

## Chem 130 Spring 2020 Topics for Exam 2

A periodic table, solubility rules, and constants (like Avogadro's number) will be provided.

The split will be something like 50% multiple choice (20-25 questions), and 50% written answers. Topics for the written answers include:

- o Nomenclature
- o Perform number/moles/mass calculations
- o Write dissociation and ionization equations
- o Classify given reactions
- o Unit conversion/dimensional analysis
- o Write and balance a combustion reaction
- o Write and balance molecular, total ionic, and net ionic equations for precipitation reactions. (No neutralization rxns.)

Here are chapter sections which are included:

### Chapter 3

- 3.3 compounds and formulas (referring to the lecture notes, the middle of page 4 to the middle of page 8).

### Chapter 4

- 4.1 to 4.2, chemical and physical properties, and chemical and physical changes.

### Chapter 6

- All sections! Nomenclature: name to formula, and formula to name; includes acids.
- Review the rules in your lecture notes and textbook.
- You are responsible for the ions listed on your Memorization Sheet; this contains more ions than listed in the book's tables.
- You should know the numeric prefixes such as mono, di, tri, etc. (up to deca for 10).
- Numeric prefixes are only used in binary nonmetal-nonmetal compounds!
- You should know the classic names for the metal ions shown on the Memorization Sheet (Cr, Fe, Co, Cu, Sn, Hg, and Pb).
- You should know the Roman Numerals for 1 to 10 for naming compounds with Type II metals (variable ionic charge).

### Chapter 8 (excluding 8.6)

- Know the 'structure' of a chemical equation: reactants, products, arrow, states [ (s), (l), (g), (aq) ], and coefficients.
- Remember that chemical equations can only be balanced by changing coefficients.
- Given a word description of a chemical reaction, write a chemical equation (balance if asked) using formulas.
- Balance a given unbalanced chemical equation.
- Know the 'driving forces' that tell you a chemical reaction has occurred.
- Classify chemical equations into the types described in 8.4; complete and balance (except redox) these types of equations.
- Know that chemical reactions can absorb (endothermic) or release (exothermic) heat, and that heat may be shown as a reactant or product.

### Chapter 15.3 and 15.6

- Lightly read sections 15.1 to 15.3 for background and review.
- Electrolytes (be able to identify strong, weak, and nonelectrolytes); use solubility rules, know weak acids and bases, ionic vs molecular.
- Write dissociation and ionization equations, like the first page of Test 2 Worksheets.
- Know the six strong acids:  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ ,  $\text{HClO}_4$ ,  $\text{HCl}$ ,  $\text{HBr}$ , and  $\text{HI}$ .
- Know how to use solubility rules
- Be able to predict the products and balance equations using double displacement; do this for precipitation reactions. Includes molecular/formula equations, complete/total ionic equations, and net ionic equations.

### Chapter 7

- Determine the molar mass of a given compound.
- Be able to convert between mass and moles, between number and moles, and between mass and number via moles (not direct).
- Pay attention! Not seen in class but is on test; it's a simple extension. Read also section 13.6 on Hydrates, which are salts that incorporate loosely-held water molecules in their solid states; we have seen these a few times in lab. Know the syntax of hydrate formulas: the formula of the salt followed by a centered dot (is NOT multiplication) and the number of water molecules of hydration. The molar mass of a hydrate is simply the sum of the mass of the salt and the mass of the water molecules. For example, the molar mass of copper(II) sulfate pentahydrate ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ) = (mass of  $\text{CuSO}_4$ ) + (5 × mass of  $\text{H}_2\text{O}$ ) = (159.62 g) + (5 × 18.016 g) = 249.70 g