



REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARD

FOR

ANALYTICAL CHEMISTRY TECHNICIAN

KNQF LEVEL 6

OCCUPATION STANDARD ISCED CODE: 0531 554A

APPLY INORGANIC CHEMISTRY PRINCIPLES.

ISCED UNIT CODE: 0531 551 08A

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

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.

ELEMENT AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up laboratory function	These are assessable statements which specify the required level of performance for each of the elements. <i>(Bold and italicized terms are elaborated in the Range)</i>
1. Draw chemical bonds	1.1 <i>Atomic structure</i> is drawn as per IUPAC standards. 1.2 Electronic configuration is written based on IUPAC standards. 1.3 Types of <i>chemical bonds</i> are identified as per IUPAC standards. 1.4 Relative atomic mass is computed as per IUPAC standards. 1.5 <i>Hybridization</i> is computed based per IUPAC standards.
2. Classify S block elements	2.1 <i>History of the Periodic Table</i> as per groups 2.2 Elements are grouped based on IUPAC standards.

	<p>2.3 Valence electrons are computed based on IUPAC standards.</p> <p>2.4 Electronic configuration is written based on IUPAC standards.</p> <p>2.5 Elements are classified based on IUPAC standards.</p> <p>2.6 Elements are arranged on periodic table based on IUPAC standards.</p> <p>2.7 Chemistry of group elements are applied based on the IUPAC standards.</p> <p>2.8 Chemical and physical properties are analyzed based on IUPAC standards.</p>
3. Classify P block elements	<p>3.1 Elements are grouped based on IUPAC standards.</p> <p>3.2 Valence electrons are computed based on IUPAC standards.</p> <p>3.3 Electronic configuration is written based on IUPAC standards.</p> <p>3.4 Elements are classified based on IUPAC standards.</p> <p>3.5 Elements are arranged on periodic table based on IUPAC standards.</p> <p>3.6 Chemistry of group elements are applied based on the IUPA standards.</p> <p>3.7 Chemical and physical properties are analyzed based on IUPAC standards.</p>
4. Classify D Block elements	<p>4.1 Elements are grouped based on IUPAC standards.</p> <p>4.2 Valence electrons are computed based on IUPAC standards.</p>

	<p>4.3 Electronic configuration is written based on IUPAC standards.</p> <p>4.4 Elements are classified based on IUPAC standards.</p> <p>4.5 Elements are arranged on periodic table based on IUPAC standards.</p> <p>4.6 Chemistry of group elements are applied based on the IUPAC standards.</p> <p>4.7 Chemical and physical properties are analyzed based on IUPAC standards.</p> <p>4.8 <i>D block elements</i> are extracted as per EPA Act 1986</p>
<p>5. Apply nuclear chemistry principles.</p>	<p>5.1 <i>Nuclear reactions</i> are illustrated as per IAEA standards.</p> <p>5.2 Reactive materials, target and reaction conditions are selected as per NEA regulations.</p> <p>5.3 <i>Nuclear radiations</i> are selected as per IAEA standards.</p> <p>5.4 Radioactive decay of radioisotopes is computed as per NEA regulations.</p>

RANGE

This section provides a work environment and conditions to which the performance criteria apply. It allows for a different work environment and situations that will affect performance.

Variable	Range
1. Chemical bonds	<ul style="list-style-type: none"> • Covalent • Ionic • Dative • Hydrogen • Intermolecular forces • Dipole-dipole attractions
2. Atomic structure	<ul style="list-style-type: none"> • Discovery of Atoms experiments • Discovery of electron experiments • Discovery of Neutron experiments • SPDF notation of Atoms
3. History of the Periodic table	<ul style="list-style-type: none"> • Dobereiners Triads • John Newlands Law of Octaves • Lothar Meyers Concept • Mendeleevs Law of the Periodic table • Modern Law of the Periodic Table
4. Hybridization	<ul style="list-style-type: none"> • Sp¹ hybridization • sp² hybridization • sp³ hybridization
5. Group	<ul style="list-style-type: none"> • S block • P-block elements • D-block elements • F-block elements
6. Physical and chemical properties	<ul style="list-style-type: none"> • Physical properties • Anomalous behavior • Melting and boiling points • Valence • Ionization energy

	<ul style="list-style-type: none"> • Atomic radius • Metal character • Chemical properties • Solubility • Flame test • Reaction with air • Oxidation- reduction
7. D block elements	<ul style="list-style-type: none"> • Gold • Copper • Lead • Chromium • Iron
8. Nuclear reactions	<ul style="list-style-type: none"> • Nuclear fission • Nuclear fusion • Radioactive decay • Neutron capture
9. Nuclear radiations	<ul style="list-style-type: none"> • Alpha • Beta • Gamma

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Communication skills
- Computer skills

- Writing skill
- Time management skills
- Extraction skills
- Decision making
- First aid skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Periodic table
- Solid state chemistry
- Reaction mechanisms
- Coordination chemistry
- Transition metal chemistry
- History of the periodic table
- IUPAC Standards.
- Nuclear chemistry

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate:
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	<p>1.1 Drew atomic structure as per IUPAC standards.</p> <p>1.2 Wrote electronic configuration based on IUPAC standards.</p> <p>1.3 Extracted metals as per the EPA Act 1986</p> <p>1.4 Placed elements in the correct groups of the periodic table as per the IUPAC standards.</p> <p>1.5 Applied nuclear reactions in energy production and medical imaging as per NEA regulations.</p>
2. Resource Implications	<p>The following resources should be provided:</p> <p>2.1 Access to relevant workplace</p> <p>2.2 Appropriately simulated environment where assessment can take place</p> <p>2.3 Materials relevant to the proposed activity or tasks</p>
3. Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <p>3.1 Written tests</p> <p>3.2 Oral questioning</p>
4. Context of Assessment	<p>Competency may be assessed:</p> <p>4.1 Workplace</p> <p>4.2 Simulated laboratory environment</p>
5. Guidance information for assessment	<p>5.1 Holistic assessment with other units relevant to the industry sector, laboratory and job role is recommended.</p>