CHEMISTRY TECHNIQUES

UNIT CODE: 0531 441 08A

TVET CDACC UNIT CODE: SLT/CU/SL/CR/04/5/MA

UNIT DURATION: 180 Hours

Relationship to Occupational Standards

This unit addresses the Unit of Competency: **Perform Chemistry Techniques**

Unit Description

This unit specifies the competencies required to perform chemistry techniques. It involves carrying out pH measurements, analyzing chemical samples and carrying out separation techniques.

Summary of Learning Outcomes

By the end of this unit, the learner should be able to:

S/No	Learning Outcomes	Duration (Hours)
1.	Carry out Ph measurement	60
2.	Analyse chemical sample	60
3.	Carry out separation technique	60
	Total	180

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Carry out pH measurement	1.1 Assemble pH apparatus and equipment 1.1.2 Indicator papers 1.1.3 Glassware 1.1.4 Glassware 1.1.5 Hot plates 1.1.6 Burettes 1.1.7 Pipettes 1.1.8 Magnetic stirrer plates	• Practical • Projects • Demonstrations • Group discussion • Direct Instructions • Written tests

	1.1.9 Bunsen burners 1.1.10 Spatulas 1.1.11 Crucibles 1.1.12 Tripod stand 1.1.13 Clamp and stand 1.1.14 Test tube racks 1.1.15 Tongs 1.2 Measurement Sample pH 1.2.2 Distilled water 1.2.3 pH indicator solutions 1.2.4 Organic solvents 1.2.5 Inorganic solvents 1.2.6 Reported sample pH result	
2. Analyse chemical sample	2.1 Assemble chemical analysis apparatus and equipment 2.1.1 Glassware 2.1.2 Hot plates 2.1.3 Burettes 2.1.4 Pipettes 2.1.5 Magnetic stirrer plates 2.1.6 Bunsen burners 2.1.7 Spatulas 2.1.8 Crucibles 2.1.9 Tripod stand 2.1.10 Clamp and stand 2.1.11 Test tube racks 2.1.12 Tongs 2.1.13 Analytical balances 2.1.14 Ovens 2.1.15 Karl Fischer titrators 2.2 Prepare chemical samples and reagents 2.2.1 Alcoholic beverages 2.2.2 Food substances 2.2.3 Petroleum products 2.2.4 Soil 2.2.5 Gases 2.2.6 Metal ores 2.2.7 Mineral salts 2.2.8 Organic acids 2.2.9 Inorganic acids	• Practical • Projects • Demonstrations • Group discussion • Direct Instructions • Written tests

	2.2.10 Organic bases 2.2.11 Inorganic bases 2.2.12 Polar solvents 2.2.13 Non-polar solvents 2.3 Perform chemical analysis 2.3.1 Volumetric 2.3.2 Gravimetric 2.3.3 Flame photometry 2.3.4 Colorimetry 2.4 Reported chemical analysis results	
3. Carry out separation technique	3.1 Assemble Separation technique apparatus and equipment 3.3.1 Glassware 3.3.2 Pestle and mortar 3.3.3 Water bath 3.3.4 Separating funnel 3.3.5 Hot plates 3.3.6 Magnetic stirrer plates 3.3.7 Bunsen burners 3.3.8 Spatula 3.3.9 Crucibles 3.3.10 Tripod stand 3.3.11 Filter paper 3.3.12 Clamp and stand 3.3.13 Chromatography paper 3.3.14 Thin layer chromatography development chamber 3.3.15 Tongs 3.3.16 Distillation apparatus 3.3.17 Soxhlet apparatus	• Practical • Projects • Demonstrations • Group discussion • Direct Instructions • Written tests

	3.3.18 Analytical balance 3.3.19 Oven 3.3.20 Furnace 3.3.21 Fridge 3.2 Prepare chemical sample and separation reagent 3.2.1 Organic solvents 3.2.2 Distilled water 3.2.3 Inorganic solvents 3.3 Perform sample separation 3.3.1 Distillation 3.3.2 Evaporation 3.3.3 Paper chromatography 3.3.4 Decantation 3.3.5 Extraction 3.3.6 Filtration 3.3.7 Crystallization 3.4 Report separation result	

Suggested Methods of Instruction

- Practical
- Projects
- Demonstrations
- Group discussion
- Direct Instructions

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	**Learning Materials**			
1.	Desktop computer/laptop	For trainer's use	2	1:12
2.	Projector	For trainer's use	1	1:25
3.	Standard laboratory manuals	For trainer's use	1	1:25

4.	Flip charts	For trainer's use	1	1:25
5.	Whiteboard	For trainer's use	1	1:25
6.	Assorted reference materials	For trainer's and trainee use	5	5:25
7.	Separation technique apparatus	For trainee use	5	1:5
8.	Assorted chemical samples	For trainee use	5	1:5
B	**Learning Facilities & infrastructure**			
1.	Lecture/theory room	For trainer's and trainee use	1	1:25
2.	Standard Science laboratory	For trainee use	1	1:25
3.	Internet connection	For trainee use	Enough	
4.	Assorted analytical instruments	For trainer's and trainee use	1	1:25
C	**Consumable materials**			
1.	Stationeries	For trainee use	25	1:1
2.	Gloves	For trainee use	25	1:1
3.	Masks	For trainee use	25	1:1
4.	Assorted Glassware	For trainee use	enough	1:1
5.	Assorted equipment	For trainee use	enough	1:5
6.	Pestle and mortars	For trainee use	12	1:2
7.	Desiccators	For trainee use	4	1:8
8.	Droppers/teat pipettes	For trainee use	25	1:1
9.	Assorted chemicals [acids, bases, solvents, salts]	For trainee use	enough	1:1
10.	Calibration standards	For trainer and trainee use	enough	1:1
D	**Tools and Equipment**			

1.	Analytical balances	For trainee use	5	1:5
2.	First aid kit	For trainee use	5	1:25
3.	Muffle Furnace	For trainee use	1	1:25
4	oven	For trainee use	2	1:12
5	centrifuges	For trainee use	4	1:6
6	refrigerator/freezer	For trainee use	1	1:25
7	Desiccators	For trainee use	4	1:8
8	Water bath	For trainee use	3	1:8
9	hot plate	For trainee use	6	1:4
10	Magnetic stirrer	For trainee use	4	1:6
11	colorimetric	For trainer and trainee use	1	1:25
12	Atomic Emission spectrophotometer	For trainer and trainee use	1	1:25
13	Soxhlet extractor	For trainee use	5	1:5
12	pH meter	For trainee use	5	1:5
13	pH testing pens	For trainee use	5	1:5
14	Buffer solutions	For trainee use	5	1:5
15	Sample storage apparatus	For trainee use	25	1:1
16	Magnetic stirrers	For trainee use	5	1:5
19	Titration apparatus	For trainee use	25	1:1
17	Separation technique apparatus	For trainee use	5	1:5