CHM 112: General Chemistry 2

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General Chemistry: The Essential Concepts, 7th ed
R. Chang & K.A. Goldsby, McGraw Hill

Ch. 14: Kinetics
Ch. 15: Equilibrium
Ch. 16: Acids & Bases
Ch. 17: Acid-Base Equilibria & Solubility
Ch. 18: Thermodynamics
Ch. 19: Redox Reactions & Electrochemistry

Concepts build on each other &
on **knowledge from CHM 101**

Chapter 1: Introduction

Measurements:

- SI units & prefixes
- Scientific notation - know how to work with your calculator*
- Rounding & significant figures

Dimensional Analysis

- Use of dimensional analysis to solve problems
- Conversions between mass, volume, moles, etc.

Percents, fractions, ratios (mass, elemental, moles, etc.)

- Know the difference between them & how to find them for chemical systems.

*Graphing calculators with the enhanced capabilities, including image capture, internet capability, & the ability to display non-text files, etc. will not be allow on exams this semester.

Chapter 2: Chemical Formulas & Names

Formulas:

- First element symbol is the most positive (metal if ionic)
- If both in same column, first element is lowest
- Covalent – subscripts based on # atoms in molecule
- Ionic – subscripts based on balancing charges

Names

- Salts & binary molecules – 2 words, one for each element, with first element in formula written first
- 2nd word has –ide ending (if not a polyatomic ion)
- Covalent – prefixes indicate # atoms of each element
- Ionic – Roman Numerals indicate charge of cation if more than one charge is possible

Covalent:	Ionic:
NO = nitrogen monoxide	$Ca_3(PO_4)_2$ = calcium phosphate
N_2O_4 = dinitrogen tetroxide	Fe_2Cl_3 = Iron (III) chloride

Polyatomic Ions

Group of bonded atoms that share a charge

Know the names & formulas of the following:

- Ammonium (NH_4^+)
- Hydronium (H_3O^+)
- Acetate (CH_3COO^-)
- Carbonate (CO_3^{2-})
- Chlorate (ClO_3^-)
- Perchlorate (ClO_4^-)
- Sulfate (SO_4^{2-})
- Nitrate (NO_3^-)
- Nitrite (NO_2^-)
- Phosphate (PO_4^{3-})
- Cyanide (CN^-)
- Permanganate (MnO_4^-)
- Hydroxide (OH^-)

Chapter 3: Stoichiometry

Mass & Moles

- Finding molar mass
- Conversion between mass & moles
- Using Avogadro's # to convert between particles & moles

Chemical Equations

- Writing & balancing chemical equations
- Phase meanings (s, l, g, aq)
- Determining amount of products (or reactants, etc.), including limiting reagents

Percent Composition of Materials

- Calculate mass percent
- Calculate mass of a material from mass percent

Chapter 4: Solution Chemistry

Molarity

- Calculating molarity
- Conversions between mass, moles & liters

Solutions & Dilutions

- Using $M_1V_1 = M_2V_2$
- Calculate mass of solid needed to make a solution

Acid-Base Titrations

- Identifying acids & bases
- Ionization properties of acids & bases
- Determining concentration of unknown solutions using titration

Know these Acids:

Hydrochloric Acid:	HCl
Sulfuric Acid:	H_2SO_4
Nitric Acid:	HNO_3
Perchloric Acid:	$HClO_4$
Carbonic Acid:	H_2CO_3
Phosphoric Acid:	H_3PO_4

You will encounter them frequently

Chapter 4: Redox Reactions

Oxidation Numbers

- Determining the oxidation number of each atom in a chemical formula

Write & Balance Redox equations

- Knowing what was oxidized & reduced
- Determining the number of electrons transferred

Redox Titrations

- Determining concentration of unknown solutions using titration
- Essentially solution stoichiometry problems

Chapters 5 & 6 : Gases & Thermodynamics

Ideal Gas Equation

- Know how to use it
- Using the correct units based on R
- Be able to solve for a variable in PV=nRT to be used in other problems (like you did in gas stoichiometry)

Enthalpy (ΔH)

- Understanding enthalpy of reactions
- Endothermic vs. Exothermic
- Using enthalpy tables to calculate enthalpy of reactions
- Hess' Law

Chapters 7-10

Chapter 7: The Electronic Structure of Atoms

- Understanding atomic structure & how it influences reactivity

Chapter 8: The Periodic Table

- Using the Periodic Table to get information about elements

Chapters 9 & 10: Chemical bonding

- Understanding how atoms interact with each other to form bonds
- Understanding Lewis Structures & molecular structure

Chapters 12 & 13 are not specifically mentioned, but that does not mean that no information from these chapters will be helpful for CHM 112.

Math

Solving Problems with the line equation: y=mx+b

- Know how to solve for slope, etc.
- Be able to solve the equation when logarithms are present: ln(y) = mx + ln(b)
- Be able to solve with inverses: 1/y = mx = 1/b

Logarithms (log) & natural logarithms (ln)

- Be able to use these functions on your calculator
- See appendix 3 in your book for more info on logs

Algebra & solving equations

Scientific notation & working with exponents

Square, cubed, & other root functions