



Quest Early College High School Chemistry

Valerie Booth

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Tutoring: Tuesday and Thursday Morning 7:45-8:40, Tuesday Flextime

Textbooks and Ancillaries

Chemistry Matter and Change

Available online through McGraw Hill Education Portal

Curriculum Framework:

| Big Ideas | Essential Questions |
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| <p>Scientific Investigation and Reasoning: Scientists use experimental and observational testing, empirical evidence, scientific reasoning, and critical thinking as they investigate the natural world safely.</p> <p>The Structure of Matter: The elements are arranged in the Periodic Table, which allows us to predict the structural, chemical and physical properties of matter.</p> <p>Bonding and Intermolecular Forces: Valence Bond Theory explains the structure and arrangement of elements bonded together and the characteristics of those bonds.</p> <p>Chemical Reactions: Chemical changes in matter involve breaking and forming chemical bonds between atoms and the transfer or sharing of electrons, a process which can be mathematically predicted and controlled.</p> <p>Solutions and Acid/Base Chemistry:</p> <ul style="list-style-type: none">• Many common reactions take place in aqueous solutions and can be predicted and controlled.• Acids and bases have specific roles during chemical reactions in aqueous solutions. <p>Gases, Thermodynamics: Energy determines the phases of matter and drives all chemical reactions, which can be predicted using the Law of Conservation of Energy and the Laws of Thermodynamics.</p> <p>Nuclear Reactions: Fusion and fission reactions, which take place in stars and supernovas to form all the elements, can be duplicated by humans for various industrial, military, and medical purposes.</p> | <p>Scientific Investigation and Reasoning: As a Scientist, how do I investigate the natural world, interpret data, and communicate findings to diverse audiences?</p> <p>The Structure of Matter: What is our basic understanding of matter, and how can we predict its properties?</p> <p>Bonding and Intermolecular Forces: How do elements combine in different ways to form all the substances observed on Earth?</p> <p>Chemical Reactions: How can I predict and control the chemical processes that take place to change one substance into another?</p> <p>Solutions and Acid/Base Chemistry:</p> <ul style="list-style-type: none">• How can the factors affecting solubility and chemical reactions taking place in aqueous solutions be predicted and controlled?• What are the specific roles of acids and bases during chemical reactions? <p>Gases, Thermodynamics: How do the Law of Conservation, the Laws of Thermodynamics, and the Ideal Gas Laws interact to explain physical and chemical changes that take place in matter?</p> <p>Nuclear Reactions: How do nuclear fusion and fission reactions create all the elements in the universe, and can we create and control these nuclear reactions to benefit mankind and the environment?</p> |



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Course Scope and Sequence:

| Unit | Topic | Tentative Exam Date |
|------|---|---------------------|
| 1 | Classification of Matter | Week of 8/26 |
| 2 | Atomic Theory and the Nucleus <ul style="list-style-type: none">● Historical Development of Atomic Theory● Atomic Structure (protons, neutrons, electrons)● Atomic Numbers and Defining Element● Isotopes and Atomic Mass● Fission & Fusion● Stars and Supernovae● Transmutations● Radioactivity (α, β^-, β^+, γ)● Half-lives & Radioactive Decay● Carbon-14 and Radiometric Dating Techniques | Week of 9/16 |
| 3 | Electron Structure <ul style="list-style-type: none">● Electron Orbitals● Electron Configuration● Valence Electrons● Lewis Dot Structures● Octet Rule● Quantum #s● Spectral Analysis | Week of 9/30 |
| 4 | The Periodic Table <ul style="list-style-type: none">● Periodic Relationships, Groups/Families● Periodic Trends | Week of 10/21 |
| 5 | Chemical Bonding <ul style="list-style-type: none">● Electronegativity● Ionic Bonds● Metallic Bonds and Metallic Character● Covalent Bonds● Hybridization (sp, sp^2, sp^3)● Resonance and Formal Charge | Week of 11/4 |
| 6 | Naming and Writing Compounds <ul style="list-style-type: none">● Ionic Compounds and Polyatomic Ions● Binary Covalent Compounds● Acids | Week of 11/18 |



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| 7 | Molecular Geometry <ul style="list-style-type: none">● Drawing Molecules and Lewis structures● VSEPR● Geometry of Polyatomic Ions | Week of 12/9 |
| 8 | Intermolecular Forces <ul style="list-style-type: none">● Dipole-dipole and Ion-dipole Interactions● Hydrogen Bonding● Dipole-induced Dipole● London Dispersion Forces● Phase Changes● Surface Tension and Capillary Action | Included on Final Exam |
| Semester 2 | | |
| 9 | Chemical Reactions <ul style="list-style-type: none">● Writing balanced equations● Types of reactions● Predicting products of reactions● Activity series● Redox reactions● Half-reactions and Balancing Electrons | Week of 1/27 |
| 10 | Methods in Quantitative Chemistry <ul style="list-style-type: none">● Significant figures● Dimensional Analysis | Week of 2/17 |
| 11 | Mass to Mass Stoichiometry <ul style="list-style-type: none">● The Mole and Avogadro's Number● Molar Mass● Percent Composition● Empirical Formulas and Molecular Formulas● Combustion Analysis● Hydrate Crystals● Stoichiometry● Limiting Reagents● Percent Yield and Percent Error | Week of 3/2 |
| 12 | Solutions <ul style="list-style-type: none">● Molarity● Solubility Rules● Precipitation Reactions● Solution Stoichiometry | Week of 3/30 |
| 13 | Gas Laws | Week of 4/13 |



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| | <ul style="list-style-type: none">● Kinetic Molecular Theory● Combined Gas Law● Ideal Gas Law● Gas Stoichiometry | |
| 14 | Thermochemistry <ul style="list-style-type: none">● Specific Heat Capacity● Heats of Fusion and Vaporization● Enthalpy and Calorimetry● Endothermic/Exothermic reactions● Heats of Formation● Hess's Law | Week of 5/4 |
| 15 | Acids and Bases <ul style="list-style-type: none">● Arrhenius Acids/bases● pH Scale Strong Acids & Bases (complete disassociation)● Brønsted-Lowry Acid/bases● Acidic and Basic Salts Acid/Base Titration | Included on Final Exam |

Academic Integrity

Cheating on an assignment or test will result in a zero being recorded for that assignment or test. In addition, cheating is considered a conduct violation and is subject to additional disciplinary measures as discussed in the Student Code of Conduct.

Grading Guidelines

QECHS adheres to the grading guidelines set forth in the Humble ISD Parent/Student Handbook and Quest Facilitator Responsibilities document.

A= 100-90; **B=** 89-80; **C=** 79-70; **F=** 69-0

Reassessment Policy

The individual and group reassessment policy found in the Humble ISD student/parent handbook will be followed in this course.

Late Work

Every effort should be made to turn in assignments on time.

Late work will be penalized. Ten points per calendar day will be deducted for late work. After 7 calendar days, no points will be given and a zero will be recorded.

Online Learning Environment:

Work for this course will be completed in the Interactive Notebook for Chemistry as well as in the Google Classroom. Online participation in discussion boards and reflections will be necessary for success in the course.



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You will find links to readings and review videos on Google Classroom, as well as quizzes, writing responses, forums, and course information.