

John Carroll Catholic High School
Course: AP Chemistry 437
Instructor: Ms. Erin W. Donovan
Room: 214
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COURSE DESCRIPTION

This course is designed to provide a solid, first-year college chemistry experience, both conceptually and in the laboratory. Covered course materials will be constructed to prepare you for the AP exam in May.

GOALS AND OBJECTIVES

- To emphasize problem solving skills for lecture and lab.
- To complete labs that support, and reinforce chemical principles presented in the lecture.
- To complete labs which provide students with the opportunity to learn new laboratory techniques.
- NOTE: All Students will be **required** to take the AP Exam in May. There is a fee associated with the exam (at present \$85.00) that is the responsibility of the student.

PURPOSE OF LABS

The labs serve to supplement the learning in the lecture section of the course. Labs support, convey, and reinforce the chemical principles presented in lectures and demonstration. Labs also provide students with an opportunity to learn new physical skills (such as titration, quantitative transfer, or the use of volumetric equipment), foster good collaborative relationships, and improve problem-solving techniques, while they learn how chemistry really works. Therefore, problem-solving skills, both on paper and in the lab, are emphasized. Students are required to submit a complete report of each lab experiment, including a hypothesis, procedure, observations/data, calculations and a conclusion.

GRADING PROCEDURE

Exams	40%	Questions will consist of multiple choice, matching, fill in the blank, short answer, and essay
Homework/Classwork	20%	Will be given 3-4 nights per week. Classwork will be given when appropriate (group and individual)
Labs	20%	Pre-Lab Assignment and Lab Reports
Quizzes	10%	May be announced or unannounced. There will be at least 1 quiz per week.
Bellwork	10%	Everyday there will be a few questions posted. Students will have a seat and begin working on these problems when they arrive in class.

***Quarter Grades** will be determined using a weighted average of the scores on the assignments given.*

***Semester Grades** each quarter grade will make up 40% of the semester grade and the semester exam will make up the remaining 20%.*

MATERIALS

- Needed Daily: 3-ring binder, dividers, paper, pen and pencil, scientific calculator
Note: No graphing calculators are allowed, and Textbook.
- Needed on Lab days: Lab notebook

MAKE-UP WORK

Will be handled according to JCCHS policy (see JCCHS handbook).

LATE WORK

- 1 days late - 50% reduction of the grade
- 2 days late it will not be accepted

ATTENDANCE

- Absences and tardies will be handled according to JCCHS policy (see JCCHS handbook)

CLASSROOM RULES AND CONSEQUENCES

- Be seated and ready to work before the bell rings
- Bring required materials daily sharing materials is not allowed (this includes homework and calculators)
- Walk and talk with permission only
- Respect others and their property
- No food, drinks, or gum
- Use class time wisely
- Obey all school rules
- Consequences for breaking class and school rules will be handled according the JCCHS policy (see JCCHS handbook)
- Because of the importance of safety in the lab, violation of laboratory safety rules and procedures may result in loss of lab privileges and a zero for that lab.

EXTRA HELP

Whenever you have questions, please come see me for extra help. If you make an appointment I will make every effort to accommodate you. You are welcome to see me without an appointment but I can't guarantee that I will be available.

SAFETY RULES

1. No horseplay or practical jokes.
2. Don't touch the eyewash station or the shower unless in an emergency. Do not touch the gas jets unless instructed to do so in a lab.
3. Follow the exact directions for a lab *or* when designing your own lab, have your procedure approved by me.
4. Do not wear loose clothing around open flame and girls with long hair must pull it back. Always wear safety goggles during labs.
5. No food or drink. This includes gum and candy.
6. Don't sniff or taste chemicals and wash your hands/skin that comes into contact with lab chemicals.
7. Always leave lab stations and equipment clean and dry. Return all equipment to their proper place.
8. Wash hands thoroughly at the completion of a lab.
9. Notify me of any accidents so proper clean up procedures can be followed.
10. When in doubt, ASK FIRST!!!!

I have read and understand all of the information on Ms. Donovan syllabus. I know my responsibilities in Chemistry (including all rules and consequences) and I also know how to be successful in this course. I realize that I may be removed from lab situations (and receive zeros for all labs) if I do not follow the safety rules.

student signature

date

As a parent/guardian I have read all of the above information and know my student's responsibilities in Chemistry. I am aware of all rules and consequences and know what my student should be doing to be successful in this course.

parent/guardian signature

date

TOPIC OUTLINE

Introduction: Matter and Measurement	The study of Chemistry; Classification of Matter; Properties of Matter; Units of Measurement; Uncertainty in Measurement; Dimensional Analysis
Atoms, Molecules, and Ions	The Atomic Theory of Matter; The Discovery of Atomic Structure; The Modern View of Atomic Structure; Atomic Weights; The Periodic Table; Molecules and Molecular Compounds; Ions and Ionic Compounds; Naming Inorganic Compounds; Some Simple Organic Compounds
Stoichiometry Calculations with Chemical Formulas and Equations	Chemical Equations; Some Simple Patterns of Chemical Reactivity; Formula Weights; Avogadro's Number and the Mole; Empirical Formulas from Analysis; Quantitative Information from Balanced Equations; Limiting Reactants
Aqueous Reactions and Solution Stoichiometry	General Properties of Aqueous Solutions; Precipitation Reactions; Acid-Base Reactions; Oxidation-Reduction Reactions; Concentrations of Solutions; Solution Stoichiometry and Chemical Analysis
Thermochemistry	The Nature of Energy; The First Law of Thermodynamics; Enthalpy; Enthalpies of Reaction; Calorimetry; Hess's Law; Enthalpies of Formation; Food and Fuels
Electronic Structure of Atoms	The Wave Nature of Light; Quantized Energy and Photons; Line Spectra and the Bohr Model; The Wave Behavior of Matter; Quantum Mechanics and Atomic Orbitals; Representations of Orbitals; Many-Electron Atoms; Electron Configurations; Electron Configurations and the Periodic Table
Periodic Properties of Elements	Development of the Periodic Table; Effective Nuclear Charge; Sizes of Atoms and Ions; Ionization Energy; Electron Affinities; Metals, Nonmetals, and Metalloids; Group Trends for the Active Metals; Group Trend for the Selected Nonmetals
Basic Concepts of Chemical Bonding	Chemical Bonds, Lewis Symbols, and the Octet Rule; Ionic Bonding; Covalent Bonding; Bond Polarity and Electronegativity; Drawing Lewis Structures; Resonance Structures; Exceptions to the Octet Rule; Strengths of Covalent Bonds
Molecular Geometry and Bonding Theories	Molecular Shapes; The Vsepr Model; Molecular Shape and Molecular Polarity; Covalent Bonding and Orbital Overlap; Hybrid Orbitals; Multiple Bonds; Molecular Orbitals; Second-Row Diatomic Molecules
Gases	Characteristics of Gases; Pressure; The Gas Laws; The Ideal-Gas Equations; Further Applications of the Ideal Gas Equation; Gas Mixtures and Partial Pressures; Kinetic-Molecular Theory; Molecular Effusion and Diffusion; Real Gases: Deviation from Ideal Behavior
Intermolecular Forces, Liquids, and Solids	A Molecular Comparison of Gases, Liquids, and Solids; Intermolecular Forces; Some Properties of Liquids; Phase Changes; Vapor Pressure; Phase Diagrams: Structure of Solids; Bonding in Solids
Properties of Solution	The Solution Process; Saturated Solutions and Solubility; Factors Affecting Solubility; Ways of Expressing Concentration; Colligative Properties; Colloids
Chemical Kinetics	Factors that Affect Reaction Rates; Reaction Rates; The Rate Law: The Effect of Concentration on Rate; The Change of Concentration with Time; Temperature and Rate; Reaction Mechanisms; Catalysis
Chemical Equilibrium	The Concept of Equilibrium; The Equilibrium Constant; Interpreting and Working With Equilibrium Constants; Heterogeneous Equilibria; Calculating Equilibrium Constants; Applications of Equilibrium Constants; Le Chatelier's Principle
Acid-Base Equilibria	Acids and Bases: A Brief Review; Bronsted-Lowry Acids and Bases; The Autoionization of Water; The pH Scale; Strong Acids and Bases; Weak Acids; Weak Bases; Relationship Between K_a and K_b ; Acid-Base Properties of Salt Solutions; Acid-Base Behavior and Chemical Structure; Lewis Acids and Bases
Additional Aspects of Aqueous Equilibria	The Common-Ion Effect; Buffered Solutions; Acid-Base Titrations; Solubility Equilibria; Factors that Affect Solubility; Precipitation and Separation of Ions; Qualitative Analysis For Metallic Elements
Chemical Thermodynamics	Spontaneous Processes; Entropy and the Second Law of Thermodynamics; The Molecular Interpretation of Entropy; Entropy Changes in Chemical Reactions; Gibbs Free Energy; Free Energy and Temperature; Free Energy and The Equilibrium Constant
Electrochemistry	Oxidation States and Oxidation-Reduction Reactions; Balancing Oxidation-Reduction Equations; Voltaic Cells; Cell EMF Under Standard Conditions; Free Energy and Redox Reactions; Cell EMF Under Nonstandard Conditions; Batteries and Fuel Cells; Corrosion; Electrolysis
Nuclear	Radioactivity; Patterns of Nuclear Stability; Nuclear Transmutations; Rates of Radioactive Decay; Detection of Radioactivity; Energy Changes in Nuclear Reactions; Nuclear Power: Fission; Nuclear Power: Fusion; Radiation in the Environment and Living Systems
The Chemistry of Life: Organic and Biological Chemistry	Some General Characteristics of Organic Molecules; Introduction to Hydrocarbons; Alkanes, Alkenes, and Alkynes

