CHEMISTRY 142

REVIEW OUTLINE

Chapter 1

Some fundamental definitions
   Know and use; chemistry, matter, composition of matter, properties, physical properties, physical change, chemical properties, chemical change, chemical reaction, density, percent, states of matter, solid, liquid, gas, energy, potential energy, kinetic energy and the rest of the end of chapter key terms.
   For example; distinguish between physical and chemical properties, intensive and extensive properties, kinetic energy, potential energy, etc.,

The scientific approach: Developing a model
   What steps are included in scientific procedure?
   How are law and theory related in the procedure?

Chemical problem solving
   Use of units in calculations, dimensional analysis
   Use conversion factors to change units
   Calculate density, percentage, etc., based on definitions

Measurement in scientific study
   know common decimal prefixes used with SI units
   Know Celcius - Kelvin temperature conversion

Uncertainty in measurement: Significant figures
   Round of calculated values to the appropriate number of significant figures
   Know the use of the terms precision, accuracy, percent deviation, standard deviation, random error and systematic error as indicated in the first laboratory exercise.

Chapter 2

Elements, compounds and mixtures: An atomic overview
   Know and use the terms element, compound and mixture

The observations that led to an atomic view of matter
   Know laws on which Dalton's atomic view of matter were based
   Definite proportions
   Multiple proportions
   Mass conservation
   Know postulates of the theory
   Know and use key word definitions
   Calculate the mass of an element in a compound

The observations that led to the nuclear atom model
   Know the observations and their interpretation
   Thompson cathode ray
   Millikan oil drop
   Rutherford alpha particle scattering
Relate to the atom model that resulted

The atomic theory today
- Know the modern atom structure and the related terms
- How many subatomic particles in a given isotope
- Calculate the atomic mass of an element from the isotopic distribution
- How is mass spectrometry used?
- Know postulates of the modern atomic theory

Elements: A first look at the periodic table
- Know and use key terms: group, family, period, metal, nonmetal, metalloid, etc.
- Use the table to obtain information

Compounds: Introduction to bonding
- Know how compounds are formed
  - ionic
  - pure covalent
  - polar covalent
- Which element combinations give the various types of bonds?
- Write and balance reactions between elements
- Know common polyatomic ions

Compounds: formulas, names and masses
- Give names or write formulas from names of binary compounds, binary acids, polyatomic ions, oxoacids, salts of polyatomic ions
- Know or deduce charges on ions
- Include charge balance in balancing chemical reactions
- Deduce the formulas of binary and oxoanion compounds
- Calculate formula masses from compound formulas
- Calculate missing masses using atom ratios, mass ratios; atomic masses from mass ratios in a compound
- Calculate percent composition by mass

Mixtures: Classification and separation
- Know types of mixtures
- Know techniques used to separate them
- Distinguish mixtures and pure substances

Chapter 24

Radioactive decay and nuclear stability
- Know components of the nucleus in relation to nuclear decay
- Compare chemical and nuclear reactions
- Know the types of radioactive decay and characteristics of the particles or energy involved
- Write and balance equations for nuclear reactions
  - Complete and balance a nuclear reaction with part of the reaction given
  - Write and balance a nuclear reaction for a given nucleus and type of decay
- Know the meaning of the curve of stability for nuclides
- Deduce the likely type of decay that a given nuclide will undergo from the nuclear size and the neutron/proton (N/Z) ratio
- Predict whether a given nuclide is likely to be stable
- Write and use appropriate nuclear isotopic symbols for given atoms
The kinetics of nuclear change
   Know end of chapter key terms
   Deduce or calculate the half-life of a nuclide from decay rates
   Calculate an item's age from nuclear activity
   Know some further applications of radioisotopes

Fission and fusion: The interconversion of mass and energy
   Calculate the mass defect and nuclear binding energy
   Describe the processes of fusion and fission
   Know by which process energy could be obtained from a given nuclide based on the plot of binding energy per nuclide
   Describe the physical method for obtaining useful energy from nuclear fission
   Describe a method by which useful energy might be obtained from nuclear fusion