Chemistry 1st Semester Exam Review

Chapter 1: Matter and Change

* Branches of chemistry
* Atom, element, compound
* Intensive vs. extensive properties
* Physical vs. chemical properties
* Physical vs. chemical changes
* Classification of matter: mixture, pure substance, element, compound
* Homogeneous vs. heterogeneous mixtures
* Periodic table basics: period, group, family
* Metals, nonmetals, metalloids, noble gases

Chapter 2: Measurements and Calculations

* Scientific method – four main stages
* Control vs. experimental group
* Units of measurement – SI system, prefixes
* Density equation
* Conversion factors
* Accuracy vs. precision
* Percentage error
* Significant figures
* Scientific notation
* Direct vs. inverse proportion

Chapter 3: Atoms: The Building Blocks of Matter

* Atomic theory – Dalton vs. modern
* Law of definite proportions vs. law of multiple proportions
* Subatomic particles – nucleus, protons, electrons, neutrons
* Isotopes
* Atomic number – mass number – average atomic mass
* Avogadro’s number, molar mass conversion

Chapter 4: Arrangements of Electrons in Atoms

* Properties of light – wave description vs. particle theory
* Speed of light equation
* Energy equation
* Line emission spectrum
* Quantum numbers – principal, angular, magnetic, spin
* Electron configurations – Aufbau principle, Pauli exclusion principle, Hund’s rule
* Noble gas configuration

Chapter 5: The Periodic Law

* Periodic law
* Important groups – alkali metals, alkaline earth metals, noble gases
* Transition metals, lanthanides, actinides
* Group configurations
* Valence electrons – main group elements
* Periodic trends – atomic radii, ionization energy, electronegativity

Chapter 6: Chemical Bonding

* Ionic vs. covalent bonding
* Ionic character – polar, nonpolar
* Chemical bond, chemical formula
* Octet rule
* Electron dot notation
* Lewis structures
* Resonance structures
* Ionic compounds and properties – lattice energy, crystal lattice
* Polyatomic ions
* Metallic bonding and properties
* VSEPR theory
* Hybridization
* Intermolecular forces – dipole – dipole, hydrogen bonding, London dispersion

Chapter 7: Chemical Formulas and Chemical Compounds

* Writing formulas
* Nomenclature
* Stock system
* Polyatomic ions
* Oxidation numbers
* Molar mass conversions
* Avogadro’s number
* Percentage composition
* Empirical vs. molecular formula