

**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)**

**JOB ANALYSIS CHART FOR ANALYTICAL CHEMISTRY TECHNICIAN LEVEL 6**

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| **DUTIES** | TASKS |
| **BASIC COMPETENCIES** |
| **A****Demonstrate communication skills** | A1Meet communication needs of clients and colleagues | A2Develop communication strategies | A3 Establish and maintain communication pathways | A4 Promote use of communication strategies |
| A5 Conduct interview | A6Facilitate group discussion | A7Represent the organization |  |
| **B****Demonstrate Numeracy Skills** | B1Apply a wide range of mathematical calculations for work | B2Use and apply ratios, rates and proportions for work | B3Estimate, measure and calculate measurement for work | B4Use detailed maps to plan travel routes for work |
| B5Use geometry to draw 2D shapes and construct 3D shapes for work | B6Use differentiation and integration concepts in solving mathematical problems | B7Collect, organize, and interpret statistical data for work  | B8Use routine formula and algebraic expressions for work  |
| B9Use common functions of a scientific calculator for work |  |  |  |
| **C****Demonstrate Digital Literacy** | C1Identify appropriate computer software and hardware | C2 Apply security measures to data, hardware, software in automated environment  | C3Apply computer software in solving tasks | C4Apply internet and email in communication at workplace |
| C5Apply Desktop publishing in official assignments | C6Prepare presentation packages |  |  |
| **D****Demonstrate employability skills** | D1Develop self-awareness and understanding of every day demands and challenges in the workplace | D2Demonstrate critical safe work habits for employees in the workplace | D3Lead a workplace team  | D4Plan and organize work  |
| D5Maintain professional growth and development in the workplace | D6Demonstrate learning, creativity and innovativeness in the workplace |  |  |
| **E****Demonstrate environmental literacy** | E1Control environmental hazard  | E2Control environmental Pollution control | E3Demonstrate sustainable resource use | E4Evaluate current practices in relation to resource usage |
| E5Identify Environmental legislations/conventions for environmental concerns | E6Implement specific environmental programs | E7Monitor activities on Environmental protection/Programs  | E8Analyse resource use |
| E9Develop resource Conservation plans |  |  |  |
| **F****Demonstrate occupational safety and health practices** | F1Identify workplace hazards and risk | F2Identify and implement appropriate control measures | F3Implement OSH programs, procedures and policies/ guidelines |  |
| **G****Demonstrate entrepreneurial skills** | G1Develop business Innovative strategies | G2Develop new products/ markets  | G3 Expand customers and product lines  | G4 Motivate staff/workers  |
| G5Expand employed capital base | G6Undertake county/ regional business expansion |  |  |

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| **COMMON COMPETENCES**  |
| **Duties**  | Tasks |
| **A****APPLY PHYSICS PRINCIPLES** | A1 Apply units of measurement and measuring instruments. | A2Apply the principles of forces | A3Solve problems related to motion, work energy and power | A4Apply the concepts of density and pressure |
| A5Apply the principles of fluid flow and heat transfer | A6Apply properties of light and sound waves |  |
| **B****APPLY STANDARD LABORATORY PRACTICES** | B1Identify and Manage Laboratory hazards and risks | B2Apply laboratory safety procedures  | B3Store laboratory samples, chemicals and reagents  | B4Prepare laboratory reagents  |
| B5Maintain laboratory ware and equipment  | B6Maintain laboratory hygiene | B7Dispose laboratory wastes | B8Specify analytical reagents, chemicals, laboratory ware and equipment for procurement  |
| B9Receive, qualify and validate the analytical, reagents, laboratory ware and equipment  |  |
| **C****APPLY INORGANIC CHEMISTRY** | C1 Demonstrate knowledge of atomic structure | C2Demonstrate knowledge of periodic table  | C3Demonstrate the knowledge of chemical bonding and structure. | C4Demonstrate knowledge of chemical equations and reactions.  |
| C5Demonstrate knowledge on qualitative & quantitative analysis of inorganic compound | C6 Demonstrate knowledge of nuclear chemistry  |  |
| **D****APPLY PHYSICAL CHEMISTRY** | D1Demonstrate the knowledge of the states of matter | D2Demonstrate the knowledge of gas behaviour | D3Demonstrate the knowledge of chemical reactions. | D4Demonstrate the knowledge of phase diagrams  |
| D5Demonstrate the knowledge of reaction kinetics | D6Demonstrate the knowledge of Electrochemistry | D7Demonstrate the knowledge of thermodynamics | D8Demonstrate the knowledge of thermometric analysis |
| **E****APPLY ORGANIC CHEMISTRY**  | E1Demonstrate the knowledge of hydrocarbons  | E2Demonstrate the knowledge of haloalkanes | E3Demonstrate the knowledge of hydroxyl compounds | E4Demonstrate the knowledge of carbonyl compounds |
| E5Demonstrate knowledge of carboxylic acids | E6Demonstrate knowledge of carboxylic acid derivatives | E7Demonstrate knowledge of amines and nitrogen compounds | E8Demonstrate the knowledge of aromatic compounds |
| E9Demonstrate the knowledge of heterocyclic compounds | E10Demonstrate the knowledge of polynuclear aromatic compounds | E11Demonstrate knowledge of polymer chemistry | E12Demonstrate knowledge of stereochemstry |
| E13Demonstrate knowledge on organic spectroscopic techniques | E14Demonstrate knowledge of formulation chemistry |  |
| **F****APPLY BIOCHEMISTRY TECHNIQUES** | F1Demonstrate knowledge of water, acids, bases and buffers  | F2Demonstrate knowledge of cell biology  | F3Demonstrate knowledge of carbohydrates  | F4Demonstrate knowledge of proteins . |
| F5Demonstrate knowledge of lipids  | F6Demonstrate knowledge of vitamins and minerals  | F7Demonstrate knowledge of enzymes and coenzymes  | F8Demonstrate knowledge of nucleic acids  |
| F9Demonstrate knowledge of metabolism  | F10Demonstrate knowledge of biochemical techniques  |  |
| **G****APPLY ANALYTICAL CHEMISTRY RESEARCH** | G1Formulate analytical chemistry problem | G2Develop research proposal | G3Prepare research instruments | G4Collect analytical chemistry data |
| G5Analyse and interpret analytical chemistry data | G6Prepare analytical chemistry research report | G7Present analytical chemistry research report |  |
| **H** **APPLY STATISTICAL METHODS**  | H1Introduction to statistics  | H2Apply Sampling methods and data collection  | H3Apply Presentation of data | H4Apply Measures of central tendency  |
| H5Apply Measures and relative measures of dispersion | H6Apply Elements of probability | H7Apply Probability distribution  | H8Apply Moments, skewness and kurtosis  |
| H9Apply Correlation and regression  |  |

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| **CORE COMPETENCIES** |
| **Duties** | Tasks |
| **A****DEVELOP STANDARD OPERATING TEST PROCEDURES** | A1Develop analytical test purpose and objective  | A2Develop analytical test scope | A3Develop analytical quality specifications | A4Develop the test methodology |
| A5Review/improve test procedures  |  |
| **B****COLLECT AND PREPARE ANALYTICAL CHEMISTRY SAMPLES**  | B1Design a sampling plan | B2Implement sampling plan | B3Label/code analytical samples  | B4Preserve and transport analytical sample |
| **C****PERFORM ANALYTICAL CHEMISTRY TECHNIQUES** | C1Demonstrate knowledge on Separation techniques | C2Demonstrate knowledge of titrimetric techniques | C3Demonstrate knowledge of gravimetric techniques | C4Demonstrate knowledge e on qualitative methods of chemical analysis |
| C5Demonstrate knowledge on spectroscopic methods | C6Demonstrate knowledge of instrumental methods of analysis | C7 Calibrates/Optimise analytical equipment | C8Perform cleaning and basic service for analytical equipment |
| **D****ANALYSE AND INTERPRET ANALYTICAL DATA**  | D1Receive and input analytical data  | D2Analyse analytical data  | D3Interpret output result | D4Prepare report and present findings |
| **E****MANAGE ANALYTICAL CHEMISTRY LABORATORY, REAGENTS AND INSTRUMENTS**  | E1Specify analytical reagents and lab-ware for procurement | E2Receive and inventory analytical reagents and lab-ware | E3Prepare and standardise working solutions  | E4Track and maintain reagents and lab-ware re-order levels |
| E5Manage analytical chemistry housekeeping, safety and security |  |
| **F****MANAGE ANALYTICAL CHEMISTRY SAMPLES**  | F1Receive , record ,re-label, retrieval and movement of analytical samples  | F2Secure and store analytical samples  |  F4Collect, segregate, and dispose laboratory sample-waste |  |

**General Knowledge and Skills**

**Skills**

* Communication
* Planning
* Organizing
* Leadership
* Interpersonal
* Problem solving
* Critical thinking
* Negotiation

**Knowledge**

* Laboratory security and safety
* Chemical safety and security
* Basic tools of analytical chemistry
* Measurements in analytical chemistry
* Concentrations
* Stoichiometric equations
* Preparation of equations
* Analytical techniques
* Procedure development
* Protocols
* Analytical methodologies
* Evaluation of analytical data
* Experimental errors
* Uncertainty
* Distribution of analytical measurements
* Statistical data analysis
* Detection limits
* Analytical standards
* Calibrations
* Sensitivity
* Regression lines and calibration curves
* Reversible Reactions and Chemical Equilibria
* Thermodynamics and Equilibrium Chemistry
* Manipulating Equilibrium Constants
* Equilibrium Constants for Chemical Reactions
* Le Châtelier’s Principle
* Ladder Diagrams
* Solving Equilibrium Problems
* Buffer Solutions
* Collection and preparation of samples
* The Sampling techniques
* Designing a sampling plan
* Separating the Analyte from Interferents
* Separation Efficiency
* Separation Techniques
* Liquid–Liquid Extractions
* Gravimetric Methods
* Titrimetric Methods
* Spectroscopic Methods
* Electrochemical Methods
* Chromatographic and Electrophoretic Methods
* Kinetic Methods
* Developing a Standard Method
* Quality Assurance
* Quality problem solving
* Improvement tools
* Chemometrics

**Behaviours**

* Trustworthy
* Reliable
* Patient
* Decisive
* Confident
* Responsible
* Creative
* Optimistic
* Honest
* Team player
* Positive attitude
* Keen to details
* Professional
* Intelligent
* Courteous
* Process oriented
* Accurate
* Knowledgeable
* Consistent
* Self-motivated
* Faithful
* Integrity
* Flexible
* Calm
* Composed

**Tools, Equipment, Supplies and Materials**

* ISO standards
* Regulatory framework
* AOAC methods
* Pharmacopoeia
* Lab-wares
* Relevant measurement and testing infrastructure/Equipment
* Reagents
* Stationary
* Personal protective equipment
* Laboratory workspace, tools and fixture

**Future Trends and Concerns**

* Occupational safety and health
* Automation of analytical testing
* Business process outsourcing
* Competition from other courses e.g. Chemical engineering, industrial chemistry