

**Chem 101A Final Exam Key Concepts Fall 2018**  
*Many of these concepts to be covered on the Final Exam*

**Cumulative Final Exam coverage:**

Ch1-8: ~ 67%

Ch9: ~33%

Crossed out items below definitely not on final.

1.13



**Chapter 1 - Intro topics**

Significant Figures

- o Rules for adding/subtracting
- o Rules for multiplying

Units & Conversion (Dimensional Analysis)

- o Know English-English Conversions within dimension (e.g. 4 qt = 1 gal)
- o Know metric-metric conversions utilizing prefix (e.g. 1 pm = ? cm)
- o I will provide English<->metric conversions (e.g. 1 lb = 453.6 g)

**Chapter 2 - Intro Chem topics**

Isotopes: determine protons, neutrons & electrons of neutral or charged atom

Nomenclature

- o Acids and ionic compounds which contain these common ions: **sulfate, nitrate, oxide, any halide, phosphate, perchlorate, chlorate, main body metals.**
- o binary molecular (two non-metals—use greek prefixes)

**Chapter 3 - Chemical quantities**

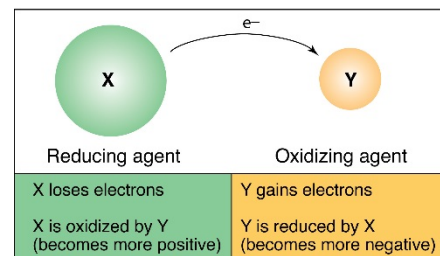
Mole / Molar Mass

Percent Composition from formula, from mass data

empirical formula - determination from mass or %composition data given

Balancing equations

Stoichiometry Problems (grams→moles→moles→grams)



**Chapter 4 - Solutions & Reactions**

Molarity & calculations

~~dilution (or concentration) problems, i.e.  $M_1V_1 = M_2V_2$~~

~~electrolyte (ionic or acid) formula dissociation in water~~

~~qualitative solubility rules - know & use in predicting solubility & precipitation reactions~~

~~precipitation reactions - predict and write formula (molecular) equation~~

~~acid/base reactions - write, balance & stoichiometry using molarity~~

~~oxidation states - assign for each element in a given species~~

**Chapter 5 - Gases**

Gas Laws: ~~Boyles, Charles, Avogadro, Ideal~~

Gas Stoichiometry

~~Dalton's Law of Partial Pressures~~

mole fraction gas as related to partial pressure

other misc formulas: density of gas, ~~effusion rates, rms velocity, avg kinetic energy~~

**Chapter 6 - Energy**

energy concepts: system, surroundings, heat work, state function, enthalpy

$\Delta E = q + w$

~~PV work problems~~

calorimetry

Hess' Law

Enthalpy of Formation (definition & use)

## Chapter 7 - Modern Atomic Structure & Periodicity

Application of formulas to determine energy / wavelength / frequency of light

Bohr Model & energy levels

Quantum Mechanical Model - Wave function

Quantum Numbers

s, p, d Orbitals: nodes, shapes, sizes & energies

number of allowed orbitals in each energy level, sub-level

Pauli Exclusion Principle, Hund's Rule, Aufbau principle, electron configurations

Periodic Trends: Ionization Energy, Electron Affinity, Atomic Radius, Electronegativity

## Chapter 8 - Bonding

Electron config of ions

electronegativity: non-polar, polar, & ionic bond character

Lewis dot structures of molecular structures

bond energies and calculation

VSEPR, 3D shapes & geometry: know: linear, bent, trigonal planar, tetrahedral, trigonal bipyramid, octahedral, as well as bond angles, and hybridization(Ch9).

net molecular polarity = shape + bond polarity

## Chapter 9 - Bonding & Molecular Orbitals

Predict hybridization of atom (steric number gives you this!)

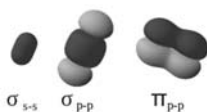
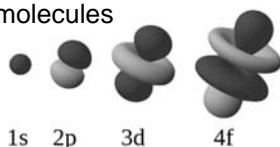
$\pi$  &  $\sigma$  bonds - definition, identify in structures

bonding & anti-bonding orbitals—how formed, shapes, energies

molecular orbital model of diatomic molecules

paramagnetic vs diamagnetic

delocalized  $\pi$  systems



~ 33% of  
final exam

Be **especially** familiar with these general concepts as they apply across chemistry curriculum:

Nomenclature

Significant Figures

Unit Conversions and agreement – esp common metric conversions (kg  $\leftrightarrow$  g, and mL  $\leftrightarrow$  L)

Stoichiometry

Hess' Law

Diatomic Elements (H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, halogens)

Standard state of any element at 25°C and 1 atm (standard reaction conditions)

## Other Reviewing Tips for Final

- ✓ Review your notes from lecture.
- ✓ Find problems for each concept above in 1) study questions, 2) Sapling Homework, end-of chapter problems.
- ✓ Answer all Study Questions - Attempt each problem without use of textbook or looking up answer.
- ✓ Attempt last year's final without notes/extra information and grade yourself
- ✓ Read the "For Review" Sections at the end of each chapter in green

**Final Exam Tuesday December 4, 12:30 – 2:30 p.m.**

