

**Murrieta Valley Unified School District
High School Course Outline
October 2004**

Department: Science

Course Title: Chemistry

Course Number: 3525

Grade Level: 10-12

Length of Course: Year

Prerequisite: Completion of Biology with a grade of “B” or better and concurrent enrollment in Algebra II or higher.

UC/CSU (A-G) Requirement: D

I. Goals

The student will:

- A. Use scientific methods of measuring and calculating with emphasis on SI prefixes and SI units, scientific notation and the factor label method of problem solving. (*Chemistry Standard: 1-all; Investigation and Experimentation*)
- B. Classify matter: 1) distinguish between physical and chemical properties. 2) explain characteristic behavior of solids, liquids and gases based on structural theories and on kinetic theory. (*2d, h; 4-all*)
- C. Demonstrate proficiency in writing chemical formulas and in naming compounds using oxidation numbers. (*1a,d; 2a-c, e; 10d*)
- D. Use Avogadro’s constant to define the mole and relate it to molar mass, molarity of a solution and % composition. (*3b-d*)
- E. Write and balance chemical equations, differentiate the five types of chemical reactions, determine the factors that affect reaction rates, and perform stoichiometric calculations based on reactions. (*3a, e; 8-all*)
- F. Relate modern atomic theory to the periodic table. (*1-all; 11a-f*)
- G. Explain chemical bonding and its relationship to molecular structure. (*2a-e, g, h*)

- H. Relate chemical reactions in solution, acid-base theories and electrochemistry to chemical equilibrium. (3a; 5a-f; 6a-d; 7a-f; 9a, b)

II. Outline of Content for Major Areas of Study

Semester I

1. Introduction to Chemistry and Matter
 - A) Matter and change
 1. Matter and its properties
 2. Classification of matter
 - B) Measurement and calculations
 1. Scientific method
 2. Units and measurement
 3. Accuracy and precision
 4. Significant digits and Scientific notation
 5. Factor label method
2. Organization of Matter
 - A) Atomic structure and nuclear processes
 1. Development of atomic theory
 2. Average atomic mass
 3. Mole calculations
 4. Nuclear forces, isotopes, and radioactive decay.
3. Electron Arrangement
 - A) Quantum mechanics
 - B) Electron configuration
4. Periodic Law
 - A) Electron configuration and the periodic table
 - B) Periodic properties and trends
5. Chemical Bonding
 - A) Ionic characteristics
 - B) Covalent characteristics
 - C) Metallic characteristics
 - D) Bonding characteristics of Carbon
 - E) Lewis structures
6. Chemical Formulas and Chemical Compounds
 - A) Formula writing and naming
 - B) Percent composition
 - C) Empirical formulas and molecular formulas
7. Chemical Equations and Reactions
 - A) Describing and balancing

B) Reaction types

Semester II

8. Stoichiometry

- A) Stoichiometric calculations
- B) Limiting reactant and percent yield

9. Gases and Their Properties

- A) Kinetic-molecular theory
- B) Gas Laws
 - 1. Boyle's Law
 - 2. Charles' Law
 - 3. Dalton's Law of Partial Pressure
 - 4. The Combined Gas law
 - 5. The Ideal Gas Law

10. Thermodynamics

- A) Thermochemistry
- B) Describe and calculate heat flow specific heat and latent heat of phase changes

11. Reaction Rates and Equilibrium

A) Concentration temperature and pressure affects reaction rates

B) Role of catalysts in increasing reaction rates and lowering activation energy

C) Chemical equilibrium and LeChatelier's principle

12. Solutions and Acids and Bases

- A) Solute, solvent and the dissolving process
- B) Calculating concentration of solutions, including molarity
- C) Properties of acids and bases and salts
- D) pH scale - use of and calculations

III. Accountability Determinants

A. Key Assignments

- a. Density Lab
- b. Isotope Lab
- c. Flame Test Lab
- d. Brass Penny Lab
- e. Empirical Formula Lab
- f. Reaction Types Lab Parts I & II

- g. Stoichiometry Lab
- h. Titration Lab
- i. Acid-Base Properties of Household Chemicals Lab

B. Assessment Methods

- a. Teacher observations of day-to-day participation and problem solving ability.
- b. Performance on laboratory component of the course by evaluation of formal lab write-ups.
- c. Individual performance on exams and quizzes.
- d. Evaluation of group and individual projects

IV. Instructional Materials and Methodologies

A. Required Text

Davis, Metcalfe, Williams, Castka: *Modern Chemistry*, Austin, Texas; Holt, Rinehart, and Winston., 1999.