

CHEM105: ACCELERATED ESSENTIALS OF CHEMISTRY

Course Description and Outline:

CHEM 105: ACCELERATED ESSENTIALS OF CHEMISTRY. This is an accelerated version of Essentials of Chemistry; CHEM101 AND CHEM102 all rolled into one. The course intended for non-science majors who require only five credits of chemistry. This course will acquaint students with chemistry and its importance to fields of study in health sciences. Basic concepts of inorganic, organic chemistry, and biochemistry are covered. **PREREQ:** M025 or satisfactory placement score and high school chemistry or CHEM 099.

Course outline:

week 1	<p>I. INTRODUCTION: CHEM 105</p> <p>A. COURSE DESCRIPTION:</p> <p>B. TEXT</p> <p>C. PREREQUISITE</p> <p>D. SCHEDULE</p> <p>E. GRADING</p> <p>F. ATTENDANCE:</p> <p>G. MY SCHEDULE</p> <p>H. INSTRUCTOR</p> <p>II. MATH & MEASUREMENTS</p> <p>A. BASIC MATH</p> <p>B. PROBLEM SOLVING GUIDE</p> <p>C. SIGNIFICANT DIGITS</p> <p>D. SCIENTIFIC NOTATION</p> <p>E. THE METRIC SYSTEM OF MEASUREMENTS</p> <p>III. ENERGY</p> <p>A. ENERGY</p> <p>B. POTENTIAL VS. KINETIC ENERGY</p>
week 2	<p>IV. COMPOSITION AND STRUCTURE OF MATTER (atoms)</p> <p>A. ATOMIC THEORY</p> <p>B. THE COMPOSITION OF ATOMS</p> <p>C. THE STRUCTURE OF NUCLEI</p> <p>1. GENERAL OBSERVATIONS</p> <p>a. ALL ATOMS ARE BUILT BASICALLY THE SAME</p> <p>b. ATOMIC MASS UNITS</p> <p>2. A DETAILED LOOK AT SOME NUCLEI</p> <p>3. ISOTOPES</p> <p>4. ISOTOPES & AVERAGE MOLECULAR WEIGHT: (Daltons & AMU)</p> <p>5. NUCLEAR STABILITY AND RADIOACTIVITY</p> <p>6. HALF LIFE</p> <p>7. MEASURING RADIOACTIVITY:</p> <p>8. THE BIOLOGICAL EFFECTS OF RADIATION.</p> <p>D. ELECTRONS and ELECTRONIC STRUCTURES OF ATOMS</p> <p>1. ENERGY LEVELS</p> <p>2. ORBITALS</p>
week 3	<p>V. THE PERIODIC TABLE</p> <p>A. FILLED VALENCE SHELLS AND THE OCTET RULE</p> <p>B. THE PERIODIC NATURE OF MATTER</p> <p>1. ELECTRONEGATIVITY; non metals, metals, and transition metals</p> <p>2. FAMILIES</p> <p>3. SUBSHELLS</p> <p>VI COMPOUNDS, THE FILLED VALENCE SHELL RULE</p> <p>A. IONIC COMPOUNDS, Gaining electrons = reduction, losing electrons = oxidation</p> <p>1. SOME EXAMPLES</p> <p>2. ELECTRONEGATIVITY</p> <p>3. FORMULAS OF SALTS</p> <p>4. NAMING IONIC COMPOUNDS</p> <p>5. PROPERTIES OF IONIC COMPOUNDS</p> <p>6. REACTIONS OF METALS AND NONMETALS</p> <p>C. COVALENT COMPOUNDS: Sharing electrons</p> <p>1. LEWIS DOT STRUCTURES</p> <p>2. THE GENERAL RULE IS ATOMS FORM AS MANY COVALENT BONDS AS THEY NEED ELECTRONS.</p> <p>3. DOUBLE AND TRIPLE BONDS</p>
week 4	<p>4. POLAR COVALENT BONDS</p> <p>5. NAMING COVALENT MOLECULES</p> <p>6. POLYATOMIC IONS</p> <p>7. PROPERTIES OF COVALENT COMPOUND</p> <p>8. REACTIONS OF NONMETALS AND NONMETALS</p> <p>D. COORDINATE COVALENT BONDS</p> <p>E. METAL – METAL BONDS</p>

week 5	VII. CHEMICAL REACTIONS A. CHEMICAL AND PHYSICAL PROPERTIES B. COMPLETING CHEMICAL REACTIONS C. BALANCING CHEMICAL REACTIONS. D. TYPES OF CHEMICAL REACTIONS 1. COMBINATION REACTIONS 2. DECOMPOSITION REACTIONS 3. REPLACEMENT REACTIONS 4. COMBUSTION REACTIONS 5. REDOX REACTIONS
week 6	VIII. KINETIC MOLECULAR THEORY A. ENERGY AND STATES OF MATTER B. GASES AND GAS LAWS C. LIQUIDS AND SOLIDS (why no liquid laws or solid laws) D. SOLUTIONS 1. properties of water and oil (polar and nonpolar solvents) 2. like dissolves like a. nonpolar solutions b. water solutions 1. polar solutes 2. ionic solutes (weak and strong electrolytes) 3. quantitative measurements; grams, moles, molarity etc. 4. other mixtures; colloids, suspensions, (detergents and cell membranes)
week 7	IX. ACIDS AND BASES A. IONIZATION IN WATER (weak vs. strong acids) B. REACTIONS OF ACIDS AND BASES C. THE pH SCALE. D. BUFFERS
week 8	X. ORGANIC CHEMISTRY AND BIOCHEMISTRY A. ALKANES 1. description of the functional group 2. physical and chemical properties 3. naming B. ALKENES 1. description of the functional group 2. physical and chemical properties 3. naming C. ALKYNES 1. description of the functional group 2. physical and chemical properties 3. naming
week 9	D. AROMATICS 1. description of the functional group 2. physical and chemical properties 3. naming E. ALCOHOLS, THIOLS, PEROXIDES, AND DISULFIDES 1. description of the functional group 2. physical and chemical properties 3. naming F. PHENOLS 1. description of the functional group 2. physical and chemical properties 3. naming
week 10	G. ETHERS 1. description of the functional group 2. physical and chemical properties 3. naming H. ALDEHYDES 1. description of the functional group 2. physical and chemical properties 3. naming I. KETONES 1. description of the functional group 2. physical and chemical properties 3. naming

week 11	<p>J. CARBOHYDRATES; poly alcohols, and aldehydes or ketones.</p> <ol style="list-style-type: none"> 1. monosaccharides (simple sugars) <ol style="list-style-type: none"> a. Fischer projections b. Haworth projections 2. disaccharides 3. polysaccharides <ol style="list-style-type: none"> a. common polysaccharides b. biological function (structures and energy) <p>K. CARBOXYLIC ACIDS</p> <ol style="list-style-type: none"> 1. description of the functional group 2. physical and chemical properties 3. naming <p>L. ESTERS</p> <ol style="list-style-type: none"> 1. description of the functional group 2. physical and chemical properties 3. naming
week 12	<p>M. LIPIDS (components of biological systems that can be extracted into nonpolar solvents)</p> <ol style="list-style-type: none"> 1. classification of lipids (saponifiable, non-saponifiable etc.) 2. chemistry 3. biological functions (structures, energy, (omega nomenclature) and hormones) <p>N. AMINES</p> <ol style="list-style-type: none"> 1. description of the functional group 2. physical and chemical properties 3. naming <p>O. AMIDES</p> <ol style="list-style-type: none"> 1. description of the functional group 2. physical and chemical properties 3. naming
week 13	<p>P. PROTEIN</p> <ol style="list-style-type: none"> 1. amino acids <ol style="list-style-type: none"> a. chemistry of α amine and α carboxylic acid (amide formation, the backbone of polypeptides) b. physical and chemical properties of the side chains (organic functional groups) 2. polypeptides and proteins <ol style="list-style-type: none"> a. structure (primary, secondary, tertiary, quaternary) b. enzymes are catalysts 3. biological functions (enzymes, transport, hormones, storage, structure)
week 14	<p>Q. NUCLEIC ACIDS</p> <ol style="list-style-type: none"> 1. The components; phosphate, sugar, and nucleotide bases 2. DNA <ol style="list-style-type: none"> a. structure (primary, secondary, and tertiary) b. replication c. biological function (the genetic code, genes, and chromosomes) 3. RNA <ol style="list-style-type: none"> a. types of RNA (mRNA, tRNA, and rRNA) b. structure (primary and secondary) c. functions of RNA (transcription and translation)
week 15	Review