Sample Topic Outline

Topic 1: The Atom

I Early Studies of Atoms

1) Dalton's Atomic Theory
   a- propose theory in the 1700's
   b- basic unit of matter is an atom
   c- elements composed of indivisible atoms
   d- atoms of an element are identical
   e- different element, different atoms
   f- compounds combination of atoms
   g- groundwork for current concept of atom

II Structure of the Atom

1) Electrons
   a- JJ Thomson cathode ray tube experiment
   b- particles formed were negatively charged
   c- theorized that negatively charged particles named electrons
   d- ~~atoms~~ particles embedded in atoms
   e- plum pudding model
   f- mass evenly distributed & positively charged

2) The Nucleus
   a- Rutherford conducted the gold-foil experiment
   b- concluded that atoms have a dense central core, called a nucleus
   c- nucleus was positively charged b/c like charges repel

3) Protons and Neutrons
   a- protons are positively charged particles in nucleus
   b- neutrons are neutral particles in nucleus

III Modern Atomic Theory

1) The Bohr Model of the Atom
   a- the model showed a center, nucleus & rings orbitting electrons
   b- electrons in concentric circles around nucleus by letters K, L, M, N, O, P & Q

b- each electron in an atom has its own amount of energy
c- electrons gain & lose energy & move to different energy levels.

2) Ground and Excited States

a- electrons occupy lowest available orbitals, atom is in the "ground state"
b- electrons in a ground state atom have filled the available spaces from the lowest energy level to higher levels
c- electrons are subjected to stimuli such as heat, light or electricity, an electron may absorb energy & temporarily move to higher energy level
d- an excited state electron returns quickly to lower available level
e- emits the same amount of energy it absorbed to go to higher energy
f- each atom has distinct patterns of emission lines used to identify elements.

VII Electron Arrangement

a- chemical properties of an element based on number of electrons in outer energy levels of its atom
b- outer electrons are called valence electrons

1) Quantum Numbers

a- quantum theory developed to explain chemical behavior of atoms
b- electrons described as a set of four numbers called quantum numbers.
c- first number describes major energy level of the electron called principal quantum number
d- if electron has principal quantum number of 2 it's in the second energy level
e- third quantum number relates to orbitals in the sub levels
f- fourth quantum number relates to the spin of an electron.

2) Electron Configurations

a- quantum numbers describe distribution of electrons
b- distribution of atoms is called electron configuration
c- electron configuration, the electrons are described by identifying energy levels and sub levels
d- complete electron configuration shown by writing symbols for sublevels.

3) Writing Electron Configuration

a- each added electron placed into sublevel of lowest available energy

c- law of definite proportions is the statement that types of atoms in a compound exist in a fixed ratio

X Mixtures

a- combinations of 2 or more pure substances that can be seperated by physical means

b- different from compounds b/c their composition isn't definite & the parts can be seperated by physical means

c- solutions are mixtures that are homogeneous.

XI Distinguishing Between Mixtures and Compounds.

a- in mixture elements can be present in different ratios

b- both contain 2 or more different elements

c- two categories are different when considering composition & properties

d- each substance in mixture retains its properties

e- compound has its own properties

f- different methods to seperates parts of mixture.

Vocab Topic 1

atom - the basic unit of matter, a tiny particle

electron - small, negatively charged particles

nucleus - a dense central core in the containing protons & neutrons

protons - positively charged particles inside nucleus

neutrons - particles in the nucleus that don't have a positive or negative charge.

valence - electrons in the outer energy level of an atom

atomic mass - average mass of all the isotopes in an element

atomic mass unit - one twelfth the mass of a carbon-12 atom

atomic number - number of protons in the nucleus of an atom

compound - substance composed of two or more elements that are chemically combined in definite proportions by mass.

element - substances that can't be broken down into simpler substances by chemical means

excited state - condition that exists when the electrons of an atom occupy higher energy levels while lower energy levels are vacant

ground state - condition of an atom or iron in which the electrons occupy the lowest available energy levels.