST EXERCISE

DIFFERENCE BETWEEN IONIZED, DEIONIZED AND DISTILLED WATER

Ionized water is water with mineral ions in it. Minerals in water become ionized when they either gain or lose electrons. All water found in nature has minerals in it and is ionized to some point.

Deionized water is a type of purified water with mineral ions (salts) removed. These mineral ions include sodium, calcium, iron, copper, chloride, and bromide. Deionized water is created by taking conventional water and exposing it to electrically charged resins that attract and bind to the salts, removing them from the water. Because most of the impurities in water are mineral salts, deionized water is mostly pure, but it does still contain numerous bacteria and viruses, which have no charge and therefore are not attracted to the electrified resins.

Distilled water is a type of demineralized water that is purified using the process of distillation to remove salts and particulates. Usually, the source water is boiled and the steam is collected and condensed to yield distilled water.

SECOND EXERCISE

GENOME EDITING TECHNOLOGY AND REGULATORY PROCESS

Genome editing (also called gene editing) is a group of technologies that give scientists the ability to change an organism's DNA. These technologies allow genetic material to be added, removed, or altered at particular locations in the genome.

Methods of genome editing

Homologous recombination

Zinc-finger nucleases (ZFN)

Transcription activator-like effector nucleases (TALENs)

Clustered regularly interspaced short palindromic repeats (CRISPR)

Genome editing law

Genome editing and human rights law Human rights treaties directly regulating genome editing There are two regional human rights treaties that regulate genetic interventions directly, namely, the 1997 European Convention on Human Rights and Biomedicine (Oviedo Convention)2and the EU Charter of Fundamental Rights (EU Charter)

PLASMIDS AND ITS APPLICATIONS

A plasmid is a genetic structure in a cell that can replicate independently of the chromosomes, typically a small circular DNA strand in the cytoplasm of a bacterium or protozoan. Plasmids are much used in the laboratory manipulation of genes.

Cloning Plasmids - Used to facilitate the cloning of DNA fragments.

Expression Plasmids - Used for gene expression (for the purposes of gene study).

Gene Knock-down Plasmids - Used for reducing the expression of an endogenous gene.

Reporter Plasmids - Used for studying the function of genetic elements.

To create transgenic organisms by introducing beneficial genes into host cells. For example, the Ti plasmid is used in plant pathology to develop resistance in plants against diseases such as holcus spot on leaves and crown gall tumours. The plasmid is rendered avirulent by curing it, prior to its use as a vector.

GEL ELECTROPHORESIS AND PCR

Gel Electrophoresis is a process where an electric current is applied to DNA samples creating fragments that can be used for comparison between DNA samples. 1) DNA is extracted. 2) Isolation and amplification of DNA. 3) DNA added to the gel wells. Scientists use gel electrophoresis to separate molecules based on their size and electrical charge. Gel electrophoresis can separate fragments of DNA that were cut with restriction enzymes, creating a visual map of fragment size that’s easy to interpret.

Polymerase chain reaction (PCR) is a method widely used in molecular biology to rapidly make millions to billions of copies of a specific DNA sample, allowing scientists to take a very small sample of DNA and amplify it to a large enough amount to study in detail.

BLUE BIOTECHNOLOGY

The colour blue in biotechnology is assigned to aquaculture, coastal and marine biotech. This area of biotechnology exploits the diversity found in marine environments, including the form, structure, physiology, and chemistry of marine animals. Blue biotechnology is more of a field that makes use of marine bioresources as the source of biological applications. Blue biotechnology, in more specific terms, is the application of molecular biological methods to marine and freshwater organisms. Blue biotechnology is thus associated with applications such as preservation of a variety of marine species, restoring the aquatic wildlife to its original state of habitat, use of marine species to develop new medicines genetic study of plants to engineer other plants to become resistant to environmental extremes.

THIRD EXERCISE

GOLDEN RICE AND ITS SOCIO-ECONOMIC IMPORTANCE

Golden rice is a variety of rice (Oryza sativa) produced through genetic engineering to biosynthesize beta-carotene, a precursor of vitamin A, in the edible parts of rice. It is intended to produce a fortified food to be grown and consumed in areas with a shortage of dietary vitamin A, a deficiency which each year is estimated to kill 670,000 children under the age of 5 and cause an additional 500,000 cases of irreversible childhood blindness. Rice is a staple food crop for over half of the world's population, providing 30–72% of the energy intake for people in Asian countries, and becoming an effective crop for targeting vitamin deficiencies. The most obvious economic advantage of Golden Rice is that it has the potential to feed and nourish more people, which leads to those people having the ability to contribute back to the economy through the workforce.

FOURTH EXERCISE

CRY GENES AND ITS USES

The Cry Gene Family: These toxins can be categorized under the d-endotoxins, which is highly specific to only certain insects. The family of genes coding for this toxin is the Cry gene family. A common characteristic of the cry genes is their expression during the stationary phase.

The Cry gene is inserted into common crops that are in high demand, such as corn, wheat, cotton, canola, soy, and potato crops. Once the Cry gene is inserted into the genome, the plant can express its own insecticidal properties.

ENDING PROJECT

PHARMACOGENOMICS AND PHARMACOGENETICS

Pharmacogenomics is the study of the role of the genome in drug response. Its name (pharmaco- + genomics) reflects its combining of pharmacology and genomics. Pharmacogenomics analyses how the genetic makeup of an individual affects his/her response to drugs. It deals with the influence of acquired and inherited genetic variation on drug response in patients by correlating gene expression or single-nucleotide polymorphisms with pharmacokinetics (drug absorption, distribution, metabolism, and elimination) and pharmacodynamics (effects mediated through a drug's biological targets). The term pharmacogenomics is often used interchangeably with pharmacogenetics. Although both terms relate to drug response based on genetic influences, pharmacogenetics focuses on single drug-gene interactions, while pharmacogenomics encompasses a more genome-wide association approach, incorporating genomics and epigenetics while dealing with the effects of multiple genes on drug response.

Pharmacogenetics is the study of inherited genetic differences in drug metabolic pathways which can affect individual responses to drugs, both in terms of therapeutic effect as well as adverse effects. The term pharmacogenetics is often used interchangeably with the term pharmacogenomics which also investigates the role of acquired and inherited genetic differences in relation to drug response and drug behaviour through a systematic examination of genes, gene products, and inter- and intra-individual variation in gene expression and function. In oncology, pharmacogenetics historically is the study of germline mutations, whereas pharmacogenomics refers to somatic mutations in tumoral DNA leading to alteration in drug response.

LAST PRACTICAL

HOW TO OPERATE AN ELECTRONIC WEIGH BALANCE

Place the electronic balance on a flat, stable surface indoors. The precision of the balance relies on minute factors and wind, shaky surfaces, or similar forces will cause the readings to be inaccurate.

Press the "ON" button and wait for the balance to show zeroes on the digital screen.

Use tongs or gloves to place the empty container you will use for the substance to be measured on the balance platform. Fingerprints and other greases from your hands add mass and must be avoided for accurate measurements.

Press the "Tare" or "Zero" button to automatically deduct the weight of the container from future calculations. The digital display will show zero again, indicating that the container's mass is stored in the balance's memory.

Carefully add the substance to the container. Ideally this is done with the container still on the platform, but it may be removed if necessary. Avoid placing the container on surfaces that may have substances which will add mass to the container such as powders or grease.

Place the container with the substance back on the balance platform if necessary and record the mass as indicated by the digital display.

OBSERVATION

my first observation was the difference between the work place and the classroom, it is different as the lab has a more hand on approach to learning.

It was always kept neat and arranged, every equipment was put back in its cabinet after use and all surfaces were wiped clean after work.

The staff took it upon themselves to educate me and the other IT students and they showed us the ropes so we got used to the ways of the office and the laboratory.

CONCLUSION

My 3 months of work experience in the FMOH and NBMA was a huge success and a great time of acquisition of knowledge and skills. Through my training I was able to appreciate my chosen course of study even more, because I had the opportunity to blend the theoretical knowledge acquired from school with the practical hands-on application of knowledge gained here to perform very important tasks that contributed in a way to my productivity in the organization.

I have also been able to improve my communication and presentation skills and thereby developed good relationship with my fellow colleagues at work. I have also been able to appreciate the connection between my course of study and other disciplines in producing a successful result.

CHALLENGES ENCOUNTERED DURING PERIOD OF TRAINING

I wasn’t given transportation or feeding money during my training period at the company, which means I had to feed and transport myself.