NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

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PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: FOOD INSPECTION AND TESTING TECHNICIAN

LEVEL: NTA 4

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ABBREVIATIONS

CBET	Competency Based Education and Training
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
LIMS	Laboratory Information Management System
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OS	Occupational Standards
OSHA	Occupational Safety and Health Administration
TBS	Tanzania Bureau of Standards
TET	Technical Education and Training
TFDA	Tanzania Food and Drugs Authority
TVET	Technical and Vocational Education and Training

GLOSSARY OF TERMS

Circumstantial Knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues.
Competence:	The ability to use knowledge, understanding, practical, and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based Education:	An instructional programme that derives its content from validated tasks and bases assessment on the learner's performance.
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/Training Programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational Area:	This is a broad grouping of related jobs. (Example: food service)
Occupational Competence:	The application of knowledge and skills that consistently meet the standards required by the work context.
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as a performance tool of assessment of the prescribed outcomes.
Occupational/Job Analysis:	A process used to identify the tasks that are important to employees in any given occupation**.**
Performance Criteria:	Indicate expected end results or outcomes in the form of evaluative statements.
Skills:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.

Standards:	A set of statements, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance.
Task Analysis:	The process of analysing each task to determine the steps, circumstantial knowledge, attitudes, performance standards, tools and materials needed, as well as safety concerns required for the employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, and consists of two or more definite steps that leads to a product, service, or decision.
Underpinning Knowledge:	Crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification Process:	The process of having experts review and confirm the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's *Development Vision 2025* intends to raise the country's economy to a middle-income status. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical and Vocational Education and Training of Tanzania has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the labour market and the country's economic agenda.

National Occupational Standards (NOS) are performance criteria that are matched with labour market demands. Each National Occupational Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current and consistent in delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training Standards/Qualifications Standards are different. Occupational Standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical circuits, performs fault in electrical wiring, etc.) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and Training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the Occupational Standards and the training standards to respond to demands of the labour market.

In TET delivery, Tanzania adopted the Competence Based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the Occupational Standards. Occupational Standards are thus the starting point for developing competency-based training (CBET) programmes. TET institutions will be required to benchmark their curricula with relevant Occupational Standards.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training (TET).

The Food Inspection and Testing Technician Occupation has its own set of occupational standards. The document explains how the Occupational Standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The Occupational Standards development process began with an examination of major documents that guide Tanzanian skill development. The *10-year National Skills Development Strategy (2016-2026)* was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes.

These sectors include: Transport and Logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a workshop comprised of experts and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as **Appendix 1** to this document.

The Occupational Standards were then developed. Experts in Occupational Analysis and the Development of Occupational Standards facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the Occupational Standards. Engineers, supervisory technicians on the job, and experienced Food Inspection and Testing Technicians were key informants in the survey to discover occupational trends. The information was used to gain insight from the workplaces regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation. A total of ..... online surveys were completed by experts from the labour market across the country. Apart from the survey aiding in defining the scope for the occupational analysis, they also served to engage a wide cross-section of experts in the occupation. Apart from this, the stakeholders' forum was attended by ... participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR FOOD INSPECTION AND TESTING TECHNICIANS

The standards cover a broad range of duties and tasks that can be performed by a Food Inspection and Testing Technician. However, the occupational standards are not meant to replace individual job descriptions. Instead, they are to be used for guidance in defining skill levels and knowledge for

the technician in specific settings or positions. The Food Inspection and Testing Technician may perform tasks in a number of key areas of the occupational standards, but not necessarily in all areas. For example, in large operations, other individuals may be employed or designated to perform specific tasks.

The Food Inspection and Testing Technicians work under the supervision of engineers, and shall conduct sample preparation, procurement of reagent supplies, preparation for physical and chemical detection and microbe detection, and safe laboratory practices. Generally, the Food Inspection and Testing Technician performs the following responsibilities:

a) Sample preparation

b) Procurement of reagent consumables

c) Preparation of physical and chemical detection

d) Preparation of microbe detection

e) Laboratory safety operation

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA 4, 5 and 6.

4.0. VALIDITY PERIOD

Due to the rapid development of technology, the validity period of occupational standards is 3-5 years. The review will proceed in the same manner as the one before it, with new occupational standards being developed based on current trends of the labour market.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR FOOD INSPECTION AND TESTING TECHNICIAN - NTA 4

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PREPARATION OF SAMPLES	**DUTY NO.**	401
TASK TITLE	PREPARATION OF SAMPLES	**TASK NO.**	4011
PERFORMANCE CRITERIA	The person performing this task must be able to prepare and retain samples in accordance with standards and programs.		
RANGE STATEMENT	The task can be performed in the food testing site under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Manual of sample preparation methods; 2. Labels, marker pens, plastic bags, recorders, etc.; 3. Commonly-used laboratory instruments and equipment, such as balances, homogenizers, pulverizers, centrifuges, thermostat water baths, transition equipment, grinders, beakers, glass rods, measuring cylinders, centrifuge tubes, sample bags, chemical reagents, and so on; 4. Personal protective equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the materials and tools as required by the task; 2. Select the method of sample preparation; 3. Separate samples; 4. Crush samples; 5. Mix samples; 6. Retain samples; 7. Fill in the sample preparation record; 8. Make specifications for preparation of identification samples; 9. Record the experimental environmental conditions; 10. Use personal protective equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Prepare samples according to the quartering method; 1.2 Prepare samples according to the three-layer and five-point-based method; 1.3 Retain samples in accordance with the sample retention system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of homogeneity, representativeness and typicality of samples; 2.2 Principles of originality and avoidance of contamination of samples; 2.3 Sample retention specifications. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Workflow and practices of sample preparation; 3.2 Sample retention methods; 3.3 Quartering method;

	3.4 Three-layer and five-point-based method; **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Skills in marking and recording.
DESCRIPTION OF THE END PRODUCT / SERVICE	Samples are prepared and retained in accordance with sample preparation standard operation procedures and sample retention systems.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Safety operation of equipment; 2. Occupational health and safety; 3. Numerical computation.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PROCUREMENT OF REAGENT CONSUMABLES	**DUTY NO.**	402
TASK TITLE	PROCUREMENT OF STANDARD SUBSTANCE	**TASK NO.**	4021
PERFORMANCE CRITERIA	The person performing this task must be able to conduct purchasing and receiving inspections in accordance with procurement management documents and manufacturer's manuals.		
RANGE STATEMENT	The task can be performed under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Computer, recording pen; 2. List of qualified suppliers; 3. Requisitions, contracts, receipts, etc.; 4. Procurement management documents.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Identify the grade markings of the standard substances; 2. Formulate the procurement plan; 3. Fill out a request form for the procurement of standard substances; 4. Collect, examine and evaluate information on suppliers of standard substances; 5. Select and confirm the qualification of the supplier of standard substances; 6. Confirm the quality, prices and service of the standard substance products; 7. Establish contracts for the procurement of standard substances; 8. Purchase standard substances; 9. Inspect and accept procured standard substances; 10. Fill in the inspection and acceptance records; 11. Organize bills; 12. Perform financial reporting.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Confirm the grade of the standard substance; 1.2 Confirm the qualification of the supplier of standard substances; 1.3 Select the supplier. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of merit-based procurement of "good quality at a low price"; 2.2 Principle of metrological traceability; 2.3 Regulations on the management of standard substances; 2.4 Regulation of contracts, records, bills, etc. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Distinction of grade markings for standard substances; 3.2 Procurement procedures for reagent consumables; 3.3 Development of procurement plans.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Negotiation skills; 4.4 Skills in information finding and collection; 4.5 E-commerce skills; 4.6 Computer application skills; 4.7 Management skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Standard substances are procured in accordance with detecting requirements and procurement management documents.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Business knowledge; 2. Occupational health and safety; 3. Numerical computation.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PROCUREMENT OF REAGENT CONSUMABLES	**DUTY NO.**	402
TASK TITLE	PROCUREMENT OF GENERIC REAGENTS	**TASK NO.**	4022
PERFORMANCE CRITERIA	The person performing this task must be able to conduct purchasing and receiving inspections in accordance with procurement management documents and manufacturer's manuals.		
RANGE STATEMENT	The task can be performed under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Computer, recording pen; 2. Reagent manual; 3. List of qualified suppliers; 4. Requisitions, contracts, receipts, etc.; 5. Procurement management documents.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Prepare procurement schedules for generic reagents; 2. Correctly complete procurement requisitions; 3. Collect, examine and evaluate information on suppliers of generic reagents; 4. Select and verify supplier qualifications; 5. Verify purchased reagents complying in requirements; 6. Establish procurement contracts; 7. Procure generic reagents; 8. Inspect and accept procured generic reagents; 9. Fill in the conservation, inspection and acceptance records; 10. Organize and record bills; 11. Complete payment of goods and financial reporting.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Select the grade and suitability of the reagent; 1.2 Select the supplier of the reagent. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of merit-based procurement of "good quality at a low price"; 2.2 The principle of safety; 2.3 The principle of sustainable supply; 2.4 Chemical reagent regulations. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Principle of identifying supplier qualifications; 3.2 Purchasing process for generic reagents. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills;

	4.3 Negotiation skills; 4.4 Skills in information finding and collection; 4.5 E-commerce skills; 4.6 Management skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Generic reagents are requested to be purchased based on the purpose of the experiment and the procurement management document.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Chemical reagents handbook; 2. Laboratory manual; 3. Business knowledge; 4. Numerical computation.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PROCUREMENT OF REAGENT CONSUMABLES	**DUTY NO.**	402
TASK TITLE	PROCUREMENT OF HAZARDOUS CHEMICAL	**TASK NO.**	4023
PERFORMANCE CRITERIA	The person performing this task must be able to request purchases in accordance with the documentation of procedures for managing the procurement of hazardous articles.		
RANGE STATEMENT	The task can be performed in the food testing site under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Documentation of procurement procedures for hazardous chemicals; 2. Documentation of procurement management systems for hazardous chemicals; 3. Computer, recording pen; 4. List of qualified suppliers; 5. Requisitions, contracts, receipts, etc.; 6. Emergency rescue equipment and devices; 7. Personal protective equipment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Identify hazardous chemical signage; 2. Identify the physical and chemical properties, hazards of hazardous chemicals; 3. Fill out purchase requisitions for hazardous chemicals; 4. Process purchase vouchers and permits for hazardous chemicals; 5. Confirm the qualifications of suppliers of hazardous chemicals; 6. Confirm carrier qualifications; 7. Procure hazardous chemicals; 8. Organize and record bills; 9. Complete payment of goods and financial reporting; 10. Observe occupational health and safety precautions; 11. Use personal protective equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Confirm the signs and rating of hazardous chemicals; 1.2 Confirm the qualifications of suppliers of hazardous chemicals; 1.3 Confirm carrier qualifications. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The principle of safety; 2.2 Principle of quality and affordability; 2.3 Principle of traceability; 2.4 Principle of license management; 2.5 Hazardous chemical act of administration. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Procurement workflow of hazardous chemicals; 3.2 Procedures for the safe use of hazardous chemicals;

	3.3 Hazards and protection against hazardous chemicals; 3.4 Classification and signs of commonly-used hazardous chemicals. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Negotiation skills; 4.4 Computer application skills; 4.5 Safety protection skills; 4.6 Management skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Hazardous articles are requested for procurement and procured in accordance with the hazardous articles management regulations and the procurement management system.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Numerical computation; 3. Business knowledge.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PROCUREMENT OF REAGENT CONSUMABLES	**DUTY NO.**	402
TASK TITLE	PROCUREMENT OF METERING GLASSWARE	**TASK NO.**	4024
PERFORMANCE CRITERIA	The person performing this task must be able to request purchases in accordance with the regulation on the use of laboratory glassware and procurement management documents.		
RANGE STATEMENT	The task can be performed in the food testing site under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Regulations for the use of glassware in chemical laboratories; 2. Computer, recording pen; 3. List of qualified suppliers; 4. Requisitions, contracts, receipts, etc.; 5. Procurement management documents.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Confirm the requirements for metering glassware; 2. Fill out procurement requisitions for metering glassware; 3. Gather information about suppliers; 4. Confirm product quality, price and service, and choose the best source; 5. Confirm supplier qualifications; 6. Procure glassware; 7. Inspect and accept procured metering glassware; 8. Dispose of substandard metering glassware and concessions; 9. Complete and maintain acceptance records for metering glassware; 10. Organize and record bills and complete payment of goods and financial reporting.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Confirm the requirements for metering glassware; 1.2 Confirm the qualification of suppliers of metering glassware. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of merit-based procurement of "good quality at a low price"; 2.2 Metrological tracing requirements; 2.3 Principle of sustainable supply; 2.4 Regulations for reagent consumables. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Procurement procedures for reagent consumables. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Skills in information finding and collection;

	4.4 E-commerce skills; 4.5 Computer application skills; 4.6 Negotiation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Procurement was requested in accordance with the procurement management system and the regulation on the use of laboratory glassware.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Business knowledge; 3. Stock preparation and inventory management.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PREPARATION FOR PHYSICAL AND CHEMICAL DETECTION	**DUTY NO.**	403
TASK TITLE	PREPARATION OF GLASSWARE	**TASK NO.**	4031
PERFORMANCE CRITERIA	The person performing this task must be able to handle glassware safely in accordance with operating procedures.		
RANGE STATEMENT	The task can be performed in the food testing site under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Glass instruments commonly-used in the laboratory, such as transfer pipets, pipettes, volumetric flasks, measuring cylinders, beakers, conical bottles, etc.; 2. Register of glassware losses; 3. Personal protective equipment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Sort and store glassware; 2. Choose the right glassware; 3. Wash glassware; 4. Dry glassware; 5. Preserve glassware with ground mouths; 6. Use glassware in a standardized way; 7. Fill out the glassware loss register; 8. Dispose of glass waste; 9. Observe occupational health and safety precautions.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Select glassware; 1.2 Wash glassware; 1.3 Dry glassware; 1.4 Use glassware in a standardized way. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of safety; 2.2 Principle of traceability. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Safety operation procedures in the laboratory; 3.2 Safety operation procedures for glassware; 3.3 Methods of washing glassware; 3.4 Methods of drying glassware. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Skills in marking and recording.

DESCRIPTION OF THE END PRODUCT / SERVICE	Glassware is operated in accordance with operating procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Laboratory safety operation; 2. Occupational health and safety.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PREPARATION FOR PHYSICAL AND CHEMICAL DETECTION	**DUTY NO.**	403
TASK TITLE	SAMPLE WEIGHING	**TASK NO.**	4032
PERFORMANCE CRITERIA	The person performing this task must be able to weigh samples correctly according to the weighing requirements.		
RANGE STATEMENT	The task can be performed in the food testing site under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Electronic balances; 2. Tray balance; 3. Commonly-used laboratory tools, such as weighing paper, label paper, calculators, pens, medicine spoons, weighing bottles, filter paper, beakers, desiccators, brushes, and common reagents used in experiments; 4. Weighing record; 5. Instrument using records; 6. Personal protective equipment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe occupational health and safety precautions; 2. Select weighing methods and equipment; 3. Determine the weighing range; 4. Weigh the sample with a tray balance; 5. Weigh the sample with an electronic balance; 6. Record weighing data; 7. Fill in the instrument using records. 8. Clean weighing instruments and workplaces.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Select weighing methods and equipment; 1.2 Determine the weighing range; 1.3 Weigh the sample with a tray balance properly; 1.4 Weigh samples with an electronic balance. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 principle of weighing on a tray balance; 2.2 Principle of operation and specifications for the use of electronic balances; 2.3 Principle of traceability of weighing data. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Operation and maintenance regulations for balances; 3.2 Sample management procedures. **4.0 Essential Skills**

	4.1 Communication skills; 4.2 Teamwork skills; 4.3 Data-logging skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Samples are weighed according to balance operation manual.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Numerical computation.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PREPARATION FOR PHYSICAL AND CHEMICAL DETECTION	**DUTY NO.**	403
TASK TITLE	PREPARATION OF SIMPLE SOLUTION	**TASK NO.**	4033
PERFORMANCE CRITERIA	The person performing this task must be able to prepare solution in accordance with standard operation procedures.		
RANGE STATEMENT	The task can be performed in the food testing site under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Standard operation procedures for solution preparation; 2. Balance; 3. Calculator, pens, label paper; 4. Measuring cylinder, transfer pipet, beaker, glass rod and reagent bottle; 5. Commonly-used reagents; 6. Reagent receipt records, return records, preparation records, etc.; 7. Personal protective equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe occupational health and safety precautions; 2. Obtain the materials and tools as required by the task; 3. Calculate the amount of reagent needed to prepare the solution; 4. Fill out reagent requests and returns; 5. Select measuring instruments and containers; 6. Weigh solid reagents or measure liquid reagents; 7. Dissolve solid reagents; 8. Dilute and condense to obtain a solution of the desired concentration; 9. Preserve solution; 10. Fill in the solution label information; 11. Fill out reagent preparation records; 12. Clean and organize the workplace.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Calculate the amount of reagent needed to prepare the solution; 1.2 Select a measuring instrument and weigh the reagents; 1.3 Dissolve and titrate the solution; 1.4 Fill out and keep records. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of solution preparation; 2.2 Principles of record completion; 2.3 Laboratory reagent standards. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Specifications of laboratory water; 3.2 Test method.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Skills in the use of standard operation procedures; 4.4 Skills in marking and recording.
DESCRIPTION OF THE END PRODUCT / SERVICE	Solutions are simply prepared according to the standard operation procedures of solution preparation.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Numerical computation.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PREPARATION FOR MICROBE DETECTION	**DUTY NO.**	404
TASK TITLE	CLEANING AND STERILIZING WRAPPING OF GLASSWARE	**TASK NO.**	4041
PERFORMANCE CRITERIA	The person performing this task must be able to clean, sterilize and wrap glassware in accordance with the glassware cleaning requirements and standard operation procedures of sterilization and dressing to prepare for microbe detection.		
RANGE STATEMENT	The task can be performed in the microbe detection laboratory under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Autoclave; 2. Electric dry oven; 3. Straws, petri dishes, conical bottles, test tubes, measuring cylinders and other glassware; 4. Scissors and tweezers; 5. String, skimmed cotton, kraft paper or newspaper; 6. Alcohol burners or lighters; 7. Instrument using records; 8. Work clothes and log pens.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe occupational health and safety precautions; 2. Wash glassware; 3. Wrap glassware; 4. Check and adjust the liquid level in the autoclave; 5. Carry out moist heat sterilization of glassware through high-pressure steam; 6. Set the parameters of the electric dry oven; 7. Sterilize glassware by dry heat; 8. Autoclave and wash biohazard glassware; 9. Record the use of instruments and equipment; 10. Clean equipment and workplaces.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Wrap glassware; 1.2 Sterilize glassware by moist heat; 1.3 Sterilize glassware by dry heat. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of autoclaving; 2.2 Principles of dry heat sterilization. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Wrapping and sterilization procedures for glassware; 3.2 Procedures for the safety operation of glassware; 3.3 Procedures for the safety operation of the autoclave; 3.4 Procedures for the safety operation of the electric dry

	oven; **4.0 Essential Skills** 4.1 Communication skills 4.2 Teamwork skills; 4.3 Clean labor skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Glassware is cleaned, sterilized and wrapped in accordance with standard operation procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation procedures in the laboratory.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PREPARATION FOR MICROBE DETECTION	**DUTY NO.**	404
TASK TITLE	PREPARATION OF COMMONLY-USED REAGENTS FOR MICROBIOLOGICAL INSPECTION	**TASK NO.**	4042
PERFORMANCE CRITERIA	The person performing this task must be able to prepare commonly-used reagents for microbiological inspections properly in accordance with standard operation procedures.		
RANGE STATEMENT	The task can be performed in the microbe detection laboratory under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Standard operation procedures; 2. Balance; 3. Glassware, such as measuring cylinders, pipettes, transfer pipets, funnels, beakers, dropping bottles, and glass rods; 4. Electric furnace; 5. Dispensing racks; 6. Medicine spoon and weighing paper; 7. Containers such as reagent bottles; 8. Reagent receipt records, return records, and preparation records; 9. Work clothes and log pens.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe occupational health and safety precautions; 2. Select a balance with the appropriate sensibility; 3. Select the pipetting gauges or instruments; 4. Select containers such as reagent bottles; 5. Identify and select reagents; 6. Calculate the reagent dosage; 7. Weigh reagents correctly; 8. Prepare and maintain reagents commonly used in microbiological inspection; 9. Clean equipment and workplaces.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Prepare reagents of a certain mass and concentration; 1.2 Prepare reagents with a certain volume fraction. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of "preparation on demand" of reagents; 2.2 Principle of "use-as-you-go" reagents; 2.3 Principle of "first prepared, first used" for reagents; **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of preparation and preservation of

	reagents commonly used in microbiological inspections; 3.2 Precautions for preparation of reagents commonly used in microbiological inspections; **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Skills in marking and recording.
DESCRIPTION OF THE END PRODUCT / SERVICE	Commonly-used reagents for microbe detection are prepared in accordance with standard operation procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation procedures in the laboratory.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	PREPARATION FOR MICROBE DETECTION	**DUTY NO.**	404
TASK TITLE	PREPARATION OF CULTURE MEDIUM AND STERILIZATION OF ITEMS	**TASK NO.**	4043
PERFORMANCE CRITERIA	The person performing this task must be able to prepare a culture medium properly and sterilize items in accordance with standard operation procedures.		
RANGE STATEMENT	The task can be performed in the microbe detection laboratory under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Glassware such as measuring cylinders, pipettes, conical bottles, test tubes, funnels, beakers, and glass rods; 2. Autoclave; 3. Electric furnace; 4. Graduated enamel cylinder; 5. Dispensing racks; 6. Balance; 7. pH meter or precision pH paper; 8. Medicine spoon and weighing paper; 9. Scissors and tweezers; 10. String, skimmed cotton, gauze, kraft paper or newspaper; 11. Alcohol burners; 12. Reagent receipt records, return records, and culture medium records; 13. Work clothes and log pens.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe occupational health and safety precautions; 2. Calculate the amount of culture medium used; 3. Fill out reagent requests and returns; 4. Weigh the culture medium; 5. Heat and melt the agar; 6. Filter the culture medium through gauze; 7. Prepare the culture medium; 8. Adjust the pH of the culture medium; 9. Dispense the culture medium;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Prepare the culture medium; 1.2 Sterilize the culture medium and items with high-pressure steam; 1.3 Check the culture medium and items for sterility. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of autoclaving; 2.2 Preparation principle of culture medium; 2.3 Safety operation specification for sterilizers, electric furnaces, acid and alkaline reagents.

10. Sterilize the culture medium; 11. Record culture medium preparation and labeling; 12. Check the sterilization of the culture medium and items; 13. Clean equipment and workplaces.	**3.0 Theories** The person performing this task must be able to explain the following: 3.1 Preparation and sterilization of culture medium; 3.2 Methods for checking the sterility of culture medium. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Skills in marking and recording.
DESCRIPTION OF THE END PRODUCT / SERVICE	Preparation of culture medium and sterilization of items are implemented in accordance with standard operation procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation procedures in the laboratory.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	LABORATORY SAFETY OPERATION	**DUTY NO.**	405
TASK TITLE	SELECTION AND USE OF PERSONAL PROTECTIVE EQUIPMENT	**TASK NO.**	4051
PERFORMANCE CRITERIA	The person performing this task must be able to select and use personal protective equipment properly in accordance with personal protection guidelines.		
RANGE STATEMENT	The task can be performed in the food testing laboratory under the supervision of senior food inspection and testing technicians or engineers. The tools and equipment to be used include: 1. Goggles; 2. Masks or face shields; 3. Gloves; 4. Hair cap; 5. Shoe covers; 6. Work shoes; 7. Guidelines for personal protection; 8. Protective suits or work clothes.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe occupational health and safety precautions; 2. Segregate lab gowns and personal belongings; 3. Select personal protective equipment; 4. Change and wear personal protective equipment; 5. Use personal protective equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Circumvent damage from UV sterilizing lamps; 1.2 Avoid microbial contamination. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of prevention of laboratory safety risks; 2.2 Using principle of personal protective equipment. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Procedures for donning and doffing laboratory personal protective equipment; 3.2 Laboratory requirements for the placement of personal protective equipment and personal belongings; 3.3 Analysis of laboratory safety risks. **4.0 Essential Skills**

	4.1 Communication skills; 4.2 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Personal protective equipment is selected and used according to personal protection requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational safety and health; 2. Standards and certification requirements for appliances; 3. Regulations on disposal of appliances.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	LABORATORY SAFETY OPERATION	**DUTY NO.**	405
TASK TITLE	OPERATION OF SAFETY PROTECTION FACILITIES AND FIRE-FIGHTING EQUIPMENT	**TASK NO.**	4052
PERFORMANCE CRITERIA	The person performing this task must be able to operate safety protection facilities and fire-fighting equipment.		
RANGE STATEMENT	The task can be performed in the food testing laboratory under the supervision of senior food inspection and testing technicians or engineers. The tools and equipment to be used include: 1. Eye washer; 2. Emergency sprinkler; 3. Gas mask; 4. Small medical kit; 5. Fire extinguisher; 6. Fire-extinguishing sand; 7. Fire blanket; 8. Hydrant; 9. Safety operation procedures.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe occupational health and safety precautions; 2. Use the eye washer properly; 3. Operate emergency sprinklers properly; 4. Use gas masks properly; 5. Use the small medicine kit properly; 6. Use the fire extinguisher properly; 7. Use the fire-extinguishing sand properly; 8. Use the fire blanket properly; 9. Operate hydrants properly; 10. Manage fire-fighting equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use safety equipment in a standardized manner; 1.2 Select and use fire suppression equipment properly. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of operation and use of safety protection facilities; 2.2 Positioning, timing and personnel principles of fire-fighting equipment management 2.3 Operating procedures of safety protection facilities and fire-fighting equipment of laboratories. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Emergency response procedures for laboratories; 3.2 Analysis of laboratory safety risks;

	3.3 Identification of signs for hazardous articles and fire protection. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Identification of safety hazards.
DESCRIPTION OF THE END PRODUCT / SERVICE	Safety protection facilities and fire-fighting equipment are operated in accordance with standard operation procedures.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Processes for relevant training and exercises; 3. Escape and evacuation routes from the workplace.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	LABORATORY SAFETY OPERATION	**DUTY NO.**	405
TASK TITLE	COLLECTION AND TREATMENT OF WASTE SOLUTIONS AND RESIDUES	**TASK NO.**	4053
PERFORMANCE CRITERIA	The person performing this task must be able to collect and dispose of waste solutions and residues according to the laboratory waste disposal process.		
RANGE STATEMENT	The task can be performed in the food testing laboratory under the supervision of senior food inspection and testing technicians or engineers. The tools and equipment to be used include: 1. Waste containers; 2. Waste solution tanks; 3. Waste bags; 4. Marker pens; 5. Work clothes.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Clean up laboratory waste; 2. Classify and collect waste solutions and residues; 3. Recycle specific wastes; 4. Classify and dispose of waste solutions and residues; 5. Identify waste solutions and residues; 6. Store waste solutions and residues; 7. Clean the tools, equipment and workplaces.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Classify and dispose of waste solutions and residues in laboratories; 1.2 Collect and store laboratory waste in sub-zones. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of sorting and disposal of laboratory waste solutions; 2.2 Principles of disposal of laboratory waste solutions and residues; 2.3 Criteria for the classification of laboratory waste solutions. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Hazards and disposal protocols for different types of waste. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills.
DESCRIPTION OF THE END	Waste solutions and residues are disposed of according to

PRODUCT / SERVICE	the laboratory waste disposal process.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Environmental protection technology.

OCCUPATION	FOOD INSPECTION AND TESTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	LABORATORY SAFETY OPERATION	**DUTY NO.**	405
TASK TITLE	TECHNIQUES FOR BASIC LABORATORY SAFETY	**TASK NO.**	4054
PERFORMANCE CRITERIA	The person performing this task must be able to perform safety operations in compliance with the laboratory safety code of practice.		
RANGE STATEMENT	The task can be performed in the food testing site under the supervision of senior technicians or food inspection and testing engineers. The tools and equipment to be used include: 1. Electricity facilities; 2. Water facilities; 3. Sterilization facilities; 4. Switches for water, electricity and gas; 5. Transferring window; 6. Work clothes.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Observe occupational health and safety precautions; 2. Comply with laboratory regulations; 3. Check for laboratory fire hazards; 4. Check the electrical safety of leakage protectors, cords, sockets, plugs, and high-power electrical equipment in the laboratory; 5. Check water safety in the laboratory; 6. Implement laboratory sterilization; 7. Turn off water, electricity, and gas switches when leaving the laboratory; 8. Evacuate from the laboratory in an emergency; 9. Clean the tools, equipment and workplaces.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Ensure the safety of water, electricity, gases, etc. in the laboratory; 1.2 Ensure biosafety in biology laboratory. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Laboratory safety code; 2.2 Precautionary principle of laboratory safety. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Class of biosafety protection for microbiology laboratories; 3.2 Safe practices for laboratory electrical facilities; 3.3 Safe practices for sterilizing facilities in microbiology laboratories; 3.4 Laboratory safety risk analysis and identification of hazard sources. **4.0 Essential Skills** 4.1 Communication skills;

	4.2 Teamwork skills; 4.3 Fast learning skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Safety operation is performed in accordance with the laboratory safety code.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Establishment of a laboratory safety management system; 3. Laboratory escape and evacuation routes.

TABLE 1: DACUM CHARTS FOR FOOD INSPECTION AND TESTING TECHNICIAN - NTA 4

DUTIES	TASKS	ENABLERS
1.0 Preparation of samples	1.1 Preparation of samples.	**General skills and knowledge** · Communication skills · Teamwork skills · Skills in marking and recording · Numerical computation skills **Tools and equipment** · Internet-connected computer · Personal protective equipment · Sample preparation manual · Commonly-used instruments and equipment for sample preparation **Materials** · Paper, pens and other office supplies · Label paper, marker pens, sample bags, etc. · **Requirements for employees** · Teamwork spirit · Conscientiousness · Time management · Meticulousness · Adherence to norms
2.0 Procurement of reagent consumables	2.1 Procurement of standard substance. 2.2 Procurement of generic reagents. 2.3 Procurement of hazardous chemical. 2.4 Procurement of metering glassware.	**General skills and knowledge** · Communication skills · Teamwork skills · Computer application skills · E-commerce skills · Skills in information finding and collection · Fast learning skills · Negotiation skills · Management skills · Numerical computation skills **Tools and equipment** · Computers and printers connected to the Internet · Personal protective equipment · Procurement management

DUTIES	TASKS	ENABLERS
		documents. · List of qualified suppliers · Reagent manual · Contracts · Documentation of procurement procedures for hazardous chemicals · Documentation of procurement management systems for hazardous chemicals **Materials** · Paper, pens and other office supplies **Requirements for employees** · Teamwork spirit · Good faith · Conscientiousness · Time management · Adherence to norms · Safety consciousness
3.0 Preparation for physical and chemical detection	3.1 Preparation of glassware. 3.2 Sample weighing. 3.3 Configuration of simple solutions.	**General skills and knowledge** · Communication skills · Teamwork skills · Skills in the use of standard operation procedures · Computer application skills · Skills in marking and recording · Arithmetic skills **Tools and equipment** · Computers and printers connected to the Internet · Personal protective equipment · Weighing equipment such as balances and measuring cylinders · Glassware such as volumetric flasks **Materials** · Standard operation procedures · Chemical reagents handbook · Commonly-used laboratory reagents · Paper, pens and data- record tables · User's manual of equipment

DUTIES	TASKS	ENABLERS
		Requirements for employees · Teamwork spirit · Conscientiousness · Time management · Meticulousness · Adherence to norms
4.0 Preparation for microbe detection	4.1 Cleaning and sterilizing wrapping of glassware. 4.2 Preparation of commonly-used reagents for microbiological inspection. 4.3 Preparation of culture medium and sterilization of items.	**General skills and knowledge** · Communication skills · Teamwork skills · Clean labor skills · Computer application skills · Skills in marking and recording · Arithmetic skills **Tools and equipment** · Personal protective equipment · Weighing equipment such as balances and measuring cylinders · Glassware such as volumetric flasks · Autoclave · Electric furnace · Standard operation procedures · Documentation of standards or requirements · User's manual of equipment **Materials** · Commonly-used laboratory reagents · Computer, recording paper and pens **Requirements for employees** · Teamwork spirit · Conscientiousness · Time management · Meticulousness · Passion for labor
5.0 Laboratory safety operation	5.1 Selection and use of personal protective equipment. 5.2 Operation of safety protection facilities and fire-fighting equipment. 5.3 Collection and treatment of waste solutions and	**General skills and knowledge** · Communication skills · Teamwork skills · Identification of safety hazards · Fast learning skills **Tools and equipment**

DUTIES	TASKS	ENABLERS
	residues. 5.4 Techniques for basic laboratory safety.	· Personal protective equipment such as goggles and work shoes · Personal first aid facilities such as eyewash, emergency sprinklers, gas masks, and small medical kits · Fire extinguishers, fire-extinguishing sand, fire blankets, fire hydrants and other fire fighting facilities · Water, electricity and sterilization facilities · Safety operation procedures **Materials** · Guidelines for personal protection · Protective materials such as masks or face shields, gloves, hair hats and shoe covers · Trash cans, waste solution barrels and trash bags **Requirements for employees** · Teamwork spirit · Conscientiousness · Safety consciousness · Composure