TRAINING COURSE

(6-10 November 2023)

CHEMICAL LABORATORY SKILLS FOR QUALITY ASSURANCE AND CONTROL

Contents

1. BACKGROUND

The importance of Good Laboratory Practice (GLP) for quality assurance and quality control cannot be over emphasised. One of the fundamental purposed of GLP is to ensure the quality and integrity of laboratory data. Many organisations in Malawi have laboratory units whose aim is to provide data on product quality parameters that assist production personnel or management in taking various process decisions. Whether it's a sugar producer, cement producer, water purification units or agriculture institutions, the laboratory results are vital in confirming the quality of the products in line with specification and standards. It is therefore important that results generated by laboratory analysts are always credible and as accurate as possible.

Wrong and costly decisions may be made based on false laboratory data. On the other hand, laboratory results may pass a product as complying with specifications only to be rejected or recalled from the market at a high cost to the organisation. Accurate laboratory data is a must in the area of food safety, where laboratory result are the basis for guaranteeing safety to consumers. Unreliable results could be a cause of expensive health related complications for the population or destruction of goods causing a huge financial loss to the organisation. As such it is important that laboratory analysts have adequate skills for conducting their work in the best way possible, and a manner scientifically promoted in certified laboratories schemes such as ISO 17025 Certification scheme.

Many laboratories in Malawi are not ISO certified and tests results are generated by analysts that may not have had exposure to ISO17025 requirements. This course has been developed to help improve working skills of analysts in line with ISO 17025 principles so that, despite not being ISO certified, the laboratory practices followed do promote the generation of credible results at all times.

The course will include sessions on chemicals handling, conducting tests, preparation of reagents, understanding Material Safety Data Sheets (MSDS) and data handling for laboratory results. The training will include discussions on the working principles of major instruments for testing used in contemporary laboratories such as UV Spectrometers, AAS, FTIR, NMR, MP-AES, GC-MS, HPLC, Bomb Calorimeter and other equipment). Analysts will have the opportunity of conducting selected tests using the equipment mentioned here. Furthermore, key analytical parameters such as systematic analytical errors, sensitivity, selectivity and bias in testing will be discussed and practical exercises conducted

2. The Outcome

At the end of this course the analysts are expected to have an improved understanding of the principles of Good Laboratory Practices in line with ISO 17025 principles. They are expected to have acquired new skills to help them improve on the consistent generation of credible results in their laboratories.

3. Venue and Facilitators

The training will be conducted in the Chemistry Laboratories at Chancellor College and will be facilitated by professional laboratory analysts from LifeSciences Consulting and lecturers. All facilitators ave vast experience in laboratory work in various institutions in the country.

4. About LifeSceinces

Lifesciences Consulting was established and registered in 2011 to support capacity building in the science field and to conduct consulting work in various basic science fields. LifeSceinces Consulting has personnel with experience in capacity building for laboratory analysts both in Malawi and outside the country, verification of laboratory performances, food analysis, food safety, developing and managing inter-laboratory proficiency testing schemes and laboratory quality systems. The

organisation is the sole Malawi agent for an international testing and certification body - Bureau Veritas. For more details on this and LifeSciences, please visit www.lifesciencesmw.com

5. The Contents of the Course

AREAS	DETAILS
1. Good Laboratory Practice & ISO 17025	a) Key elements
2. Handling Chemicals	a) Properties of chemical reagents (Analar, General etc.) b) Reagent preparations (weighing, molarity/normality, labelling) c) Material Safety Datasheets and handling of hazardous chemicals
3. Volumetric Work	1. Properties of glassware (grades A, B…) 2. Pipette functions and handling 3. Accuracy in volumetric work
4. Instrumentation	1. Spectrophotometry (UV/VIS) – Single/double bean, cuvettes (glass/quarts), principles for quantification A= lbc.. 2. HPLC/UPLC – separations, columns, solvents (and grades), peak/area for quantification, internal standards 3. AAS – Principles – gases, lamps, calibration 4. ICP-MS/OES 5. GC-MS 6. MPAES 7. FTIR 8. NMR 9. Bomb Calorimeter
10.Data Handling	a) Use of worksheets, Excel/google sheet b) Calculations of %CV, Method error, Range of allowed results

11.Methods performance	a) Control samples b) Sensitivity c) Selectivity d) Reproducibility e) Bias f) Total Analytical Errors g) Detection Limits, etc.