***Honors PS 1st Sem. Chemistry Content: Brief Overview***

**Chapter 1:Intro to Physical Science**

\_\_\_1. measurements – length, volume, area

\_\_\_2. metric system and prefix conversion

\_\_\_3. indirect measurements (proportions)

\_\_\_4. basic lab skills, burners, safety equipment,

\_\_\_5. measuring estimations (major/minor scales)

\_\_\_6. accuracy vs precision

\_\_\_7. significant digits from measurements in

 calculations / uncertainty and percent error

\_\_\_8. Scientific method: dependent and

 independent variables/ control

\_\_\_9. Scientific notation

\_\_\_10. Quantitative vs qualitative

Lab: accuracy and precision

Lab: measurement lab (indirect measurement)

Lab: chromatography

Lab: safety techniques

Lab: critical thinking of burner

Lab: Scientific Method : flame test

Lab: flame color comparison lab with lighting

smoke

**Chapter 2:Matter**

\_\_\_1. States of matter

\_\_\_2. (pure substaces):Elements, compounds; (mixtures):homogeneous [solutions]/ heterogenous mixtures [colloids, suspensions]

\_\_\_3. Diffusion and Brownian motion

\_\_\_4. I can describe various materials based on the following physical properties as well as create examples demonstrating high and low characteristics of the following:

 \_\_\_ hardness \_\_\_ density

 \_\_\_ elasticity \_\_\_ malleability

 \_\_\_ tensile strength \_\_\_ viscosity

 \_\_\_ brittleness

\_\_\_5. I can use the periodic table keys (legends) to differentiate properties as physical and chemical properties.

\_\_\_6. I can recognize signs that differentiate physical and chemical changes.

\_\_\_7. Given two of three variables present in the density equation (d = m/V), I can calculate the unknown quantity.

Lab: distillation of wood; distill liquids/flame tests/gas collection

Lab demos: making tea, axe spray,

Lab: glass bend/ fire polishing

Lab: Density

Lab: Melting pt and freezing pt lab independent of sample size (moth nuggets and flakes)

**Chapter 3:States of Matter**

\_\_\_1. temperature is a measurement of KE of molecules (kinetic molecular theory); heat is a measure of total energy.

\_\_\_2. States of matter operationally defined

\_\_\_3. heating curve of water

\_\_\_4. I can differentiate temperature vs heat (thermal energy)

\_\_\_5. phase changes (melting, freezing, boiling, condensing, sublimation) and plateaus on a graph

\_\_\_6. I can see applications for the Law of Conservation of Total Mass and Energy

Lab: liquid X: fractional distillation

Lab: 5 minilabs for Conservation of Mass

**Chapter 4: Atoms**

\_\_\_1. I can explain prominent discoveries of various scientists pertaining to the atomic structure.

 \_\_\_ Democritus (term atom)

 \_\_\_ Dalton (atomic spheres)

 \_\_\_ Rutherford (protons, nucleus, space)

 \_\_\_ Thomson (electron)

 \_\_\_ Bohr (energy level model of atom)

 \_\_\_ Chadwick (neutron)

 \_\_\_ Mendeleev (periodic table)

 \_\_\_ DeBroglie (electron wave theory)

\_\_\_2. I can locate the placement of protons, neutrons, and electrons within an atom.

\_\_\_3. I can compare electrical charges on protons, neutrons, and electrons.

\_\_\_4. I can determine the identity of an element based on atomic number.

\_\_\_5. I can determine the number of neutrons in an atom when given the mass number and atomic number.

\_\_\_6. How does An atom become charged?

\_\_\_6a. I can determine the number of electrons in both neutral atoms as well as ions.

\_\_\_7. I can differentiate between strong nuclear force and electromagnetic force.

\_\_\_8. Using the average atomic mass, I can determine the most common isotope of an element.

\_\_\_9. I can identify the trends associated with periods and groups in the periodic table.

\_\_\_10. I can construct models of atoms including placement of electrons in proper energy levels.

\_\_\_11. I can explain how electrons absorb and transmit energy as photons.

Game/lab/models: atom building

Lab: Rutherford Lab Simulation with Geiger demo

Lab: Magnets and strong nuclear force

Lab: Cu(s) + heat 🡪 CuO (s)

 CuO(s) + HCl(aq)🡪 CuCl2 (aq)+ H2O

 CuCl2(aq)+ Zn(s) 🡪 ZnCl2 (aq)+ H2(g)

Lab: gas tubes & diffraction glasses & spectroscopes

Lab: Atom drawing lab models

Lab: spdf on atom board

**Chapter 5 : Periodic Table**

\_\_\_1.Recognize periodic law modified to atomic number

\_\_\_2. Metallic trends, nonmetal, metalloids

\_\_\_3. Group (Family) vs Period and chemical similarities.

\_\_\_4. Alkali metals, Alkaline-Earth metal, halogens, noble gases, transition metal, synthetics

Lab: Lab Aids periodic trends lab

Lab: Color classify periodic tables

Lab: Atom draw and periodic placement

**Chapter 6 – Chemical Bonds and Formulas**

\_\_\_1. I can determine the number of valence electrons in an atom using a periodic table.

\_\_\_2. I can draw dot diagrams for elements.

\_\_\_3. I can utilize the octet rule to predict oxidation numbers.

\_\_\_4. I can predict the charge of ions based on their location in the periodic table.

\_\_\_5. I can differentiate between ionic and covalent compounds, including those involving transition metals and polyatomic ions.

\_\_\_6. I can name ionic compounds when given the formula.

\_\_\_7. I can write the formula of an ionic compound when given the name of the compound.

\_\_\_8. I can name covalent compounds when given the formula

\_\_\_9. I can write the formula of a covalent compound when given the name of the compound.

\_\_\_10. I can identify elements that form diatomic molecules.

\_\_\_11. I can compare the value of a mole to real life examples including math problems.

\_\_\_12. I can calculate molar masses and formula masses when given the formula of a substance.

\_\_\_13. I can convert from an empirical to molecular formula when given a chemical formula.

\_\_\_14. I can explain why metallic bonds allow metals to be malleable and ductile, conductors, etc.

Lab: atom building game

Lab: Lab Aids Families of element Lab rastios

Lab: moles/fasteners and rings (FsR)/ count with mass

Lab: Zn and HCl, etc….

**Chapter 7 – Types of Chemical Reaction and Balancing Reactions**

\_\_\_1. I can identify the following types of reactions:

\_\_\_\_ addition \_\_\_\_ decomposition

\_\_\_\_ combustion \_\_\_\_ single displacement

\_\_\_\_ double displacement

\_\_\_2. *Given the reactants, I can predict and name the products of the following types of reactions*:

\_\_\_\_ addition \_\_\_\_ decomposition

\_\_\_\_ combustion \_\_\_\_ single displacement

\_\_\_\_ double displacement

\_\_\_3. I can apply the law of conservation of mass to demonstrate why the number and types of atoms in the reactants equal the number and types of atoms in the products.

\_\_\_4. I can count the number of atoms of each type of element in the reactants and products of a chemical reaction.

\_\_\_5. I can balance chemical equations.

\_\_\_6. I can determine the exchange of energy in endothermic and exothermic reactions.

\_\_\_7. Factors that change the rate of a reaction

Lab: types of reactions

Lab: conservation of mass

Web: <http://funbasedlearning.com> / CD labs

Chemplates DD reactions

Demos “whoosh”, flaming ramp, etc..

**Chapter 8: Solutions**

\_\_\_1. Tyndall and colloids, emulsifiers, solute/solvent

\_\_\_2. Saturated/unsaturated/supersaturated

\_\_\_3. Molarity problems

\_\_\_4. Solubility graph interpretations

\_\_\_5. Factors controlling the rate of dissolving

\_\_\_6. Polarity of water and the role in dissolving

\_\_\_7. Likes dissolve likes. (polarity and nonpolar)

Lab: chromatography shown

Labs: drops on penny, solubility of NaCl, marker cleaning of solution X and Y, down the drain X and Y

Lab: penny galvanizing and turn to brass

Lab: Alloys and penny

Lab demo: conductivity of ions in solutions

Lab: CD solubility graph and problems

**Chapter 9: Acids, Bases, Bases, and Salts**

\_\_\_ 1. I can differentiate between acidic, basic, and neutral solutions.

\_\_\_ 2. Identify common properties of acids and bases.

\_\_\_ 3. Utilize the pH scale to rank acids and bases in terms of relative acidity or alkalinity.

\_\_\_ 4. Apply the relative concentration of H3O+ and OH- ions to describe acidity or alkalinity

\_\_\_5. I can analyze solutions in terms of levels of concentration.

\_\_\_ 6, I can identify the acid and base solutions creating the salt

Labs: Litmus test to assist operational definition

Lab: pH

Lab: neutralization reaction and formation of chemical salt