1. Know and understand the rules of lab safety.
2. Define and calculate density.
3. Convert between units in the metric system.
4. Use scientific notation correctly.
5. Convert between grams, moles, and atoms of a specified substance.
6. Be able to explain the difference and identify between chemical and physical changes.
7. Be able to explain the difference and identify between a mixture, compound, and element.
8. Explain the difference between a homogeneous and heterogeneous mixtures.
9. Draw and label reaction coordinate diagrams.
10. Be able to calculate enthalpy using a reaction coordinate diagram.
11. Know and understand Collision Theory, and the factors that have an effect on reaction rate.
12. Understand what the mass number, atomic number, and subatomic particles (proton, electron, neutron) are.
13. Be able to calculate protons, electrons, and neutrons.
14. Know what an isotope is.
15. Be able to draw Bohr models for all isotopes of an atom.
16. 1. Be able to understand light and energy equations. (how are frequency, energy, and wavelength related?)
17. 2. Be able to use the Bohr Model to solve for wavelength, type of light, and color of light.
18. 3. Explain what wave-particle duality is.
19. 4. Be able to write electron configurations for an atom.
20. 5. Be able to write noble gas configurations for an atom.
21. 6. Be able to write orbital notation for an atom.
22. Know the different groups on the periodic table and be able to say the elements in those groups. (alkali metals, alkaline earth metals, transition metals, metalloids, halogens, noble gases, lanthanides, actinides, metals, and non-metals )
23. Know the properties of each group. (listed above)
24. Know the history of the periodic table (Medeleev, Seaborg, Newlands, Mosely).
25. Know and explain the trend for electronegativity.
26. Know and explain the trend for ionization energy.
27. Know and explain the trend for atomic radius.
28. Know and explain the trend for ionic radius.
29. Be able to compare elements for each of the trends
30. Know the ions that different elements can form.
31. What are ionic, covalent, and metallic bonds? What properties do their molecules have?
32. Be able to calculate if the bond is ionic, non-polar covalent, or polar covalent based on electronegativity.
33. Be able to name and write the formula for covalent compounds.
34. Be able to name and write the formula for ionic compounds (binary, transition metals, and polyatomic ions).
35. Be able to name and write the formula for acids.
36. Be able to name and write the formula for hydrates.
37. Be able to determine the percent composition of a compound.
38. Be able to calculate the empirical and molecular formulas.
39. Be able to determine hydrates.
40. Be able to identify different types of reactions, (synthesis, decomposition, single replacement, double replacement, combustion)
41. Be able to balance chemical reactions.
42. Explain why we balance chemical reactions. (law of conservation of mass)
43. Be able to predict products for all five reactions.
44. Know how to read the activity series to predict if single replacement reactions will occur.
45. Be able to identify if a compound is soluble or insoluble based on the solubility rules.
46. Be able to predict if a double replacement reaction will occur based on solubility rules.
47. Be able to write complete ionic reactions.
48. Be able to write net ionic reactions.
49. Be able to identify the indicators of a chemical reaction.
50. Know how to test for an acid or base in a product and for a gas. (chemical indicators, splint tests, lime-water tests)
51. Know the difference between heat and temperature.
52. Be able to use the specific heat equation.
53. Be able to read and label a heating/cooling curve.
54. Use a heating/cooling curve to solve for the heat absorbed or released during a phase change. (multi-step q-problems)
55. Be able to read a phase diagram and determine normal points (boiling, melting, and freezing), critical point, and triple point.
56. Know the difference between a phase diagram for H2O and CO2.
57. Be able to convert between unit of measurement for pressure and temperature.
58. Know what the Kinetic Molecular Theory is and why it is important.
59. Know the relationship between pressure, temperature, and volume.
60. Be able to use the three basic gas laws. (Boyle’s, Charles’, and Gay-Lussac’s)
61. Be able to use the combined gas law.
62. Be able to use the ideal gas law.
63. Be able to use Dalton’s Law.
64. What are ionic, covalent, and metallic bonds? What properties do their molecules have?
65. Be able to calculate if the bond is ionic, non-polar covalent, or polar covalent based on electronegativity.
66. Be able to draw Lewis Dot Structures for Ionic Compounds.
67. Be able to draw Lewis Dot Structures for Covalent Compounds.
68. Know the molecular shape for molecules four domains or less.
69. Be able to determine if a molecule is polar or non-polar.
70. Know the difference between intramolecular forces and intermolecular forces.
71. Be able to determine which intermolecular forces a molecule has. (electrostatic, hydrogen, dipole-dipole, London Dispersion/van der Waals)
72. Know the order of strength for intermolecular forces.
73. Define solution, solute, solvent, soluble, and insoluble.
74. Define saturated, unsaturated, and supersaturated.
75. Interpret solubility curves.
76. Solve molarity problems.
77. Solve dilution problems.
78. Be able to describe the steps to use in the lab to make a solution from the pure substance and water, or by diluting a more concentrated solution.
79. Distinguish between acids, bases, and salts based on formula, names, and chemical properties.
80. Be able to write the name and formula of acids and bases.
81. Differentiate between concentration (molarity) and strength (degree of dissociation).
82. Use the pH scale to identify acids and bases.
83. Compute the pH, pOH, [H3O+], and [OH-].
84. Be able to interpret titration curves.
85. Calculate the concentration of an acid or a base by using information from a titration.
86. Be able to convert between grams, moles, particles, and volume using mole ratios in chemical reactions.
87. Be able to identify and create nuclear reactions using alpha, beta, gamma, and positron particles.
88. Know the necessary protection needed to reduce penetration of alpha, beta, and gamma particles.
89. Be able to calculate half-life, number of cycles, and amount of substance left over or started with in half-life problems.