

Chemistry Regents

**CHEMISTRY R – 4300, 4305** Full year - 1 credit

Grades 10, 11, 12

Prerequisites: 4300: Successful completion of Earth Science and Living Environment

4305 CT: Faculty recommendation

The Regents Chemistry program is designed to meet all the requirements of the State curriculum. The course deals with all areas of inorganic, physical, and nuclear chemistry in a qualitative and quantitative manner. It has alternating lab periods each week (meets 7 or 8 times each week). Written laboratory reports are required. The Chemistry Regents examination terminates the course.

### **Instructional philosophy**

Work in Chemistry R course is built on the knowledge, understanding, and ability to do science that students have acquired in their earlier grades. The instruction is focused on the understanding of concepts, relationships, processes, mechanisms, models, and applications rather than on the memorization of specialized terminology and technical details. In attaining scientific literacy, students will be able to demonstrate these understandings, generate explanations, exhibit creative problem solving and reasoning, and make informed decisions. Future assessments will test students' ability to explain, analyze, and interpret chemical processes and phenomena, and use models and scientific inquiry. Critical to understanding science concepts is the use of scientific inquiry to develop explanations of natural phenomena. Therefore, as a prerequisite for admission to the Physical Setting/Chemistry Regents Examination, students must have successfully completed 1200 minutes of laboratory experience with satisfactory reports on file.

### **Knowledge and Skills Objectives**

Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

Students will access, generate, process, and transfer information using appropriate technologies.

Students will understand the relationships and common themes that connect

mathematics, science, and technology and apply the themes to these and other areas of learning.

Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.

Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

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## **Chemistry – The Physical Setting Curriculum Units of Study**

### **1. Physical Behavior of Matter**

- a. Properties of solids, liquids and gases
- b. Temperature scales (C and K)
- c. Measurement of Heat Energy and Calorimetry
- d. Behavior of Gases under various conditions of pressure, temperature and volume
- e. Classification and Separation of Mixtures
- f. Classification of elements, compounds and mixture

### **2. The Atom**

- a. Historical Development of the Atomic Model
- b. Structure of the Atom
- c. Electron Arrangement
- d. Types of Matter

### **3. Nuclear Chemistry**

- a. Stability of Nuclei
- b. Nuclear Equations
- c. Transmutations
- d. Fission and Fusion
- e. Half life calculations
- f. Uses and Dangers of Radioisotopes

### **4. The Periodic Table**

- a. Classifying and Types of Elements
  - b. Arrangement of the Periodic Table
  - c. Properties of Groups
  - d. Trends in Groups and Periods
5. **Bonding**
- a. The Role of Energy in Chemical Bonding
  - b. Lewis Dot Diagrams
  - c. The Octet Rule
  - d. Metallic Bonds
  - e. Ionic Bonds
  - f. Covalent Bonds
  - g. Distinguishing Bond Types
6. **Formulas and Equations**
- a. Chemical Symbols and Formulas
  - b. Atoms, Compounds and Ions
  - c. Writing Formulas and Naming Compounds
  - d. Chemical Reactions and Equations
7. **The Mathematics of Formulas and Equations**
- a. The Mole
  - b. Balancing Equations
  - c. Mole Relationships in Balanced Equations
8. **Solutions**
- a. Properties of Solutions
  - b. Concentration of Solutions
  - c. Molarity Calculations
  - d. Colligative Properties
9. **Kinetics and Equilibrium**
- a. Kinetics
  - b. Potential Energy Diagrams
  - c. Equilibrium
  - d. Entropy and Enthalpy
  - e. The Equilibrium Expression
10. **Oxidation – Reduction**
- a. Assigning Oxidations Numbers
  - b. Oxidation Reactions

- c. Reduction Reactions
- d. Examining Redox Reactions
- e. Balancing Half Reactions
- f. Electrochemical Cells

11. **Acids, Bases and Salts**

- a. Properties of Acids
- b. Properties of Bases
- c. Arrhenius' Theory
- d. Acid-Base Titration
- e. Acidity and Alkalinity of solutions
- f. Acid-Base Indicators

12. **Organic Chemistry**

- a. Bonding of Carbon Atoms
- b. Hydrocarbons
- c. Naming Organic Compounds
- d. Functional Groups
- e. Organic Reactions

**Major resources:**

*Textbook:*

*Zumdahl "World of Chemistry"*

*Review Book:*

*Prentice Hall Brief Review for the New York Regents Exam: Chemistry*