

TOPIC LIST TWO

Chapter 03-05

The following is a list of important topics and objectives for students taking Chemistry 10. Exams and assignments will focus on helping students achieve these objectives. Additional topics may be added during the semester and not all will be tested for on any given exam or assignment. Students are encouraged to use this outline as a baseline for reviewing chapters, preparing for exams, and determining if Chemistry 10 meets the student's personal objectives in studying chemistry.

Atomic Mass:

- Know roughly the weight of a proton, neutron and electron in AMU.
- Explain why no atom has the weight shown on the periodic table.
- Explain how an AMU is defined.
- Determine the weighted average in a set of numbers.
- Given the natural abundance and mass of isotopes of an element, calculate the average atomic mass.
- Determine the atomic mass and molar mass of an atom of any element from a periodic table.
- Convert between a count of single atoms and mass in AMUs, using atomic mass.
- Convert between a count of mols of atoms and mass in grams, using molar mass.

Mole

- Show Avogadro's number is the relationship between an AMU (in grams) and a gram.
- Know Avogadro's number as 6.022×10^{23} .
- Use Avogadro's number to convert between a count of particles as singles and in mols.
- Using atomic mass, molar mass, and Avogadro's number convert between quantities in grams, AMUs, singles, or mols.

Naming Elements & Ions:

- Give the chemical formula for an element, including sulfur, phosphorus and the seven diatomic elements.
- Use the periodic table to predict the formula and charge for ions of representative elements.
- Translate between the name and formula of ions formed from representative elements.
- Know the possible charges on the ions of the metals Co, Cr, Fe, Cu, Hg, Mn, Pb, and Sn.
- Use classical and stock systems for naming metals you know may have more than one possible charge.

Binary Compounds:

- Translate between the name and formula of binary compounds composed of a metal and non-metal.
- Translate between the name and formula of binary compounds composed of two non-metals.
- Interpret a chemical formula to give the ratio of atoms of each element.
- Write chemical formulas of ionic compounds given the component ions.
- Define the terms binary compound, monatomic, diatomic, and polyatomic.

Oxy-Ions:

- Translate between the name and formula of the primary oxy-ions of C, N, P, S, Br, Cl, and I.
- Understand the use of the prefix per- and hypo- to describe other oxy-ions of Br, Cl, and I.
- Translate between the name and formula of ammonium, cyanide, hydroxy, and acetate ions.
- Translate between the name, common name, and formulas of hydrogen oxy ions of P, S, and C.
- Translate between the name and formula of compounds formed from oxy-ions and hydrogen oxy-ions.

Acids:

- Define the terms acid and base.
- Recognize halogen ions, oxy-ions, and hydrogen oxy-ions are bases.
- Translate between the name and formula of binary acids of F, Br, Cl, and I.
- Translate between the name and formula of acids of oxy-ions of C, N, P, S, Br, Cl, and I.

Bonding:

- Understand the differences between a mixture and a compound.
- Know the difference between ionic, covalent, and metallic bonds.
- Describe the structural differences between ionic and molecular compounds.
- Identify a compound as ionic or molecular.
- Recognize monatomic, diatomic, and polyatomic particles (molecule, atom, or ion).

Lewis Structures:

- Classify a covalent bond as polar or nonpolar.
- Use electronegativities of elements to determine bond polarity.
- Predict the number of bonds formed by common nonmetals (the HONC rules).
- Write Lewis formulas for simple molecules and polyatomic ions.
- Identify free radicals.

Molecular Shape:

- Predict the shapes of simple molecules from their Lewis formulas.
- Classify a simple molecule as polar or nonpolar from its shape and the polarity of its bonds.
- Explain how shape and composition change the properties of molecules.
- Describe the concept of molecular recognition.

Molecular Mass

- Calculate the formula mass, molecular mass, or molar mass of a substance.
- Use Avogadro's number to determine the number of particles of different types in a mass of a substance.
- Convert from mass to moles and from moles to mass of a substance.

Equations:

- Understand the symbols for reactants, products, yield, state, and reaction conditions.
- Distinguish between a chemical change and a physical change.
- Represent a chemical change with a chemical equation.
- Recognize single displacement, double displacement, combination, and decomposition reactions.
- Recognize single combustion, gas evolution, and precipitation reactions.