Midterm Review: Regents Chemistry

Atomic Structure and Electron Configuration:

- ☐ Rutherford's gold foil experiment
- ☐ Protons, neutrons, electrons (location, charge and mass)
- ☐ Atomic number
- ☐ Nuclear charge
- ☐ Ions-different number of electrons
- ☐ Isotopes-different mass due to different number of neutrons
- ☐ Electron configuration: shell method (2-8-2)
- ☐ Principal energy levels
- ☐ Excited state vs. Ground state
- ☐ Valence electrons
- ☐ Dot diagrams

Nuclear Chemistry (Not on Ms. Dudeck's Midterm):

- ☐ All isotopes above 84 have no known stable isotopes
- ☐ Nuclear Transmutation equations- Artificial and Natural
- ☐ Beta decay
- ☐ Alpha decay
- ☐ Effect of electric field on radioactive particles
- ☐ Half life problems

Periodic Table:

- ☐ Names of groups or families: alkali metals, alkaline earth metals, halogens and noble gases
- ☐ Characteristics of groups
- ☐ Locations of Metals, Non-metals, metalloids and their properties
- ☐ Transition metals form colored compounds
- ☐ Phases of elements: which are solids, liquids and gases
- ☐ Groups vs. Periods
- ☐ Definitions and Periodic Trends for:
  - Atomic radius
  - Electronegativity
  - Ionization Energy

Bonding:

- ☐ Binary compound
- ☐ Polyatomic ions
- ☐ Cations vs. Anions
- ☐ Types of Substances:
  - Ionic Compounds
  - Molecular compounds
  - Metallic compounds

- ☐ Types of bonds and their properties:

- Ionic bonds
- Polar covalent bonds
- Non-polar covalent bonds

☐ Naming compounds: Roman numerals when needed
☐ Dot diagrams of Ionic vs. molecular compounds
☐ Types of molecules:
- Polar- non-symmetrical
- Non-polar- symmetrical

☐ Shapes of molecules:
- Linear
- Tetrahedral
- Pyramid
- Bent

☐ Intermolecular attractions
- Dipole-dipole
- H-bonding
- Van der Waals (London Dispersion Forces)

Organic: (On Ms. Dudeck's Midterm Only)

☐ Properties of Organic Molecules
- Contain C
- Low melting and boiling point
- Weak or Non-conductors
- Weak intermolecular attractions
- Low to Non-polar molecules
- Low solubility in water
- Identify and draw condensed and structural formulas for members of the following homologous series:

☐ Alkanes
☐ Alkenes
☐ Alkynes
☐ Identify and draw condensed and structural formulas for members of the Functional Groups on Table R
☐ Isomers
☐ Saturated vs. unsaturated hydrocarbons
☐ Be able to identify the following reactions:
- Combustion
- Addition
- Substitution
- Esterification
- Fermentation
- Polymerization
- Saponification

Matter and Energy:

- ☐ Significant figures
- ☐ Pure substances vs. mixtures
- ☐ Atoms, elements (can't be broken down by chemical change) vs. Molecule, compound
- ☐ Homogeneous vs. Heterogeneous
- ☐ Aqueous
- ☐ Symbols: (s), (l), (g) and (aq)
- ☐ Exothermic vs. Endothermic
- ☐ Average kinetic energy = Temperature
- ☐ Phases: The properties of each as well as the relative energies
- ☐ Phase change diagrams:
  - No temperature change during a phase change
  - Potential energy vs. kinetic energy changes during each section
  - Phases during each section
  - Use to determine melting point, freezing point, boiling point
- ☐ Phase changes: (exo or endo)
  - Melting
  - Freezing
  - Evaporation
  - Condensation
  - Sublimation
  - Deposition
- ☐ Heat of fusion ($q = mH_{fus}$)
- ☐ Heat of vaporization ($q=mH_{vap}$)
- ☐ $Q= m\Delta TCp$
- ☐ °C + 273 = K
- ☐ $Q_{lost} = - Q_{gained}$

Conversions: (Not on Mrs. Schmutzers Midterm)

- ☐ Converting between grams, moles, atoms and molecules
- ☐ Percent composition
- ☐ Getting an empirical and molecular formula from percent composition

Tables from the Reference Tables Booklet:

- ☐ Table B: Physical Constants of Water
- ☐ Table C: Metric Conversions (Not on Mrs. Schmutzer's midterm)
- ☐ Table E: Selected Polyatomic Ions
- ☐ Table N: Radioisotopes (Not on Ms. Dudeck's midterm)
- ☐ Table O: Symbols Used in Nuclear Chemistry (Not on Ms. Dudeck's midterm)
- ☐ Table P: Organic Prefixes (Ms. Dudeck only)
- ☐ Table Q: Homologous Series (Ms. Dudeck only)
- ☐ Table R: Functional Groups (Ms. Dudeck only)
- ☐ Table S: Properties of Selected Elements
- ☐ Table T: Important Formulas and Equations
- ☐ Periodic Table