Dougherty Valley HS Chemistry
Study Guide Test #1

S-4

This list is a general guideline to help you study. It is NOT a definitive list. There are potentially things on here that will not show up on the test, and there are potentially things not on this list that will show up on the test. Material that appeared in Warm Ups, Notes, Homework, Classwork, Labs, Study Materials, etc are all have the potential to appear on the test.

+ denotes calculations

Chemistry Basics and Atomic Structure

- Chemistry Math
  - Know the equation for Density
  - Know how to solve for each variable in the Density equation +
  - Know the common metric prefixes (KHDBdcm)
  - Be able to perform metric conversions using either "King Henry" or Dimensional Analysis +
  - Know how to perform "single" and "double" unit dimensional analysis problems +
  - Know how to count the number of significant figures in a given number
  - Know how to carry significant figures through a calculation to report the final answer with the correct number of sig figs +
- Properties of Matter
  - Be able to tell the difference between a physical property and a chemical property
  - Be able to tell the difference between a physical change and a chemical change
  - Know examples for each type of property
  - Know examples for each type of change
  - Know each type of classification of matter (Pure Substance, Element, Compound, Mixture, Homogeneous, Heterogeneous)
- Atomic Structure
  - Know each type of subatomic particle (Proton, Neutron, Electron)
  - Know the difference between their charges, location, etc… for each type of subatomic particle
  - Be able to describe and explain the experiment that lead to the discovery of the electron
  - Be able to describe and explain the experiment that lead to the discovery of the nucleus
  - Know the different models of "atom" and be able to sketch or identify a simple version of each
    - Democritus
    - J. Dalton (billiard ball)
    - J.J. Thompson (plumb pudding)
    - N. Bohr (planetary model)
    - E. Rutherford (atomic nucleus)
    - J. Dalton
    - Quantum Model
- Atomic #'s
  - Know the difference between Atomic #, Atomic Mass, Mass Number, Isotope
    - Know how these terms relate to each other so you can calculate things such as the number of protons, neutrons, electrons, and mass of a given atom +
  - Know how to calculate the average atomic mass when given the relative abundances of various isotopes +
  - Know how to calculate the % relative abundance of two different isotopes when given the average mass (limited to doing two isotopes) +

Nuclear Chemistry

- Basics
  - Be able to describe the difference between Chemical Reactions and Nuclear Reactions
  - Be able to describe and identify nuclear fission, nuclear fusion, neutron bombardment
  - Be able to describe the different types of radioactive decay – charges, masses, symbols, penetration power, what stops them, what charge are they attracted to, where/how they originate (alpha, beta, gamma, positron) (α, β, γ)
  - Know some pros and cons about nuclear chemistry (medicine, power plants)
- Equations
  - Identify types of equations or particles when shown an equation
    - Alpha, beta, gamma, positron, fission, fusion, neutron bombardment
  - Be able to write nuclear equations involving α, β^+, β^-, γ, neutrons and protons +
    - Find the missing part when given most of an equation
    - Write the equation when given it in words
  - Be able to write and graph a decay series
- Half-Life
  - Definition
  - Find the half-life when given a chart or a graph
  - Equations +
    - Know the equation for half-life: $A_E = A_S \times 0.5^n$
    - Know how to calculate the number of half-lives: $n = \frac{t}{h}$
    - Know how to solve for A_E and A_S
    - Know how to calculate the % still radioactive: $\%_{still\ radioactive} = 0.5^n$
    - Know how to calculate the % decayed: $\%_{decayed} = 100\% - \%_{still\ radioactive}$
    - Know how to calculate the amount decayed into stable: $A_{decayed} = A_S - A_E$
    - Know how to use logarithms to solve for t or h (isolate the one you are looking for): $\log\left(\frac{A_E}{A_S}\right) = \frac{t}{h} \times \log(0.5)$

Electrons

- Orbitals
  - Know the definition of an orbital
  - Know how many shapes/types of orbitals there are
  - Know how many of each shape/type of orbital there are in a "set"
  - Know how many electrons can fit inside an individual orbital
- Orbital Diagrams
  - Know the rules for filling an Orbital Diagram and be able to apply them to filling out an orbital diagram
    - Hund's Rule
    - Pauli Exclusion Principle
    - Aufbau Principle
- Electron configuration
  - Be able to write the electron configuration for:
    - An atom using an orbital diagram
    - An atom using only the periodic table
    - An ion
    - Noble gas configuration
- Absorption and Emission
  - Know how absorption and emission work and be able to sketch a picture of each
  - Describe how Absorption and Emission Spectra can be used to identify elements present in a sample or in a star