

## Chemistry 215 Final

Material from midterms 1 and 2 plus the following;

### Atomic Structure

Know about electromagnetic radiation, and the relationships between wavelength, frequency and energy.

$$c = \lambda \nu$$

$$E = h \nu$$

#### Bohr Atom

Know why emission spectra arise when atoms are excited by an electric discharge, and be able to describe Bohr's model of the atom. Be able to determine the energy, frequency, or wavelength of radiation emitted or absorbed when an electron moves between two Bohr orbits.

$$E_n = \frac{hR}{n^2}, \text{ where } n \text{ is the quantum number of the orbit}$$

$$\Delta E = E_{\text{final}} - E_{\text{initial}}$$

Know why the Bohr atom is not a good model for all atoms.

Know the photoelectric effect, and blackbody radiation. What information did they provide.

Know what is meant by the Heisenberg uncertainty principle and the de Broglie wave-particle duality

#### Quantum Theory and Atomic Orbitals

Know the shapes and relative energies of atomic orbitals. Be able to describe orbitals in terms of their quantum numbers. Know the significance of each quantum number.

$$n = 1, 2, 3, 4, 5, \dots, n$$

$$l = 0, 1, 2, 3, 4, \dots, n-1$$

$$m_l = -l, \dots, 0, \dots, +l$$

$$M_s = +1/2, -1/2$$

#### Electronic Configurations

Be able to write electronic configurations for atoms and ions. Know the exceptions to the general rules for writing electronic configurations, *i.e.* Cr, and Cu.

### Trends in Physical Properties

Know the general trends in the periodic table of properties such as atomic and ionic size, ionization energy, electron affinity and electronegativity. Know trends in reducing and oxidizing ability of the elements, and acid base behavior.

Atomic size increase Right to Left, across a period and down a group

Ionization energy, electron affinity and electronegativity increase Left to Right across a period and up a group

## Chemical Bonding

### Lewis Structures

Be able to draw lewis structures for atoms, ions, ionic compounds and molecules, and be able to decide between two or more plausible lewis structures for a given species, by using the concept of formal charge.

Be aware of the exceptions to the octet rule.

Be able to predict the shape of molecules using VSEPR, and decide whether the molecules will be polar or non-polar.

### Intermolecular Bonding

Be able to describe Van der Waals and London Forces, and Hydrogen bonding. Know what network covalent structures are.

## Nuclear Chemistry

Know what is meant by alpha, beta, gamma and positron emissions, and electron capture. Be able to identify products of decay processes, and be able to write balanced reactions for decay processes.

Know what the half life of a nuclide is. Be able to identify the stability of nuclides based on their number of neutrons and protons, and the magic numbers.

Know the major uses of nuclear chemistry

### Review questions

Try the following questions chosen from the text to practice for the final.

Chapter 4; 12, 18, 65

Chapter 5 12, 17, 26

Chapter 6 8, 13, 48

Chapter 9 12, 13, 17, 22

Chapter 11 6, 7, 12, 15

Answers to most of these questions are in the back of the text.