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General, Organic, and Biochemistry

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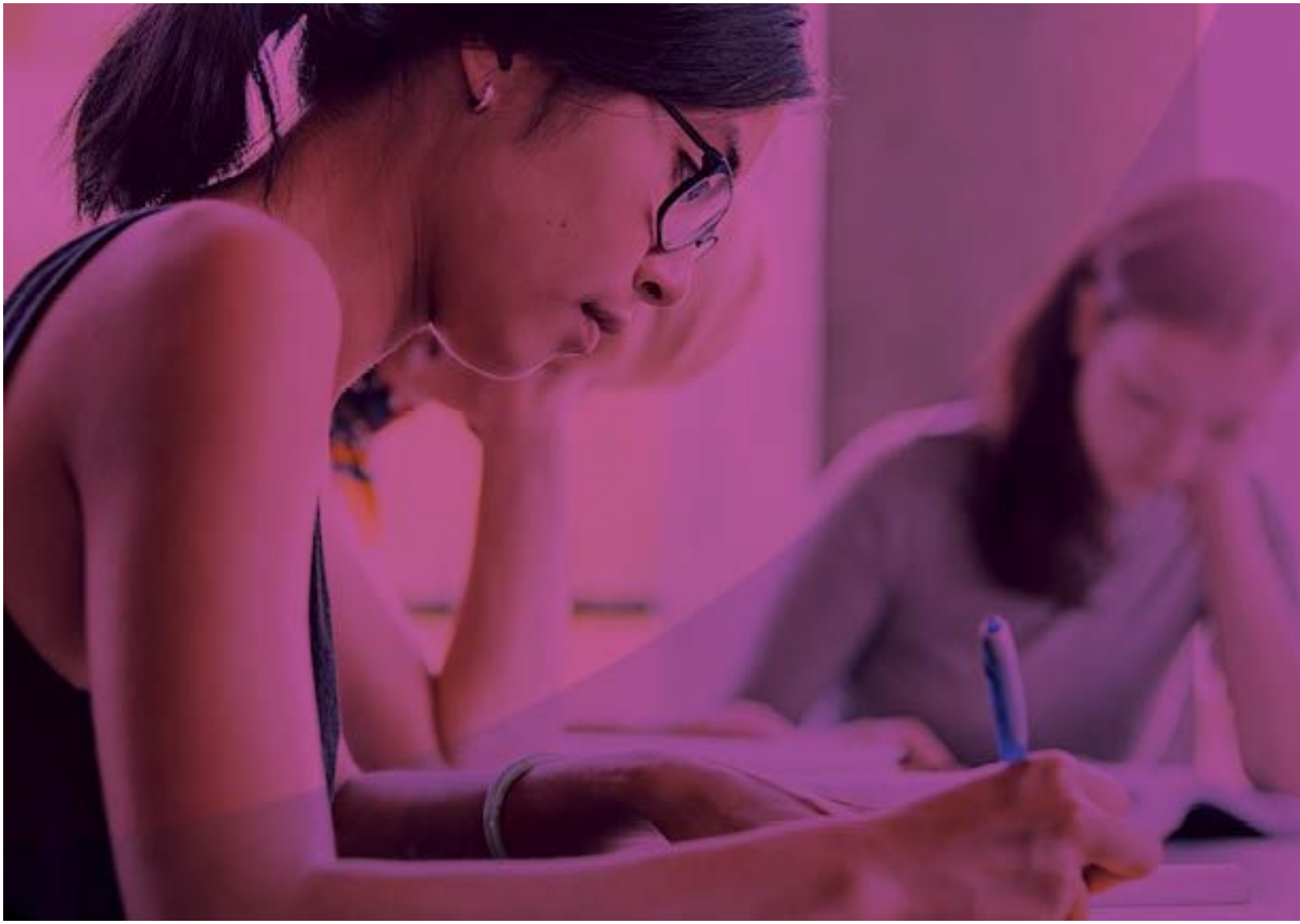

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Alta General, Organic, and Biochemistry is a 1- or 2-semester course intended for students whose professional goals require an understanding of chemistry, but not a mastery of it. Many students studying health-related majors may take this course. To develop this course Knewton used several sources including a Chemistry professor with a graduate degree from Cal State Northridge who has taught in various undergraduate settings but specializes in organic chemistry, along with a team of Subject Matter Experts (SMEs). The SMEs come from diverse backgrounds and are all accomplished academics in the Chemistry field.

Alta General, Organic, and Biochemistry has at least two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our instructional texts, videos, and SMEs, we were able to solicit ideas from chemistry instructors and students. alta General, Organic, and Biochemistry covers the typical breadth of chemistry topics and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.

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General, Organic, and Biological Chemistry | Table of Contents

- 3.7 Transitions Between Different States of Matter
    - Understand physical properties and physical changes
    - Understand chemical properties and chemical changes

Chapter 4 : Atomic Structure and the Periodic Table of Elements

- 4.1 Symbols and Names of Elements
    - Read and identify chemical symbols
- 4.2 The Periodic Table of Elements
    - Read and interpret element blocks on the periodic table
    - Identify the group on the periodic table an element belongs to
    - Understand how elements are arranged in the periodic table
- 4.3 Structure of Atom
    - Identify and describe the subatomic particles that make up an atom
    - Understand Dalton's Atomic Theory
- 4.4 Atomic Number and Mass Number
    - Determine the number of protons, electrons, and neutrons in the atom by using the atomic and mass numbers
- 4.5 Isotopes
    - Determine the number of protons, electrons, and neutrons in the isotope from the atomic symbol and write the atomic symbol for the specific isotope
    - Identify the most abundant isotope
- 4.6 Electron Arrangement and Energy Levels
    - Write electron arrangement for the first twenty elements in the Periodic Table of Elements
- 4.7 Electron Arrangement and Property Trends
    - Determine the electron configuration of an element

Chapter 5: Radioactivity and Nuclear Processes

- 5.1 Types of Radiation
    - Compare and contrast alpha, beta, gamma, and positron radiation
- 5.2 Nuclear Reactions and Equations
    - Write and balance equations for alpha, beta, positron, and gamma decay
- 5.3 Radiation Measurements, Exposure, and Safety
    - Understand how radiation activity is measured
    - Convert between the different units of radiation activity
    - Understand health effects of exposure to radiation
- 5.4 Nuclear Decay and Dating
    - Understand how to determine the age of an object by using radioisotopes
    - Conduct calculations involving half-life of a radioisotope
- 5.5 Nuclear Medicine
    - Understand how nuclear decay is used in modern medicine

- 5.6 Nuclear Power
    - Describe nuclear fission
    - Describe nuclear fusion
    - Understand the operation of a nuclear power plant

Chapter 6: Ions, Compounds, and Molecules

- 6.1 Simple Ions
    - Define ions and distinguish between monatomic and polyatomic ions
    - Understand physiological and metabolic functions of biologically important ions
- 6.2 Ionic Compounds with Simple Ions
    - Describe the properties of ionic compounds
    - Write the name and formula of an ionic compound with a simple ion
- 6.3 Ionic Compounds with Polyatomic Ions
    - Write the name and formula of a polyatomic ion or compound containing it
- 6.4 Covalent Bonding and Molecular Compounds
    - Understand the type of bonding between atoms in a molecular compound
    - Write the name and formula of a molecular compound
- 6.5 Lewis Structures
    - Read and draw Lewis structures for an atom
    - Understand how to use the octet rule to draw Lewis structures for covalent compounds
- 6.6 Types of Bonds and Electronegativity of Atoms
    - Determine the type of bond by evaluating electronegativity
    - Compare and contrast covalent non-polar, covalent polar, and ionic bonds
- 6.7 VSEPR Theory and Molecular Geometry
    - Understand how to use VSEPR theory to determine molecular shape
- 6.8 Molecular Geometry and Polarity
    - Understand the role that molecular geometry plays in the polarity of a compound
- 6.9 Intramolecular Forces and Properties of a Compound
    - Compare and contrast intermolecular and intramolecular forces
    - Define, identify, and describe dipole-dipole attractions between molecules
    - Understand the relationship between the intermolecular forces and the melting point of a compound
    - Define, identify, and describe hydrogen bonding

Chapter 7: Chemical Reactions and Mass Relationships

- 7.1 Avogadro's Number and the Mole
    - Understand the mole as a unit in measurements
    - Convert moles to grams and grams to moles for elements and compounds
- 7.2 Calculating Atoms, Moles, and Mass
    - Derive the number of atoms from an element's mass

- 7.3 Chemical Equations
    - Understand how to represent chemical reactions using an equations
    - Write and balance chemical reactions
- 7.4 Types of Chemical Reactions
    - Understand solubility rules and precipitation reactions
    - Write balanced chemical equations for acid-base reactions
    - Understand oxidation and reduction
- 7.5 Molar Ratios in Chemical Equations
    - Calculate the molar ratios from balanced equations
- 7.6 Mass Ratios in Chemical Equations
    - Calculate the mass of a product or a reactant given a balanced chemical equation
- 7.7 Exothermic and Endothermic Reactions
    - Compare and contrast endothermic and exothermic reactions

Chapter 8: Properties of Gases

- 8.1 Kinetic Molecular Theory of Gases
    - Understand postulates of the kinetic molecular theory of gases
- 8.2 Boyle's Law
    - Perform calculations with Boyle's Law
- 8.3 Charles's Law
    - Perform calculations with Charles's Law
- 8.4 Gay-Lussac's Law
    - Perform calculations with Gay-Lussac's Law
- 8.5 The Ideal Gas Law
    - Apply the ideal gas law in calculations
- 8.6 Avogadro's Law
    - Perform calculations using Avogadro's law
- 8.7 Dalton's Law
    - Perform calculations with Dalton's Law

Chapter 9: Chemical Solutions and Their Constituents

- 9.1 Solutions
    - Recognize solutions and distinguish between solute and solvent
    - Describe the formation and properties of solutions
- 9.2 Solutions of Electrolytes and Nonelectrolytes
    - Classify solutes in aqueous solution as strong, weak, and nonelectrolytes
    - Describe the characteristics of ionic electrolytes
    - Describe covalent electrolytes
- 9.3 Saturated and Unsaturated Solutions
    - Explain the differences between saturated, unsaturated, and supersaturated

- 9.4 Solubility
    - Understand factors that affect solubility
    - Compare and contrast soluble and insoluble ionic compounds
- 9.5 Concentration Units
    - Calculate the mass percentage of a component of a solution
    - Calculate percent by volume
    - Calculate percent by mass-volume
- 9.6 Dilutions
    - Understand how to calculate concentrations of diluted solutions
- 9.7 Solutions, Colloids, and Suspensions
    - Compare and contrast properties of solutions, colloids, and suspensions
- 9.8 Osmosis and Dialysis
    - Classify solutions as isotonic, hypotonic, and hypertonic
    - Understand processes of osmosis and dialysis

Chapter 10: Acids and Bases

- 10.1 Acids, Bases, and Conjugate Pairs
    - Identify acids and bases given physical properties and recognize common acids and bases
    - Identify acids and bases using the Bronsted-Lowry definition
- 10.2 Strong and Weak Acids and Bases
    - Explain Ka and acid strength
    - Explain the relationship between conjugate acid-base pairs
- 10.3 Acid-Base Equilibrium
    - Explain acid-base equilibrium using the concept of reversible reactions
- 10.4 The Effects of Change on Equilibrium
    - Understand the effect that changes in concentration have on equilibrium
    - Understand the effect that changes in pressure have on equilibrium
    - Understand the effect that changes in temperature have on equilibrium
    - Understand how catalysts affect equilibrium
- 10.5 Water as an Acid and Base
    - Read and write equations for the self ionization of water and for acid and base ionization reactions
    - Calculate concentrations of hydronium and hydroxide ions
- 10.6 Hydronium Ions, Hydroxide Ions, and the pH Scale
    - Classify solutions as an acidic, basic, or neutral based on pH or hydronium/hydroxide concentrations
    - Perform calculations that relate pH and pOH

- 10.7 Reactions of Acids and Bases
    - Understand how acids react with metals, carbonates/bicarbonates, and bases
    - Use titration to determine the molar concentration of an unknown solution
- 10.8 Acid-Base Buffers
    - Explain buffers and how they work
    - Calculate the pH of a buffer solution using the Henderson Hasselbalch equation
    - Understand the role of buffers in the control of blood pH

Chapter 11: Hydrocarbons

- 11.1 The Chemistry of Carbon
    - Compare and contrast properties of organic and inorganic compounds
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    - Understand how to name alkanes and write their formulas
- 11.3 Reactions Involving Alkanes
    - Write balanced equations for reactions involving alkanes
- 11.4 Structure and Physical Properties of Alkenes
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Chapter 12: Compounds with Hydroxyl and Carbonyl Functional Groups

- 12.1 Compounds with Hydroxyl Group
    - Understand how to name and write formulas for compounds with hydroxyl groups
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    - Classify alcohols as primary, secondary, and tertiary
    - Recognize physical and chemical properties of alcohols
    - Understand the relationship between the structure of alcohol and their physical properties
    - Write balanced equations for reactions involving alcohols
- 12.3 Structure, Properties, and Reactions of Phenols
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    - Understand the relationship between the structure and acidity of phenols
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- 12.4 Structure, Properties, and Reactions of Ethers
    - Recognize chemical and physical properties of ethers
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    - Recognize physical and chemical properties of aldehydes
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    - Recognize physical and chemical properties of ketones

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- 13.3 Fischer Projections: Spatial Depictions of Linear Monosaccharides
    - Draw Fischer projections and understand the numbering of the carbon atoms in a Fischer projection
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    - Distinguish open-chain monosaccharides from cyclic forms and draw Haworth structures
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- 13.6 Glycosidic Linkages: Linking Monosaccharides
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- 13.7 Polysaccharides: Carbohydrate Macromolecules
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- 14.4 Acid and Base Hydrolysis of Esters
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- 14.5 Amines: Nitrogenous Derivatives of Ammonia
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    - Understand lipid diversity and distinguish between the lipids as a group and the polymers
- 15.2 Fatty Acids: Basic Lipid Building Blocks
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- 15.3 Waxes and Triacylglycerols
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    - Explore chemical properties of triacylglycerols and compare esterification, hydrolysis, hydrogenation, and saponification
- 15.4 Phospholipids
    - Understand the structure, properties, and physiological functions of phospholipids
- 15.5 Steroids: Lipids with Ring Structures
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- 16.3 Primary Protein Structure: Amino Acid Sequence
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- 16.4 Secondary Protein Structure: Alpha Helices and Beta Sheets
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- 16.8 Inhibition of Enzymes
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- 17.2 Phosphodiester Bonds: Linking Nucleotides
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- 18.4 Coenzymes as Energy-Carrying Molecules
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- 18.7 The Citric Acid Cycle: Completing the Dismantling of the Fuel
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