



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

INORGANIC CHEMISTRY PRINCIPLES

ISCED UNIT CODE: 0531 551 07A

TVET CDACC UNIT CODE: ASC/CU/ACHEM/CC/04/6/MA

Relationship to Occupational Standards

This unit addresses the Unit of Competency: **Apply Inorganic Chemistry Principles.**

Duration: 150 Hours

Unit Description

This unit covers the competencies required in applying inorganic chemistry principles. It involves drawing chemical bonds, classifying s block, p block, d Block elements and applying nuclear chemistry principles.

Summary of Learning Outcomes

S/No	Learning Outcomes	Duration (Hours)
1.	Draw Chemical bonds	15
2.	Classify S-block elements	35
3.	Classify P-block elements	40
4.	Classify D-block elements	35
5.	Apply Nuclear chemistry principles	25
Total		150

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Draw chemical bonds	1.1 Atomic structure	<ul style="list-style-type: none">• Practical Assessment

	<p>1.1.1 Discovery of Atoms experiments</p> <p>1.1.2 Discovery of electron experiments</p> <p>1.1.3 Discovery of Neutron experiments</p> <p>1.1.4 s,p,d,f notation of Atoms</p> <p>1.2 Electronic configuration</p> <p>1.3 Chemical bonds</p> <p>1.3.1 Covalent</p> <p>1.3.2 Ionic</p> <p>1.3.3 Dative</p> <p>1.3.4 Hydrogen</p> <p>1.3.5 Intermolecular forces</p> <p>1.3.6 Dipole-dipole attractions</p> <p>1.4 Relative atomic mass</p> <p>1.5 Hybridization</p> <p>1.5.1 Sp¹ hybridization</p> <p>1.5.2 sp² hybridization</p> <p>1.5.3 sp³ hybridization</p> <p>1.5.4 sp³d hybridization</p> <p>1.5.5 sp³d² hybridization</p>	<ul style="list-style-type: none"> • Project-Based Assessment • Portfolio of Evidence • Written Assessment
<p>2. Classify S block elements</p>	<p>2.1 History of periodic table</p> <p>2.1.1 Dobereiners Triads</p> <p>2.1.2 John Newlands Law of Octaves</p> <p>2.1.3 Lothar Meyers Concept</p> <p>2.1.4 Mendeleevs Law of the Periodic table</p> <p>2.1.5 Modern Law of the Periodic Table</p>	<ul style="list-style-type: none"> • Practical Assessment • Project-Based Assessment • Portfolio of Evidence

	<p>2.2 Group elements</p> <p>2.3 Determine valence electrons</p> <p>2.4 Electronic configuration</p> <p>2.5 Elements classification</p> <p>2.6 Arrange elements on periodic table</p> <p>2.7 Chemistry of s block elements</p> <p>2.8 Chemical and physical properties</p> <p> 2.6.1 Physical properties</p> <p> 2.6.2 Anomalous behavior</p> <p> 2.6.3 Melting and boiling points</p> <p> 2.6.4 Valence</p> <p> 2.6.5 Ionization energy</p> <p> 2.6.6 Atomic radius</p> <p> 2.6.7 Metal character</p> <p> 2.6.8 Chemical properties</p> <p> 2.6.9 Solubility</p>	<ul style="list-style-type: none"> • Written Assessment
<p>3. Classify p block elements</p>	<p>3.1 Group P block elements group</p> <p>3.2 P block valence electrons</p> <p>3.3 Electronic configuration</p> <p>3.4 Classification of Elements</p> <p>3.5 Arrangement of Elements</p> <p>3.6 Chemistry of group elements</p> <p>3.7 Chemical and physical properties</p> <p> 3.7.1 Physical properties</p> <p> 3.7.2 Anomalous behaviour</p>	<ul style="list-style-type: none"> • Practical Assessment • Project-Based Assessment • Portfolio of Evidence • Written Assessment

	<p>3.7.3 Melting and boiling points</p> <p>3.7.4 Valence</p> <p>3.7.5 Ionization energy</p> <p>3.7.6 Atomic radius</p> <p>3.7.7 Metal character</p> <p>3.7.8 Chemical properties</p> <p>3.7.9 Solubility</p>	
4. Classify D block elements	<p>4.1 d block elements groupings</p> <p>4.1.1 Gold</p> <p>4.1.2 Copper</p> <p>4.1.3 Lead</p> <p>4.1.4 Chromium</p> <p>4.1.5 Iron</p> <p>4.2 D block valence electrons</p> <p>4.3 Electronic configuration</p> <p>4.4 Element classification</p> <p>4.5 Elements are arranged</p> <p>4.6 Chemistry of group elements</p> <p>4.7 Chemical and physical properties</p> <p>4.7.1 Physical properties</p> <p>4.7.2 Anomalous behaviour</p> <p>4.7.3 Melting and boiling points</p> <p>4.7.4 Valence</p> <p>4.7.5 Ionization energy</p> <p>4.7.6 Atomic radius</p> <p>4.7.7 character</p> <p>4.7.8 Chemical properties</p> <p>4.7.9 Solubility</p> <p>4.8 Extraction of D-block elements</p>	<ul style="list-style-type: none"> • Practical Assessment • Project-Based Assessment • Portfolio of Evidence • Written Assessment

5. Apply nuclear chemistry principles.	5.1 Nuclear reactions 5.1.1 Nuclear fission 5.1.2 Nuclear fusion 5.1.3 Radioactive decay 5.1.4 Neutron capture 5.2 Selection of reactive materials, target and reaction conditions 5.3 Nuclear radiation 5.3.1 Alpha 5.3.2 Beta 5.3.3 Gamma 1.4.Radioactive decay of radioisotopes	<ul style="list-style-type: none"> • Practical Assessment • Project-Based Assessment • Portfolio of Evidence • Written Assessment
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Suggested Methods of Instruction

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

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	Learning Materials			
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	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.	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
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.	X-ray fluorescence spectrometers	For trainee use	1	1:25
8.	Alpha-beta counters	For trainee use	6	1:4
9.	Alpha spectrometers	For trainer and trainee use		
10.	Beta spectrometers	For trainer and trainee use		
11.	Colorimetric	For trainer and trainee use	1	1:25
12.	Ultraviolet -Visible spectrophotometer	For trainer and trainee use	1	1:25
13.	Fourier Transform-Infrared spectrophotometer	For trainer and trainee use	1	1:25
14.	Atomic Absorption spectrophotometer	For trainer and trainee use	1	1:25