



WTCS Repository

10-806-127 Chemistry 1

Course Outcome Summary

Course Information

Description	Fundamental concepts of inorganic chemistry. Emphasizes learning the basic principles and quantitative measurements used in chemistry. Consists of three hours of lecture and one, two-hour laboratory period per week.
Instructional Level	College Parallel
Total Credits	4

Course History

Last Revision Date	9/17/2012
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Pre/Corequisites

Prerequisite Each Wisconsin Technical College determines the General Education course prerequisites used by their academic institution. If prerequisites for a course are determined to be appropriate, the final Course Outcome Summary must identify the prerequisites approved for use by the individual Technical College.

Course Competencies

1. Demonstrate proper laboratory technique and safety procedures using various measuring instruments

Assessment Strategies

- 1.1. by completing assigned labs
- 1.2. by completing study guide

Criteria

Criteria - Performance will be satisfactory when:

- 1.1. you obtain precise measurements using a variety of laboratory equipment
- 1.2. you express measurements using the proper number of significant digits
- 1.3. you use dimensional analysis and proportion methods to solve conversion problems involving metric to metric, metric to English, mass-volume relationships, and specific gravity
- 1.4. you utilize scientific notation in problem solving
- 1.5. you apply safety rules and proper procedure in performing laboratory work

2. Analyze the concept of matter and its relationship to chemical properties

Assessment Strategies

- 2.1. by completing assigned labs

- 2.2. by completing study guide
- 2.3. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 2.1. you use the term atom as it relates to matter
- 2.2. you use the term ion as it relates to matter
- 2.3. you use the term molecule as it relates to matter
- 2.4. you use the term element as it relates to matter
- 2.5. you use the term compound as it relates to matter
- 2.6. you use the term formula unit as it relates to matter
- 2.7. you use the term pure substance as it relates to matter
- 2.8. you use the term solution as it relates to matter
- 2.9. you use the term physical property as it relates to matter
- 2.10. you use the term chemical property as it relates to matter
- 2.11. you use the term homogeneous mixture as it relates to matter
- 2.12. you use the term heterogeneous mixture as it relates to matter
- 2.13. you use the term metallic as it relates to matter
- 2.14. you use the term non-metallic as it relates to matter
- 2.15. you use the term active as it relates to matter
- 2.16. you use the term inactive as it relates to matter
- 2.17. you use the term inert as it relates to matter
- 2.18. you use the periodic table to identify and predict properties of metals
- 2.19. you use the periodic table to identify and predict properties of non-metals
- 2.20. you use the periodic table to identify and predict properties of metalloids
- 2.21. you use the periodic table to identify and predict properties of active
- 2.22. you use the periodic table to identify and predict properties of inactive
- 2.23. you use the periodic table to identify and predict properties of non-reactive elements
- 2.24. you write the names and symbols for elements in the first four periods of the periodic table, as well as other elements commonly used in a laboratory setting
- 2.25. you distinguish between chemical and physical changes
- 2.26. you compare and contrast organic and inorganic substances

3. Analyze the concept of matter and its relationship to chemical properties

Assessment Strategies

- 3.1. by completing assigned labs
- 3.2. by completing study guide
- 3.3. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 3.1. you use the term atom as it relates to matter
- 3.2. you use the term ion as it relates to matter
- 3.3. you use the term molecule as it relates to matter
- 3.4. you use the term element as it relates to matter
- 3.5. you use the term compound as it relates to matter
- 3.6. you use the term formula unit as it relates to matter
- 3.7. you use the term pure substance as it relates to matter
- 3.8. you use the term solution as it relates to matter
- 3.9. you use the term physical property as it relates to matter
- 3.10. you use the term chemical property as it relates to matter
- 3.11. you use the term homogeneous mixture as it relates to matter
- 3.12. you use the term heterogeneous mixture as it relates to matter
- 3.13. you use the term metallic as it relates to matter
- 3.14. you use the term non-metallic as it relates to matter
- 3.15. you use the term active as it relates to matter
- 3.16. you use the term inactive as it relates to matter
- 3.17. you use the term inert as it relates to matter
- 3.18. you use the periodic table to identify and predict properties of metals

- 3.19. you use the periodic table to identify and predict properties of non-metals
- 3.20. you use the periodic table to identify and predict properties of metalloids
- 3.21. you use the periodic table to identify and predict properties of active
- 3.22. you use the periodic table to identify and predict properties of inactive
- 3.23. you use the periodic table to identify and predict properties of non-reactive elements
- 3.24. you write the names and symbols for elements in the first four periods of the periodic table, as well as other elements commonly used in a laboratory setting
- 3.25. you distinguish between chemical and physical changes
- 3.26. you compare and contrast organic and inorganic substances

4. Analyze the structure of the atom relating this information to make chemical predictions

Assessment Strategies

- 4.1. by completing assigned labs
- 4.2. by completing study guide
- 4.3. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 4.1. you explain Dalton's Atomic Theory and how it relates to the basic laws of chemical change
- 4.2. you determine the following for a given element: atomic number, atomic mass, number of neutrons, protons, and electrons
- 4.3. you write Lewis dot structures for atoms using the periodic table
- 4.4. you write electron configurations for atoms and ions using orbital notation
- 4.5. you distinguish the differences of properties for the isotopes of elements
- 4.6. you distinguish the similarities of properties for the isotopes of elements
- 4.7. you determine the number of valence electrons for any A-group elements
- 4.8. you predict trends in electron affinities
- 4.9. you predict trends in electronegativities
- 4.10. you predict trends in ionization potentials
- 4.11. you predict trends in atomic and ionic radii
- 4.12. you predict trends in metallic and non-metallic properties
- 4.13. you classify elements according to their similar chemical properties

5. Analyze the systematic naming of chemicals

Assessment Strategies

- 5.1. by completing assigned labs
- 5.2. by completing study guide
- 5.3. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 5.1. you identify the names of the commonly used polyatomic ions
- 5.2. you use the names of the commonly used polyatomic ions correctly in formulas
- 5.3. you identify a compound as an acid, a base, an acid salt, a hydroxy salt, and a normal salt
- 5.4. you analyze the distinguishing characteristics of an acid
- 5.5. you analyze the distinguishing characteristics of a base
- 5.6. you analyze the distinguishing characteristics of an acid salt
- 5.7. you analyze the distinguishing characteristics of a hydroxy salt
- 5.8. you analyze the distinguishing characteristics of a normal salt

6. Perform mathematical calculations of elements and compounds

Assessment Strategies

- 6.1. by preparing solutions of various concentrations
- 6.2. by completing assigned labs
- 6.3. by completing study guide
- 6.4. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 6.1. you distinguish between the mass of a molecule and the mass of a mole of molecules
- 6.2. you distinguish between the number of moles of a compound or element and the mass of that number of moles, moles of atoms, ions, molecules or formula units
- 6.3. you calculate the molecular or formula mass of a substance given the formula
- 6.4. you calculate the number of moles in a given mass of a particular substance
- 6.5. you calculate the actual number of particles in a given mass of an element or a compound of known formula
- 6.6. you calculate the percent composition of a compound from its formula
- 6.7. you determine the empirical or molecular formula of a compound given appropriate information
- 6.8. you use experimental data from laboratory analysis to calculate the percent of a given element present

7. Predict chemical events using chemical equations.

Assessment Strategies

- 7.1. by completing assigned labs
- 7.2. by completing study guide
- 7.3. by participating in a group activity on solubility
- 7.4. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 7.1. you identify the type of reaction given a chemical equation
- 7.2. you balance various types of chemical equations
- 7.3. you use the "solubility rules" to identify precipitates formed in a given chemical equation
- 7.4. you identify gases formed in a given chemical equation
- 7.5. you write correct word equations for various chemical reactions
- 7.6. you distinguish between acidic and basic

8. Analyze Stoichiometric Principles as they relate to determination of chemical reactions

Assessment Strategies

- 8.1. by completing assigned labs
- 8.2. by completing study guide
- 8.3. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 8.1. you calculate the mass or the volume of a particular reactant required to react with an excess of another reactant given a balanced equation
- 8.2. you calculate the mass or the volume of a particular reactant required to react with an excess of another reactant given an unbalanced equation
- 8.3. you calculate the theoretical mass or volume of a product formed in a particular balanced equation given other appropriate information
- 8.4. you calculate the theoretical mass or volume of a product formed in a particular unbalanced equation given other appropriate information
- 8.5. you use a balanced chemical equation to calculate the percent yield given actual yield for a particular reaction
- 8.6. you determine the limiting reactant and the amount of excess reactant given actual yield for a particular reaction
- 8.7. you determine whether a reaction is exothermic or endothermic from the heats of reaction in given equations
- 8.8. you apply the mole concept to balanced equations to understand mass relationships, mass-volume relationships, and volume relationships

9. Utilize bonding principles to analyze chemical forces and chemical reactions

Assessment Strategies

- 9.1. by completing assigned labs
- 9.2. by completing study guide
- 9.3. by participating in a group activity on bond type identification

- 9.4. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 9.1. you examine the different types of chemical bonds
- 9.2. you examine the relative strengths of chemical bonds
- 9.3. you examine the properties of the different types of chemical bonds
- 9.4. you choose the most likely type of bond formed between various atoms or molecules based on electronegativity difference
- 9.5. you identify which types of bonds are intermolecular and intramolecular
- 9.6. you identify various bond types within a given molecule

10. Apply gas law principles

Assessment Strategies

- 10.1. by completing assigned labs
- 10.2. by completing study guide
- 10.3. by demonstrating Boyle's and Charles' law
- 10.4. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 10.1. you distinguish between force and pressure of a gas
- 10.2. you distinguish between absolute and gauge pressure of a gas
- 10.3. you distinguish between a real and ideal gas
- 10.4. you use the gas laws to calculate changes in gas properties
- 10.5. you calculate the partial pressure of a gas in a mixture of gases given appropriate information
- 10.6. you use the assumptions of the Kinetic Molecular Theory and use these to explain characteristic behavior of gases
- 10.7. you calculate changes in pressure, volume, or temperature based on the gas laws (Boyle's, Charles', Gay-Lussac's, Ideal)
- 10.8. you predict changes in pressure, volume, or temperature based on the gas laws (Boyle's, Charles', Gay-Lussac's, Ideal)
- 10.9. you demonstrate a working knowledge of procedures used for collecting and measuring gases

11. Analyze properties of liquids and solids

Assessment Strategies

- 11.1. by completing assigned labs
- 11.2. by completing study guide
- 11.3. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 11.1. you distinguish between the liquid, solid, and gas states in terms of the Kinetic Molecular Theory
- 11.2. you apply the factors affecting the vapor pressure and boiling point of liquids to interpret the behavior of various liquids
- 11.3. you identify properties of liquids and solids versus gases
- 11.4. you identify bonding types within liquids and solids

12. Analyze the results of alternative solution composition

Assessment Strategies

- 12.1. by completing assigned labs
- 12.2. by completing study guide
- 12.3. by demonstrating the solution identification and preparation
- 12.4. on an exam

Criteria

Criteria - Performance will be satisfactory when:

- 12.1. you apply the principles of colligative property to interpolate their effect on solutions

- 12.2. you calculate a solution in concentration units of molarity, percent, molality, equivalents, milliequivalents, and/or osmolality
- 12.3. you prepare a solution in concentration units of molarity, percent, molality, equivalents, milliequivalents, and/or osmolality
- 12.4. you perform multiple part solution problems