General Chemistry I Course Outline – Over 40 hours of video

I. Units of Measurement – 3.75hrs of Video

- Writing Numbers in Scientific Notation – Coming Soon!!!
- SI Metric Units and Prefixes – 50 minutes of video
- Unit Conversions and Factor Label Method – 30 minutes of video
- Density Calculations – 30 minutes of video
- Precision vs. Accuracy- 20 minutes of video
- Determining the # of Significant Figures in a measurement – 40 minutes of video
- Significant Figures in Mathematical Operations – 20 minutes of video

II. Matter, Elements, Compounds and Mixtures – 2hrs 20 minutes of video

- Composition of Matter – 30 minutes of video
- Physical vs. Chemical Changes – 15 minutes of video
- Law of Definite Proportions– Coming Soon!!!
- Law of Multiple Proportions– Coming Soon!!!
- Writing Atomic Symbols – *Counting Protons, Neutrons, Electrons* – 35 minutes of video
- Isotopes – 15 minutes of video
- Calculating Average Atomic Weights of Isotopic Mixtures – 15 minutes of video
- Allotropes – 15 minutes of video
- Isomers **-** 20 minutes of video

III. History of Early Atomic Theory – 1hr 20 minutes of video

- Dalton's Atomic Theory – 30 minutes of video
- J.J Thomson's Plum Pudding Atomic Model– Coming Soon!!!
- Early Atomic Experiments-
    - Thomson's Cathode Ray Experiment – 15 minutes of video
    - Millikan's Oil Drop Experiment – 20 minutes of video
    - Rutherford's Gold Foil Experiment – 15 minutes of video

IV. Chemical Formulas – Ionic & Molecular Compounds – 5hrs of video

- Naming Binary Ionic/Molecular Compounds – 1hr of video
- Ionic vs, Molecular Compounds – 15 minutes of video
- Naming Hydrates – Coming Soon!!!
- Naming Acids – 30 minutes of video
- Know the Polyatomic Ions – 45 minutes of video
- Predicting Ionic Formulas – 20 minutes of video
- Assigning Oxidation States in Compounds – 40 minutes of video
- Predicting Empirical & Molecular Formulas – 25 minutes of video
- Empirical & Molecular Formula by Combustion Analysis – 1hr of video

V. The Mole & Avogadro's Number – 2.5hrs of video

- What is a mole? – Coming Soon!!!
- Calculating Molar Mass of compounds – 30 minutes of video
- Converting between *moles, atoms, molecules and grams*– 1hr 30 minutes of video
- Mass Percent Composition of Compounds – 30 minutes of video

VI. Chemical Reactions – 1hr of video

- Writing Chemical Equations– Coming Soon!!!
- Know the 5 Types of Reactions – 45 minutes of video
- Balancing Chemical Reactions – 15 minutes of video

VII. Solutions & Concentration - 6hrs of video

- Molarity: Solution Concentration – 25 minutes of video
- Molarity & Dilutions – 20 minutes of video
- Electrolytes – 30 minutes of video
- Salt Reactions: Precipitation & Solubility– Coming Soon!!!
- Know The Solubility Rules – 30 minutes of video
- Writing a Molecular and Net Ionic Reaction – 50 minutes of video
- Acid-Base Reactions – Coming Soon!!!
- Molecular and Net Ionic Reactions – 50 minutes of video
- Redox Reactions
- Know the 5 Types of REDOX Reactions – 1hr of video
- Balancing REDOX – 1hr of video
- Redox and the Activity Series – 25 minutes of video

VIII. Reaction Stoichiometry – 7hrs 45minutes of video

- Type 1 (Simple) Mass/Mole Stoichiometry – 2hrs 25 minutes of video
- Type 2: Limiting Reactant Stoichiometry - combined with above
- Percent Yield – 45 minutes of video
- Precipitation (Solution) Stoichiometry – 1hr of video
- Acid- Base Titrations – 2hrs of video
- Gas Stoichiometry – 1hr and 25 minutes of video

IX. Gases and the Gas Laws – 5hrs 30 minutes of video

- Kinetic Molecular Theory of Gases – Coming Soon!!!
- Van der Walls Equation – 45 minutes of video
- Standard Temperature and Pressure (STP conditions) – Coming Soon!!!
- Barometers: Measuring Atmospheric Pressure– Coming Soon!!!
- U-Tube Manometers: Measuring a confined gas pressure – 40 minutes of video
- Ideal Gas Law: PV=nRT – 1hr of video
- Gas Laws of Boyle's Charles' Avogadro's – 1hr of video
- Dalton's Law of Partial Pressure – 50 minutes of video
- Gas Collection over Water (Partial Pressure II) – Coming Soon!!!
- Graham's Law of Effusion & Diffusion – 35 minutes of video
- Average (root mean square) speed of Gases– Coming Soon!!!
- Average Kinetic Energy of Gases– Coming Soon!!!
- Calculating Density and Molar Mass of a Gas – 35 minutes of video
- Stoichiometry of Gas Reactions – Coming Soon!!!

X. Thermochemistry – Coming Soon!!!

- 1st Law of Thermodynamics: Energy Conservation– Coming Soon!!!
- Systems and Surroundings– Coming Soon!!!
  - -Open, Closed Isolated Systems– Coming Soon!!!
- Internal Energy– Coming Soon!!!
- State Functions (Variables) – Coming Soon!!!
- Heat & Work Energy– Coming Soon!!!
  - - The Heat Equation– Coming Soon!!!
  - - Determining Signs of Heat Transfer Processes– Coming Soon!!!
  - - The Work Equation– Coming Soon!!!
  - -Determining signs of Work Transfer Processes – Coming Soon!!!
- Enthalpy– Coming Soon!!!
- Enthalpy of Thermochemical Equations– Coming Soon!!!
- Calorimetry- Measuring Heat – Coming Soon!!!
  - - Bomb Calorimeters – Coming Soon!!!
  - - Coffee-cup calorimeters – Coming Soon!!!

- Hess' Law– Coming Soon!!!
- Calculating Standard Heats of Formation – Coming Soon!!!
- Heating Curves – Calculating Enthalpy of Phase Changes– Coming Soon!!!

XI. Modern Atomic Theory - 10hrs of video

- Electromagnetic Radiation & the Energy Spectrum– Coming Soon!!!
- Wave Properties- *Wavelength, Frequency, Amplitude* – 1hr of video
- The Bohr Model of the Hydrogen Atom – 40 minutes of video
- Heisenberg's Uncertainty Principle– Coming Soon!!!
- De Broglie's Equation – 30 minutes of video
- Planck's Quantum Energy Equation – 50 minutes of video
- Albert Einstein's Photoelectric Effect – 50 minutes of video
- Schrodinger's Quantum Mechanical Model– Coming Soon!!!
- Properties of Orbitals– Coming Soon!!!
    - Shapes– Coming Soon!!!
    - Energies– Coming Soon!!!
    - Nodes– Coming Soon!!!
- Orbital Filling Principles- Pauli, Aufbau, Hund's – 40 minutes of video
- Quantum Numbers – 2hrs and 20 minutes of video
- Electron Configurations – 3hrs of video

XII. Periodic Table – 2hrs of video

- Know the Periodic Table – *An Essential Crash Course!* – Coming Soon!!!
- Periodic Trends- Ionization Energy, Size, Electron Affinity – 2hrs of video

XIII. Bonding in Covalent Compounds – 50 minutes of video

- Ionic Bonding– Coming Soon!!!
- Covalent Bonding– Coming Soon!!!
- Intermolecular (Non-Covalent) Forces– Coming Soon!!!
- Polar and Nonpolar Covalent Bonds– Coming Soon!!!
- Electronegativity Trends– Coming Soon!!!
- How to Draw Lewis Structures– Coming Soon!!!
- Resonance– Coming Soon!!!
- VSEPR Theory – Molecular Shapes & Angles– Coming Soon!!!
- Predicting Molecular Dipole Moments– Coming Soon!!!
- Calculating Bond Reaction Energies – 50 minutes of video
- Hybridization– Coming Soon!!!
- Sigma & Pi Bonding– Coming Soon!!!
- Molecular Orbital (MO) Theory– Coming Soon!!!
- Delocalized Orbitals & Conjugated Systems– Coming Soon!!!

XIV. Essentials of Organic Chemistry – 1hr 40 minutes of video

- Intro to Hydrocarbons: Alkanes, Alkenes, Alkynes– Coming Soon!!!
- Predicting Boiling/Melting Properties of Hydrocarbons– Coming Soon!!!
- Drawing Line Structures– Coming Soon!!!
- Predicting Molecular Formulas from Line Structures– Coming Soon!!!
- Organic Isomers
    - Constitutional Isomers– Coming Soon!!!
    - Geometrical (Cis/Trans) Isomers– Coming Soon!!!
    - Optical (Chiral) Isomers – 20 minutes of video
    - Cyclic Isomers of Benzene– Coming Soon!!!
- Nomenclature: Naming Organic Alkanes – 1hr 20 minutes of video