

Chemistry: Final Exam Study Topics – Fall Semester

Unit 1: Introduction to Chemistry

chemistry vs. alchemy
pure science vs. applied science (technology)
measurement
organic / inorganic compounds
scientific law vs. scientific theory
safety
using conversion factors
reactants, products, law of conservation of mass

Unit 2: Energy and Matter

chemical and physical properties; intensive and extensive properties
states of matter (solid, liquid, gas) and transitions
energy: potential and kinetic
law of conservation of energy
endothermic vs. exothermic reactions
pure substances: elements and compounds
mixtures: heterogeneous, homogeneous
atoms, molecules
density
the mole, Avogadro's number = 6.02×10^{23}
molar mass for elements
allotropes, alloys, polyatomic elements

Unit 3: Atomic Structure

proton, neutron, electron
electron configuration: longhand and shorthand
development of the atomic model: the Greeks, Dalton, Thomson, Rutherford, Bohr
modern theory of the atom
atomic number, mass number
isotopes, isotope notation
average atomic mass

Unit 4: The Periodic Table and Periodicity

group (family), period
metals, nonmetals, metalloids
alkali metals, alkaline earth metals, transition elements, coinage metals, halogens, noble gases, lanthanides, actinides
trends in atomic radius, ionic radius, ionization energy, electronegativity, shielding effect
valence electrons vs. kernel electrons
cations, anions: how they are formed, how they are named

Unit 5: Chemical Bonding and Nomenclature

ionic vs. covalent bonding
finding charges on atoms from the periodic table
polyatomic ions
criss-cross rule
finding formulas for, and naming, chemical compounds
cation / anion
nonmetal / nonmetal
Stock System vs. Traditional System of nomenclature

Unit 6: The Mathematics of Chemical Formulas

molar mass of a chemical compound
finding the percentage composition from the chemical formula
finding empirical or molecular formula from percentage composition
hydrate vs. anhydrous salt
Island Diagram with four islands: M, V, P, and MOLE island