EXAM 2 study guide

Atoms First 2e sections: 4.1-4.6, 5.1-5.5, 6.1-6.6, 7.1-7.3, 5.7

**DAY 9, Terms to know**:

Sections 4.1-4.4 valence electrons, core electrons, effective nuclear charge (Zeff), shielding, atomic radii, ionization energy, electron affinity

**DAY 9, Specific outcomes and skills that may be tested on exam 2:**

Sections 4.1-4.4

* Be able to give a complete or abbreviated electron configuration for an atom in either its ground state or a possible excited state
* Be able to give a complete or abbreviated orbital diagram for an atom either its ground state or a possible excited state
* Be able to describe what effective nuclear charge is and how it is calculated
* Be able to rank relative atomic radii, electron affinity, ionization energy ionic radii, and explain WHY they are ranked based on attractions and repulsions within the atom
* Be able to rank atoms in order of increasing ionization energies including IE1, IE2, IE3, etc. and explain WHY they should be ranked in that order

**DAY 10, Terms to know**:

Sections 4.5-4.6, 5.1-5.4: ionic radii, isoelectronic, compound, Lewis dot symbol, ionic bonding, ionic compound, chemical formula, lattice energy

**DAY 10, Specific outcomes and skills that may be tested on exam 2:**

Sections 4.5-4.6, 5.1-5.4

* Be able to give a complete or abbreviated electron configuration for an ion in either its ground state or a possible excited state
* Be able to give a complete or abbreviated orbital diagram for an ion either its ground state or a possible excited state
* Be able to rank the radii of isoelectronic particles and explain your answer
* Be able to rank relative radii, electron affinity, and ionization energy ionic radii for a series of particles including atoms and ions, and explain WHY they are ranked based on attractions and repulsions within the atom
* Be able to give the Lewis dot symbol for any main group element or ion
* Be able to predict the chemical formula for an ionic compound resulting from any two given ions

**DAY 11, Terms to know**:

Sections 5.5, 6.1-6.3: covalent bonding, molecule, law of definite proportions, diatomic molecules, heteronuclear, homonuclear, polyatomic molecules, molecular formula, allotropes, structural formula, electronegativity, octet rule, lone pairs, Lewis structure, single bond, double bond, triple bond, bond length, bond energy

**DAY 11, Specific outcomes and skills that may be tested on exam 2:**

Sections 5.5, 6.1-6.3

* Given a structural formula, be able to give a corresponding molecular formula
* Given a molecular or structural formula, be able to determine the formula
* Given a formula, be able to predict whether a substance is likely bonded by ionic bonds, covalent bonds, or both
* Given a formula, be able to predict which atoms present are bonded through ionic bonds and which atoms are bonded through covalent bonds
* Be able to explain why some bonds are shorter and stronger than others
* Be able to rank relative electronegativities and explain WHY some atoms are more electronegative than others
* Given a molecular formula, be able to draw a reasonable Lewis structure obeying octets and minimizing formal charge where possible

**DAY 12, Terms to know**:

Sections 6.4-6.6: formal charge, resonance, free radical

**DAY 12, Specific outcomes and skills that may be tested on exam 2:**

Sections 6.4-6.6

* Be able to calculate formal charges for atoms in Lewis structures
* Be able to draw all resonance contributors for a given Lewis structure and explain how resonance stabilizes molecules
* Be able to draw reasonable Lewis structures for molecules that are exceptions to the octet rule

**DAY 13, Terms to know**:

Sections 7.1, 6.2: VSEPR, linear, bent, trigonal planar, trigonal pyramidal, tetrahedral, trigonal bipyramidal, octahedral, electron domain geometry, molecular geometry, bond angle, polar covalent bonds

**DAY 13, Specific outcomes and skills that may be tested on exam 2:**

Sections 7.1, 6.2

* Be able to determine the electron domain geometry for a central atom
* Be able to determine the molecular geometry for a central atom
* Be able to determine individual bond polarities from electronegativity differences
* Be able to use polarity arrows or partial charge symbols to represent bond polarity
* Be able to use electronegativities to quantify and rank bond polarity and classify as either nonpolar, polar covalent, or ionic

**DAY 14, Terms to know**:

Sections 7.2-7.3, 5.7: molecular geometry, bond angle, molecular polarity, intermolecular forces (van der Waals forces), dipole-dipole interactions, hydrogen bonding, London forces, polarizability, instantaneous dipole, induced dipole, ion-dipole, polyatomic ions, hydrate, anhydrous

**DAY 14, Specific outcomes and skills that may be tested on exam 2:**

Sections 7.2-7.3, 5.7

* Be able to determine direction and relative magnitude of overall molecular polarity by analyzing molecular geometry, individual bond polarities, and formal charges
* Be able to list the types of intermolecular forces that exist and give examples of molecules that would have those forces of attractions and WHY
* Given a molecular formula or a Lewis structure, be able to determine what types of intermolecular forces would likely to be present between two molecules
* Be able to explain how hydrogen bonds are different from covalent bonds and how they are different from other types of dipole-dipole attractions
* For a given set of molecules, rank them in order of increasing strengths of intermolecular attractions
* Given a formula including a polyatomic ion, be able to predict which atoms present are bonded through ionic bonds and which atoms are bonded through covalent bonds
* Be able to predict the chemical formula for an ionic compound involving polyatomic ions
* Be able to recognize hydrates, write and read their formulas, and describe the attractions present in hydrates

**DAY 15: Exam 2**