

Central High School  
ChemCom: Chemistry in the Community Syllabus  
Mr. D. Ladehoff

## Course Description

This course is designed to stimulate an understanding of chemistry in your life. Topics center on chemistry-related solutions found for society and the world. Centered on laboratory experiences, an appreciation of chemical processes and reactions are met through problem solving. Examples of topics are conserving resources, food composition, environmental impact, nuclear energy, and health.

## Course Objectives

Understand how agricultural run-off and pollution entering groundwater and surface water can effect drinking water and local wildlife.

Identify the most familiar elements by name and some of their most familiar properties.

Identify the chemical symbol for familiar elements.

Know that atoms are made of sub-atomic particles (protons, neutrons, electrons) which have positive, neutral, and negative charges.

Understand that the periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure.

Understand how to relate the position of an element in the periodic table to its chemical properties.

Understand how to use the periodic table to identify the families of elements (and their properties) known as alkali metals, alkaline Earth metals, halogens, and noble gases.

Know that there is a kind of periodicity in the physical properties of chemical elements, that the periodic table arranges them accordingly, and that this way of ordering corresponds to the order of their atomic structures.

Understand that the major groups of chemical elements are: (1) alkali metals, (2) alkaline Earth metals, (3) transition metals, (4) nonmetals (boron family, carbon family, nitrogen family, oxygen family, halogen family, noble gases), (5) metalloids, and (6) rare Earth elements. Know why hydrogen is not in any of these groups.

Know that there are two major differences in bonds (ionic and covalent).

Know the distinction between a compound and a mixture.

Understand how to use the periodic table to identify the trends in relative sizes of ions and atoms.

Understand how to use the periodic table to determine the number of electrons available for bonding.

Understand that the nucleus of the atom is much smaller than the whole atom yet contains most of its mass.

Understand isotopes.

Understand that the transuranium elements were not discovered in nature but synthesized through the use of nuclear accelerators.

Understand the different states of matter: solid, liquid, gas, plasma.

Define freezing, melting, boiling, condensing, and sublimation.

Understand that the temperature of water (or any substance) is constant during phase changes, even when heat is being added or removed.

Understand the kinetic molecular theory explains the properties of gases by the random motion of molecules in them. For example, the collision of these particles with a surface create an observable pressure on that surface, and their motion explains the diffusion of gases.

Understand how to apply the gas laws to relations between pressure, temperature, and volume of any amount of an ideal gas. Understand Boyle's Law and Charles' Law and how to logically solve problems.

Understand the values of standard temperature and pressure (STP): 0° Celsius and 1 atm.

Understand how to convert between Celsius and Kelvin temperature scales. Understand that there is no temperature lower than 0 Kelvin, or absolute zero.

Understand that in chemical reactions, atoms combine into molecules by means of bonds (e.g., by sharing electrons to form covalent or metallic bonds or by exchanging electrons to form ionic bonds).

Know that ions are atoms or groups of atoms that have a positive or negative charge and that polyatomic ions are groups of covalently bonded atoms that act like a single atom when combining with other atoms.

Understand that metals tend to form positive ions, and nonmetals tend to form negative ions.

Understand that ionic solids like NaCl (sodium chloride, ordinary table salt) are formed from a three dimensional repeating pattern of alternating positive and negative ions, held together by electrostatic forces (ionic bonds).

Understand that the conservation of atoms in a chemical reaction, as summarized in a balanced chemical equation, leads to the ability to calculate theoretical masses of reactants and products.

Understand how to read, interpret, and balance chemical equations.

Understand the quantity of one mole is set by calling the number of atoms in exactly 12 grams of carbon-12 atoms one mole. This number turns out to be  $6.02 \times 10^{23}$ , also known as Avogadro's Number.

Understand that energy is exchanged or transformed in all chemical reactions and physical changes of matter.

Understand that chemical processes either release (exothermic) or absorb (endothermic) thermal energy.

Understand that energy is released when a material condenses or freezes and is absorbed when a material evaporates, melts, or sublimates.

Understand that most acids, bases, and salts, when dissolved into water, conduct electric current and form ions in water solutions. Understand the observable properties of acids, bases, and salt solutions.

Understand that among other definitions of acids and bases, acids are hydrogen-ion-donating and bases are hydrogen-ion-accepting substances.

Use the pH scale to characterize acidic and basic solutions. Understand the definition of pH as the negative logarithm of the hydrogen ion concentration, and understand what the log scale means.

Distinguish between chemical compounds and solutions and mixtures. Differentiate between solute and solvent.

Understand the concentration of a solute in terms of molarity, parts per million, and percent composition.

Understand that energy, defined somewhat circularly, is the ability to change matter or the ability to do work.

Understand that energy is defined by the way it is measured or quantified.

Understand the difference between potential and kinetic energy.

Know the first two laws of thermodynamics: (1) Energy is conserved (neither created nor destroyed) and (2) Heat flows naturally from a hot object to a cold object; heat will not flow spontaneously from a cold object to a hot object.

Understand the principles of air pressure and fluid dynamics. Understand Archimedes' Principle and Bernoulli's Principle.

Understand that air pressure decreases as altitude increases.

Understand that the electrical force is a universal force that exists between any two charged objects.

Understand the causes of disruptions: changes in climate, human activity, introduction of nonnative species, changes in population size, sudden natural disasters.

## Required Materials

Paper for laboratory reporting  
Spiral notebook  
Student Handbook

## Textbook

ChemComm: Chemistry is the Community, 3rd Edition, American Chemical Society, 2000.

## Laboratory Reports

The writing of laboratory reports will consist of a title page, a data collection page or table (include with that the required calculations), answers to questions in complete sentences, and a conclusion paragraph telling what you learned of the lab and its relevance towards your understanding of chemistry.

## Quizzes

The occasional need to discover how you are progressing will require the occurrence of a quiz or two depending on the difficulty of the unit. There may not be a formalized or verbalized notice for a quiz.

## Test Schedule

**Test 1: Water Unit–Sept. 29/30**

**Test 2: Resources Unit–Dec. 1/2**

**Test 3: Petroleum Unit–Jan. 14/13**

**Test 4: Food Unit–Feb. 16/17**

**Test 5: Nuclear Unit–Mar. ~~30/31~~**

**Test 6: Air Unit–April 28/29**

**Test 7: Health Unit–May 20/24**

**Comprehensive Final included/added to Test 3 for 1st Semester and to Test 7 for 2nd Semester.  
Weighted score of 15% of Semester Grade.**

## Classroom Procedures

1. Start the beginning task written on the board.
2. Discipline yourself to listen first.
3. Life long learning comes one step at a time.
4. Write names on the upper right on any assignment along with the class period.
5. Do your own work, share your thoughts, and avoid temptation to take from others.

## Final Grade

To achieve a final grade it will be tabulated from

<b>Homework/Worksheet</b>	<b>:25%</b>
<b>Quizzes</b>	<b>:15%</b>
<b>Laboratory Reports</b>	<b>:25%</b>
<b>Tests</b>	<b>:20%</b>
<b>Final Exam</b>	<b>:15%</b>
	<b>100%</b>

## Scale Percentages

The grading scale used in the chemistry class is designed to the standards set by the administration. Students are assessed using the following scale:

A <sup>+</sup>	→	98-100%
A	→	94-97%
A <sup>-</sup>	→	92-93%
B <sup>+</sup>	→	90-91%
B	→	87-89%
B <sup>-</sup>	→	85-86%
C <sup>+</sup>	→	83-84%
C	→	79-82%
C <sup>-</sup>	→	77-78%
D <sup>+</sup>	→	75-76%
D	→	72-74%
D <sup>-</sup>	→	70-71%
F	→	≤ 69%

## Instructor Contact

I can be reached through e-mail at [dladehoff@cusd4.org](mailto:dladehoff@cusd4.org), in B154 before school Monday, Tuesday, and Wednesday,