CHM 161 Final Examination checklist

I will give you all formulas needed for the exam. You will be given a periodic table. You should know how to interconvert millimeters into meters or kcal in cal without any formulas (all conversions within a metric unit). CH 1 is an introduction and is a general overview. Chapters 2-9 are below:

**CH 2 – Measurements in Chemistry**
- Metric prefixes (milli, centi, kilo, etc), what they mean and how to interconvert
- Unit conversions using dimensional analysis
- density
- Scientific notation – know how to use your calculator

**CH 3 – Atoms and the Periodic Table**
- Make-up of the atom
  - Nucleus with protons and neutrons
  - Electrons outside the nucleus
- Atomic number (number of protons or electrons in atom)
- Mass number (number of protons and neutrons in nucleus)
- Isotopes
- Electron configurations (pp. 64-69)

**CH 4 – Ionic Compounds**
- How periodic table is used to predict ion formation: cations and anions
- Electron configurations of ions (how does the number of electrons change
- Electron-dot symbols, octet rule
- Binary ionic compounds (with two elements)
- Polyatomic ions – names, formulas and charges (p. 91)
  - Know: ammonium, carbonate, bicarbonate, hydroxide, nitrate, nitrite, phosphate, sulfate, sulfite
- Nomenclature (naming) ionic compounds using Roman numeral system and standard system (e.g. gold(III) chloride and ammonium carbonate)

**CH 5 – Molecular Compounds**
Covalent bonding
- Octet rule
- bonding tendencies of different atoms
- similarities between elements in the same group
- Lewis structures
- Be able to draw Lewis structures from molecular formulas or from partially drawn structures
- geometries of compounds based on the structure
- Naming covalent compounds (P₂O₅ is diphosphorous pentoxide e.g.)

CH 6 – Chemical Reactions – Classification and Mass Relationships

- Balancing chemical equations (crucial)
- Molecular weight
- Mole concept; number of atoms/molecules in a mole (Avogadro)
- Mole to mole conversions (using balanced equations)
- Mole to gram conversions (using molecular weights)
- Gram to gram conversions (using both)
  o g reactant -> mol reactant -> mol product -> g product

CH 7 – Chemical Reactions - Energy, Rates and Equilibrium
There will be nothing from chapter 7 😊

CH 8 – Gases, Liquids and Solids

- P, V, T problems using combined gas law 8.4, 8.5, 8.6, 8.7
- Ideal gas law PV=nRT (solving for missing variable) 8.9
- Know what “directly” and “inversely” proportional means mathematically
- Avogadro’s molar volume (1 mol of any gas = 22.4 L at Standard Temp and Pressure (STP) 8.8
- Dalton’s partial pressure law 8.10

CH 9 – Solutions (sections 1-5,7,12,13)

- Mixtures, homogeneous vs. heterogeneous, examples
- Hydrates, unique formulas, names
- Concentration units:
  o Weight/volume (mass solute g/volume solution in mL)
  o Molarity (M, moles solute/liter solution)
  o Mol/L x L = mol
- C₁V₁ = C₂V₂ (solve for missing variable)
- Osmosis: osmolarity – how it relates to molarity; hypotonic, isotonic, hypertonic solutions

CH 10 – Acids and Bases (sections 1,2,8,14 – problem 10.24,25,52,53)

- Know formulas of hydrochloric, hydrobromic, sulfuric, nitric and phosphoric acids
- Be able to predict the products of these acids with hydroxide bases
- Be able to predict the products of these acids with carbonate and bicarbonate bases
- Be able to balance these equations (CH 6), carry out mole-mole conversions (CH 6), molarity to mol conversions (CH 9); mol to gram conversions (CH 6)
- pH Be able to convert [H₃O⁺] (molarity) into pH (worked example 10.10)