



**REPUBLIC OF KENYA**

**COMPETENCY BASED MODULAR CURRICULUM**

**FOR**

**ANALYTICAL CHEMISTRY TECHNOLOGY**

**KNQF LEVEL 6**

**(CYCLE 3) PROGRAMME ISCED CODE: 0531 554A**



**TVET CDACC**  
**P.O. BOX 15745-00100 NAIROBI**

## INDUSTRIAL CHEMISTRY ANALYSIS

**ISCED UNIT CODE: 0531 551 14A**

**TVET CDACC UNIT CODE: ASC/OS/ACHEM/CR/08/6/MA**

### **Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Perform Industrial Chemistry Analysis.

**Duration:** 200 Hours

### **Unit Description**

This unit covers the competencies required in performing industrial chemistry. It involves performing water and wastewater analysis, carrying out soap and detergents analysis, performing agrochemical analysis, petroleum analysis, cement analysis, sugar and allied analysis and pulp analysis.

### **Summary of Learning Outcomes**

<b>S/No</b>	<b>Learning Outcomes</b>	<b>Duration (Hours)</b>
1.	To perform water and waste water	35
2.	To perform soap and detergents	30
3.	To perform agrochemicals	30
4.	Perform petroleum analysis	25
5.	Perform cement analysis	25
6.	Perform sugar and allied analysis	30
7.	Perform paper and allied analysis	25
<b>Total</b>		<b>200</b>

## Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. To perform water and waste water analysis	1.1 Collect water and waste water sample 1.2 Measure water biological parameters 1.2.1 Nutrients 1.2.2 Bacteria 1.2.3 Algae 1.2.4 Protozoa 1.2.5 Virus 1.3 Measure water physical parameters 1.3.1 Turbidity 1.3.2 Odor 1.3.3 Density 1.3.4 Taste 1.3.5 Temperature 1.3.6 Color 1.3.7 Electric conductivity 1.4 Measure water chemical parameters 1.4.1 pH 1.4.2 Dissolved oxygen 1.4.3 Hardness 1.4.4 Biological oxygen demand 1.4.5 Total soluble solids 1.4.6 Total dissolved solids	<ul style="list-style-type: none"> <li>• Practical Assessment</li> <li>• Project-Based Assessment</li> <li>• Portfolio of Evidence</li> <li>• Written Assessment</li> </ul>

2. To carry out soap and detergents analysis	2.1 Test free fatty acids 2.2 Test acid value 2.3 Measures moisture content 2.4 Test foam stability test hardness 2.5 Calculate saponification values	<ul style="list-style-type: none"> <li>• Practical Assessment</li> <li>• Project-Based Assessment</li> <li>• Portfolio of Evidence</li> <li>• Written Assessment</li> </ul>
3. To perform agrochemical analysis	3.1 Test solubility test of agrochemicals 3.2 Vapour pressure test 3.3 Photo stability test 3.4 Shelf-life test	<ul style="list-style-type: none"> <li>• Practical Assessment</li> <li>• Project-Based Assessment</li> <li>• Portfolio of Evidence</li> <li>• Written Assessment</li> </ul>
4. Perform petroleum analysis	4.1 Calculate octane number 4.2 Calculate cetane number 4.3 Determine flash point 4.4 Measure specific gravity	<ul style="list-style-type: none"> <li>• Practical Assessment</li> <li>• Project-Based Assessment</li> <li>• Portfolio of Evidence</li> <li>• Written Assessment</li> </ul>
5. Perform cement analysis	5.1 Fineness test 5.2 Setting time test 5.3 Chemical test 5.4 Unsoundness test 5.5 Compressive strength test	<ul style="list-style-type: none"> <li>• Practical Assessment</li> <li>• Project-Based Assessment</li> <li>• Portfolio of Evidence</li> <li>• Written Assessment</li> </ul>
6. Perform sugar and allied analysis	6.1 Brix test 6.2 Crystal size test 6.3 Moisture content	<ul style="list-style-type: none"> <li>• Practical Assessment</li> </ul>

	6.4 Colour test 6.5 Ash test 6.6 Polarisation test 6.7 pH measurement	<ul style="list-style-type: none"> <li>• Project-Based Assessment</li> <li>• Portfolio of Evidence</li> <li>• Written Assessment</li> </ul>
7. Perform paper and allied analysis	7.1 Calculate copper number 7.2 Calculate kappa number 7.3 Viscosity test 7.4 Starch test	<ul style="list-style-type: none"> <li>• Practical Assessment</li> <li>• Project-Based Assessment</li> <li>• Portfolio of Evidence</li> <li>• Written Assessment</li> </ul>

### Suggested Methods of Instruction

- 1 Practical
- 2 Projects
- 3 Demonstrations
- 4 Group discussion
- 5 Direct instructions

### Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/Specifications	Quantity	Recommended Ratio (Item: Trainee)
<b>A</b>	<b>Learning Materials</b>			
1.	Power point presentations	For trainer's use	1	1:25
2.	Desktop computer/laptop	For trainer's use	1	1:25
3.	Projector	For trainer's use	1	1:25
4.	Standard manuals/SOPs	For trainer's use	1	1:25
5.	Flip charts	For trainer's use	1	1:25
6.	Whiteboard	For trainer's use	1	1:25

7.	Assorted reference materials	For trainer's and trainee use	5	5:25
<b>B</b>	<b>Learning Facilities &amp; infrastructure</b>			
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
<b>C</b>	<b>Consumable materials</b>			
1.	Stationeries	For trainee use	25	1:1
2.	Gloves	For trainee use	25	1:1
3.	Laboratory coats	For trainee use	25	1:1
4.	Masks	For trainee use	25	1:1
5.	Covers slips	For trainee use	5	1:5
6.	Assorted whiteboard markers	For trainer's	enough	
7.	Assorted Glassware	For trainee use	enough	1:1
8.	Assorted equipment	For trainee use	enough	1:5
9.	Pestle and mortars	For trainee use	12	1:2
10.	Droppers/teat pipettes	For trainee use	25	1:1
11.	Assorted chemicals [acids, bases, solvents, salts]	For trainee use	enough	1:1
12.	Calibration standards	For trainer and trainee use	enough	1:1
<b>D</b>	<b>Tools and Equipment</b>			
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.	Water bath	For trainee use	3	1:8
8.	hot plate	For trainee use	6	1:4
9.	Water and waste water analysis instruments [colorimeter, turbid meter, spectrophotometer, pH meter, Conductometer...]	For trainer and trainee use	1	1:25
10.	soap and detergents analysis instruments [pH meter, AAS, refractive index meter]	For trainer and trainee use	1	1:25
11.	agrochemical analysis instruments [mass spectrometer, UV spectrophotometry, liquid chromatography, HPLC]	For trainer and trainee use	1	1:25
12.	petroleum analysis instruments [Flash Point Tester, distillation tester,	For trainer and trainee use	1	1:25

	viscometer, combustion analyzer]			
13.	cement analysis instruments [Vicat apparatus, Le Chartelier mold, air permeability apparatus]	For trainer and trainee use	1	1:25
14.	sugar and allied analysis instruments [refractometer, hydrometer, sucrolyser, UV-Vis spectrophotometer, glucometer, HPLC]	For trainer and trainee use	1	1:25
15.	paper and allied analysis instruments [refractometer, hydrometer, Cob sizing tester]	For trainer and trainee use	1	1:25