Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

APPLIED CHEMISTRY

GENAC302 DEMONSTRATE BASICS OF CHEMISTRY

Competence

RQF Level: 3

Learning Hours: 40

Credits: 4

Sector: Building and construction services, Agriculture and food processing, Transport and logistics, Manufacturing and mining, Hospitality tourism, Art and craft.

Trade: Building construction, Public works, Land surveying, Plumbing Technology, Interior design, Agriculture, Animal health, Wood Technology, Leather technology, Forestry, Water and Irrigation, Food processing, Automobile technology, Heavy machinery, Manufacturing technology, Mining technology, Food and baverage operations, Fine and plastic arts.

Module Type: General

Curriculum: TVET Certificate 3 in Building construction, Public works, Land surveying, Plumbing Technology, Interior design, Agriculture, Animal health, Wood Technology, Leather technology, Forestry, Water and Irrigation, Food processing, Automobile technology, Heavy machinery, Manufacturing technology, Mining technology, Food and baverage operations, Fine and plastic arts.

Issue Date: April 2022

<table>
<tr><td>Purpose statement</td><td colspan="5">This module describes the skills, knowledge and attitudes required to apply the basics of Chemistry. At the end of this module, the learner will be able to describe the structure of atom and molecules, apply the basics of inorganic chemistry and perform acid-base titration.</td></tr>
<tr><td rowspan="6">Delivery modality</td><td colspan="2">Training delivery</td><td>100%</td><td>Assessment</td><td>Total 100%</td></tr>
<tr><td colspan="2">Theoretical content</td><td>30%</td><td rowspan="4">Formative assessment</td><td>30%</td><td rowspan="4">50%</td></tr>
<tr><td colspan="2">Practical work:</td><td rowspan="3">70%</td><td rowspan="3">70%</td></tr>
<tr><td>• Group project and presentation</td><td>20%</td></tr>
<tr><td>• Individual project /Work</td><td>50%</td></tr>
<tr><td colspan="3"></td><td colspan="2">Summative Assessment</td><td>50%</td></tr>
</table>

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Describe the structure of atom and molecules	1.1. An atom is properly explained according to Dalton's atomic theory
	1.2. Atomic mass is correctly determined based on periodic table of chemical elements
	1.3. Chemical molecule formation is appropriately explained in accordance with chemical properties of elements
	1.4. Transition metals are properly discussed according to their physical and chemical properties
2. Apply the basics of inorganic chemistry	2.1. Chemical equations are correctly balanced based on types of chemical reactions
	2.2. Acids, Bases and Amphoteric substances are properly distinguished as per their chemical properties and uses
	2.3. Concentration of chemical solution is accurately calculated based on expressions of concentration
3. Perform acid-base titration	3.1. Laboratory apparatus and reagents are properly identified according to acid-base titration
	3.2. Acid-base titration is correctly conducted according to the concentration of solution
	3.3. Utility of acid-base titration is clearly explained refer to its area of application

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Describe the structure of atom and molecules 2. Apply the basics of inorganic chemistry 3. Perform acid-base titration
Learning outcome 1: Describe the structure of atom and molecules	**Learning hours: 12**

Indicative content

- **Atom description**
  - ✓ Atom Dalton's theory
  - ✓ Atomic particles structure and their properties
    - Nucleus
    - Electrons
- **Calculation of Atomic mass**
  - ✓ Periodic table of chemical elements
  - ✓ Atomic mass, Relative atomic mass and Isotopes
  - ✓ Electronic configuration
- **Molecule formation**
  - ✓ Properties of metals and non-metals
  - ✓ Chemical bonds
- **Explanation of transition metals**
  - ✓ Physical and chemical properties
  - ✓ Uses of transition metals

Resources required for the learning outcome

Equipment	- White/black board, Projector ,Computer ,Chalkboard, DVD players
Materials	- Reference books, Marker pen, Flip Chalks, chart
Tools	- Internet connection , Periodic table of chemical elements, Calculator
Facilitation techniques	- Demonstration and simulation, Individual and group work, Laboratory experiment, Individualized , Trainer guided, Group discussion

Formative assessment methods	- Written assessment, Oral presentation, Performance assessment, Product based assessment, Project based assessment

Learning outcome 2: Apply the basics of inorganic chemistry	**Learning hours: 14**

Indicative content

- **Balancing chemical equations**
  - ✓ Types of chemical reaction
  - ✓ Balance of chemical equations
- **Distinction of Acids, Bases and Amphoteric substances**
  - ✓ Chemical properties of Acids, Bases and Amphoteric substances
  - ✓ Use of acids and bases
- **Calculation of concentration**
  - ✓ Mole concept
    - Number of moles
    - Relative molecular mass (RMM)
  - ✓ Types of solution
  - ✓ Calculation of Morality (C), Normality (N), Molality (M), Percentage composition (%).

Resources required for the indicative content

Equipment	- White/black board, Projector ,Computer ,Chalkboard, DVD players
Materials	- Reference books, Marker pen, Flip Chalks, chart
Tools	- Internet connection , Periodic table of chemical elements, Calculator
Facilitation techniques	- Demonstration and simulation, Individual and group work, Laboratory experiment, Individualized , Trainer guided, Group discussion
Formative assessment methods	- Written assessment, Oral presentation, Performance assessment, Product based assessment, Project based assessment

Learning outcome 3: Perform acid-base titration	Learning hours: 14

Indicative content

- **Identification of laboratory apparatus and reagents for Acid-base titration**
  - ✓ Acid-base titration
  - ✓ Apparatus and reagents for Acid-base titration
- **Conduct acid-base titration**
  - ✓ Preparation of solutions
    - Solute
    - Solvent
    - Solution and standard solution
  - ✓ Dissolution and Dilution
  - ✓ Results interpretation
- **Application of acid-base titration**
  - ✓ Areas of application of acid-base titration

Resources required for the indicative content

Equipment	- White/black board, Projector ,Computer ,Chalkboard, DVD players , laboratory equipment
Materials	- Reference books, Marker pen, Flip Chalks, chart
Tools	- Internet connection , Periodic table of chemical elements, Calculator, laboratory apparatus
Facilitation techniques	- Demonstration and simulation, Individual and group work, Laboratory experiment, Individualized , Trainer guided, Group discussion
Formative assessment methods	- Written assessment, Oral presentation, Performance assessment, Product based assessment, Project based assessment

References:

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2. D.Mukama, S. a. (2013). Chemistry for Rwanda Secondary Schools, Advanced Level Senior5. Fountain.
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5. Holman, G. H. (2000). Chemistry in Context 5th Edition. United Kingdom: Nelson Thornes.
6. Huhes, P. C. (2002). Chemistry for advanced level. London: JOHN MURRAY.
7. Lister, T., & Renshaw. (1995). Understanding Chemistry for Advanced Level (second ed.). Stanley Thornes.
8. Lister, T., & Renshaw, J. (2000). New Understanding Chemistry for Advanced Level (Illustrated ed.).
9. Nelson Thornes. Lwishi, K. (2013). Pearson Advanced Level Chemistry Student's Book for S6.
10. Harlow: PEARSON. Moore, J. T. (2012). Chemisrty II for Dummies. John Wiley & Sons