CHEM-1010: INTRODUCTION TO INORGANIC CHEMISTRY

Cuyahoga Community College

Viewing: CHEM-1010: Introduction to Inorganic Chemistry

Board of Trustees:
2016-03-31

Academic Term:
Spring 2019

Subject Code
CHEM - Chemistry

Course Number:
1010

Title:
Introduction to Inorganic Chemistry

Catalog Description:
Introduction to atomic structure and bonding as basis for understanding valence, formulas, compounds and chemical reactions. Measurement, stoichiometry, states of matter, solutions, ionization, equilibria, acids, bases and pH, and health careers, scientific studies, and applications in daily life.

Credit Hour(s):
4

Lecture Hour(s):
3

Lab Hour(s):
3

Other Hour(s):
0

Requisites

Prerequisite and Corequisite
MATH-0955 Beginning Algebra, or appropriate score on Math placement test.

I. ACADEMIC CREDIT

Academic Credit According to the Ohio Department of Higher Education, one (1) semester hour of college credit will be awarded for each lecture hour. Students will be expected to work on out-of-class assignments on a regular basis which, over the length of the course, would normally average two hours of out-of-class study for each hour of formal class activity. For laboratory hours, one (1) credit shall be awarded for a minimum of three laboratory hours in a standard week for which little or no out-of-class study is required since three hours will be in the lab (i.e. Laboratory 03 hours). Whereas, one (1) credit shall be awarded for a minimum of two laboratory hours in a standard week, if supplemented by out-of-class assignments which would normally average one hour of out-of-class study preparing for or following up the laboratory experience (i.e. Laboratory 02 hours). Credit is also awarded for other hours such as directed practice, practicum, cooperative work experience, and field experience. The number of hours required to receive credit is listed under Other Hours on the syllabus. The number of credit hours for lecture, lab and other hours are listed at the beginning of the syllabus. Make sure you can prioritize your time accordingly. Proper planning, prioritization and dedication will enhance your success in this course.

The standard expectation for an online course is that you will spend 3 hours per week for each credit hour.

II. ACCESSIBILITY STATEMENT

If you need any special course adaptations or accommodations because of a documented disability, please notify your instructor within a reasonable length of time, preferably the first week of the term with formal notice of that need (i.e. an official letter from the Student Accessibility Services (SAS) office). Accommodations will not be made retroactively.
For specific information pertaining to ADA accommodation, please contact your campus SAS office or visit online at [https://www.tri-c.edu/student-accessibility-services](https://www.tri-c.edu/student-accessibility-services). Blackboard accessibility information is available at [http://access.blackboard.com](http://access.blackboard.com).

Eastern (216) 987-2052 - Voice. (216) 987-2423 - Fax
Metropolitan (216) 987-4344 – Voice. (216) 987-3257 - Fax.
Western (216) 987-5079 – Voice. (216) 987-5118 - Fax.
Westshore (216) 987-3900 – Voice. (216) 987-5294 - Fax.
Brunswick (216) 987-5079 – Voice. (216) 987-5118 - Fax.
Off-Site (216) 987-5079 – Voice.

### III. ATTENDANCE TRACKING

Regular class attendance is expected. Tri-C is required by law to verify the enrollment of students who participate in federal Title IV student aid programs and/or who receive educational benefits through other funding sources. Eligibility for federal student financial aid is based in part on enrollment status.

Students who do not attend classes for the entire term are required to withdraw from the course(s). Additionally, students who withdraw from a course or stop attending class without officially withdrawing may be required to return all or a portion of their financial aid based on the date of last attendance. Students who do not attend the full session are responsible for withdrawing from the course(s).

Tri-C is responsible for identifying students who have not attended a course before financial aid funds can be applied to students’ accounts.

Therefore, attendance is recorded in the following ways:

- For in-person and blended-learning courses, students are required to attend the course by the 15th day of the semester (or equivalent for terms shorter than five weeks) to be considered attending. Students who have not met all attendance requirements for in-person and blended courses, as described herein, within the first two weeks or equivalent, will be considered not attending.
- For online courses, students are required to login at least two times per week and submit one assignment per week for the first two weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for online courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

At the conclusion of the first two weeks of a semester or equivalent, instructors report any registered students who have “Never Attended” a course. Those students will be administratively withdrawn from that course. However, after the time period in the previous paragraphs, if a student stops attending a class or wants or needs to withdraw, for any reason, it is the student’s responsibility to take action to withdraw from the course. Students must complete and submit the appropriate Tri-C form by the established withdrawal deadline.

Tri-C is required to ensure that students receive financial aid only for courses that they attend and complete. Students reported for not attending at least one of their registered courses will have all financial aid funds held until confirmation of attendance in registered courses has been verified. Students who fail to complete at least one course may be required to repay all or a portion of their federal financial aid funds and may be ineligible to receive future federal financial aid awards. Students who withdraw from classes prior to completing more than 60 percent of their enrolled class time may be subject to the required federal refund policy.

If illness or emergency should necessitate a brief absence from class, students should confer with instructors upon their return. Students having problems with coursework due to a prolonged absence should confer with the instructor or a counselor.

### IV. LEARNING OUTCOMES ASSESSMENT

Occasionally, in addition to submitting assignments to their instructors for evaluation and a grade, students will also be asked to submit completed assignments, called ‘artifacts,’ for assessment of course and program outcomes and the College’s Essential Learning Outcomes (ELOs). The artifacts will be submitted in Blackboard or a similar technology. The level of mastery of the outcome demonstrated by the artifact DOES NOT affect the student’s grade or academic record in any way. However, some instructors require that students submit their artifact before receiving their final grade. Some artifacts will be randomly selected for assessment, which will help determine improvements and support needed to further student success. If you have any questions, please feel free to speak with your instructor or contact the Learning Outcomes Assessment office.

### V. CONCEALED CARRY STATEMENT

College policy prohibits the possession of weapons on college property by students, faculty and staff, unless specifically approved in advance as a job-related requirement (i.e., Tri-C campus police officers) or, in accordance with Ohio law, secured in a parked vehicle in a designated parking area only by an individual in possession of a valid conceal carry permit.

As a Tri-C student, your behavior on campus must comply with the student code of conduct which is available on page 29 within the Tri-C student handbook, available at [http://www.tri-c.edu/student-resources/documents/studenthandbook.pdf](http://www.tri-c.edu/student-resources/documents/studenthandbook.pdf) You must also comply with the College’s Zero Tolerance for Violence on College Property available at [http://www.tri-c.edu/policies-and-procedures/documents/3354-1-20-10-zero-tolerance-for-violence-policy.pdf](http://www.tri-c.edu/policies-and-procedures/documents/3354-1-20-10-zero-tolerance-for-violence-policy.pdf)
VI. CORONAVIRUS/COVID-19 STATEMENT

Students are responsible for adhering to all College health and safety guidance, including that which relates to the COVID-19 pandemic.

Public health requirements and standards are changing rapidly, and the College is adapting its guidance accordingly. Please check your Tri-C email and visit tri-c.edu/coronavirus regularly for updates.

All students must adhere to the following general guidelines, until further notice:

- Remain at home if you are ill or experiencing symptoms of illness. Do not attend any in-person class or gathering.
- Notify your instructor(s) if you are ill, have tested positive for COVID-19, or were exposed to an individual who has tested positive for COVID-19 and they will report the information to the Tri-C Compliance & Risk Management team and you may be contacted for follow-up information.
- Wear a mask or face covering at all times, including, but not limited to: upon entering and exiting any Tri-C facility, in class, and in all common areas.
- Maintain a distance of at least six feet between yourself and others at all times and if you must pass near an individual do it quickly and do not linger.
- Provide the College with relevant information about your current health status and participate in any required on-site checks (e.g., temperature checks, current contact information, symptom profile, etc.).
- Use only designated areas of Tri-C facilities, including entrances and exits. Sign in and out of Tri-C facilities as directed.

The general guidelines listed above do not encompass all coronavirus-related guidance. These guidelines are subject to change at the discretion of the College and under the direction of public health authorities. Students who fail to adhere to this guidance may be subject to disciplinary action under the College’s Student Code of Conduct and the Student Judicial Code.

Outcomes

Course Outcome(s):
Apply the core principles of chemistry to the health careers, other scientific studies, and/or applications in daily life.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):
1. Describe the fundamental principles of atomic theory and the atomic structure of the elements including principle energy levels, sub-energy levels, orbitals, and electronic configurations.
2. Classify and describe the states of matter and chemical and physical changes.
3. Differentiate between covalent and ionic compounds based on composition and chemical and physical properties.
4. Name ionic and covalent compounds and determine the chemical formulas.
5. Describe acid and base chemistry including pH and buffer solutions
6. Define chemical equilibrium and equilibrium constants.
7. Explain the principles of nuclear chemistry including nuclear decay reactions, fission, fusion, measurement of radiation, and half-life.
8. Discuss the properties of liquids including vapor pressure, viscosity, and surface tension.
9. Describe energy changes in endothermic and exothermic reactions, energy diagrams, and bond dissociation energies.

Course Outcome(s):
Apply problem solving skills in a career in the health sciences, advanced scientific studies, and/or applications in daily life.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):
1. Calculate density and specific gravity.
2. Convert between International System of Units (SI)/Metric system and English units and standard and scientific notation.
3. Solve problems by balancing chemical equations and using Avogadro’s number, mole concept, stoichiometry, theoretical yield, and percent yield.
4. Examine the relationship between pressure, temperature, volume, and moles as defined by the gas laws.
5. Determine the concentrations of solutions and predict effect of temperature and pressure on solubility.
6. Construct Lewis structures and valence shell electron pair repulsion (VSEPR) models.

Course Outcome(s):
Apply fundamental knowledge of chemistry to analyze reactions and properties and develop critical thinking skills such as deducing, predicting, and determining the causes of physical observations and various chemical reactions.
Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):
1. Explain atomic size, structure, physical properties, chemical properties, and the bonding of elements using periodic trends.
2. Deduce the effects of concentration, temperature, and catalysts on reaction rates.
3. Apply LeChatelier’s Principle to predict responses to stresses in equilibrium.
4. Determine the intermolecular forces for compounds and the effect of the forces on the melting point, boiling point, and solubility.

Course Outcome(s):
Apply laboratory safety and fundamental laboratory skills to health careers and other scientific studies.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):
1. Demonstrate laboratory safety and proper laboratory techniques.
2. Perform experiments in a cooperative group environment.
3. Analyze experimental results by applying the concepts of chemistry.

Course Outcome(s):
Apply fundamental knowledge of chemistry to communicate scientific information in written formats

Essential Learning Outcome Mapping:
Written Communication: Demonstrate effective written communication for an intended audience that follows genre/disciplinary conventions that reflect clarity, organization, and editing skills.

Objective(s):
1. Report experimental results and conclusions in a written form
2. Use information resources in chemistry, including the primary literature and report/summarize in a written format.

Methods of Evaluation:
1. Exams (including laboratory and a final examination)
2. Lab reports
3. Evaluation of laboratory skills
4. Participation
5. Quizzes
6. Homework assignments

Course Content Outline:
1. Matter
   a. States of matter
   b. Changes of state
   c. Physical and chemical changes and properties
   d. Classification of matter as chemical compounds, elements, and mixtures
2. Measurement
   a. Physical quantities including mass, length, and volume
   b. Significant figures
   c. Scientific notation
   d. Conversion of units
   e. Density and specific gravity
3. Atomic structure and the periodic table
   a. Atomic theory and structure
   b. Elements, symbols, and isotopes
   c. Electronic structure including shells, subshell, and orbitals
d. Electronic configurations and electron-dot symbols
e. Periodic trends
f. Ionization energy, electron affinity, and electronegativity

4. Ionic compounds
   a. Ion formation based on periodic trends
   b. Ionic bonding and octet rule
   c. Nomenclature and properties of ionic compounds

5. Covalent compounds
   a. Covalent bonds and periodic trends
   b. Lewis structures and VSEPR models
   c. Nomenclature and properties of covalent compounds

6. Chemical reactions and energy
   a. Chemical equations and reactions
   b. Avogadro's number and mole concept
   c. Limiting reagent and percent yield
   d. Acid-base reactions
   e. Precipitation reactions and solubility
   f. Reduction-oxidation reactions

7. Thermodynamics
   a. Enthalphy, endothermic, and exothermic reactions
   b. Entropy and Gibb's free energy
   c. Effects of temperature, concentration, and catalysts on reaction rates
   d. Heat of fusion and heat of vaporization

8. Chemical equilibrium
   a. Equilibrium constant and equations
   b. LeChâtelier's principle
   c. Effect of temperature, pressure, and concentration on equilibrium

9. Gas Laws
   a. Kinetic-molecular theory and ideal gases
   b. Relationships between volume, temperature, pressure, and molar amount
   c. Ideal gas law
   d. Partial pressure and Dalton's law
   e. Intermolecular forces

10. Solutions and liquids
    a. Solubility and dependence of temperature and pressure
    b. Calculations of concentrations and dilutions
    c. Vapor pressure, surface tension, and boiling points
    d. Colligative properties
    e. Osmosis and dialysis
    f. Colloids

11. Solids
    a. Properties of solids
    b. Amorphous and crystalline solids
    c. Solid hydrates and hygroscopic solids

12. Acids, bases and pH
    a. Bronsted-Lowry acid and bases and conjugates
    b. Dissociation constants
    c. Calculations of pH and Henderson-Hasselbach equation
    d. Buffers in body fluids

13. Nuclear chemistry
    a. Radioactivity and radioisotopes
    b. Nuclear decay and half-life
    c. Nuclear fission and fusion
    d. Detection and measurement of radiation

14. Chemistry in daily life
    a. Ionic compounds, biologically important ions, and electrolyte concentrations
    b. Covalent compounds in polymers, medicine, and the environment
    c. Measurements
d. Chemical reactions in batteries, the environment, and the body  
e. Minerals in nutrition  
f. Acid base chemistry in the body and the environment  
g. Radioactivity in food irradiation and body imaging  

15. Laboratory work  
a. Perform experiments in a cooperative group environment  
b. Record experimental results  
c. Perform calculations using data acquired  
d. Interpret experimental outcomes and report in written form  

Resources  


Instructional Services  
OAN Number:  
TMNS  
Top of page  
Key: 1097