Second Quarter Goals and Objectives for Final Review

Chapter 10

1. Students will be able to define the Kinetic-Molecular Theory.
2. Students will be able to list the five (5) assumptions of the Kinetic- Molecular Theory as it applies to gases.
3. Students will be able to describe the behavior of an ideal gas.
4. Students will be able to describe the five (5) physical properties of gases (Expansion, Fluidity, Low Density, Compressibility, and Diffusion).
5. Students will be able to compare and contrast the processes of diffusion and effusion.
6. Student will be able to explain the conditions for an ideal gas versus a real gas.
7. Students will be able to define a real gas according to its properties.
8. Given a scenario (pressure, temperature, etc.), students will be able to categorize a gas's behavior as ideal or real.
9. Students will be able to compare and contrast evaporation and boiling of a liquid.
10. Students will be able to define surface tension.
11. Students will be able to explain why substances have higher surface tension than other substances.
12. Students will be able to describe the process of freezing or solidification.
13. Students will be able to define a solid.
14. Students will be able to define an amorphous solid.
15. Students will be able to define the melting point of a substance.
16. Students will be able to compare and contrast solid, liquid, and gas in reference to the Kinetic-Molecular Theory.
17. Students will be able to classify a change of state in matter as melting, freezing, condensing, sublimating, vaporization, or deposition.
18. Given a graph of boiling points, students will be able to explain the differences in boiling temperatures for different substances.
19. Given a phase diagram with temperature and pressure values, students will be able to determine which phase of matter the substance.

Chapter 11

1. Students will be able to define pressure.
2. Given a conversion sheet, students will be able to convert a given pressure value into atmosphere, torr, kPa, or mmHg.
3. Students will be able to describe how to measure the pressure of a gas inside of an object.
4. Students will be able to define volume.
5. Students will be able to define temperature.

6. Students will be able to convert Celsius degrees into absolute temperature.
7. Students will be able to convert absolute temperature into Celsius degrees.
8. Students will be able to give the correct value and units for Standard Temperature and Pressure (STP) of a gas.
9. Student will be able to describe the relationship between pressure and volume according to Boyle's Law of Gases.
10. Given volume-pressure changes at constant temperature, students will be able to solve using Boyle's Law of Gases.
11. Given volume-temperature changes at constant pressure, students will be able to solve using Charles' Law of Gases.
12. Given pressure-temperature changes at constant volume, students will be able to solve using Gay-Lussac's Law of Gases.
13. Given pressure, temperature, and volume changes, students will be able to solve using the Combined Gas Law.
14. Given a scenario with a change in pressure, volume or temperature, students will be able to explain how the three factors will change.
15. Students will be able to recall one mole of any gas at STP as a volume of 22.4 liters.
16. Given a combination of pressure, temperature, volume, or moles, students will be able to solve using the Ideal Gas Law.

Chapter 12-13

1. Students will be able to define soluble.
2. Students will be able to define solution.
3. Students will be able to distinguish between a solute and a solvent to form a solution.
4. Given a list of substances, students will be able to classify each as an electrolyte or nonelectrolyte.
5. Students will be able to list the three factors affecting the rate of dissolution.
6. Students will be able to explain (in writing) the three factors affecting the rate of dissolution.
7. Students will be able to compare and contrast a saturated solution, unsaturated solution, and supersaturated solution.
8. Given two substances, students will be able to determine whether the two substances are able to be mixed together.
9. Students will be able to explain the effects of pressure on solubility.
10. Students will be able to explain the effects of temperature on solubility.
11. Given the mass of the solute and volume of the solution, students will be able to calculate the molarity of a solution.
12. Given a volume and the concentration of the solution, students will be able to calculate the number of moles and mass of the solute.
13. Students will be able to calculate the amount of solute needed to create a dilution of a concentrated solution.
14. Students will be able to calculate the molality of a solution.

15. Students will be able to calculate the percent by volume of a solution.
16. Students will be able to define precipitate.
17. Students will be able to predict the products of a double replacement chemical reaction in aqueous solution.
18. Students will be able to write the net ionic reaction when two aqueous solutions are combined.
19. Given a solubility chart, students will be able determine if a substance is soluble.
20. Given a solubility chart, students will be able determine if a substance is strong or weak electrolyte.

Chapter 14 and 15

1. Students will be able list four of the five characteristics of both acids and bases.
2. Given a Periodic Table of Elements, students will be able to name (write) binary acids.
3. Given a Periodic Table of Elements and polyatomic ion chart, students will be able to name (write) oxyacids.
4. Students will be able to define an Arrhenius acid and base.
5. Students will be able to define a Brønsted-Lowry acid and base.
6. Given an acid-base chemical reaction, students will be able to label the acid, base, conjugate acid, and conjugate base.
7. Student will be able to define an amphoteric substance according to the acid and base theories.
8. Students will be able to give an example of one amphoteric substance according to the acid and base theories.
9. Given an acid and a base, the student will be able to predict (write) the products for the chemical reaction (neutralization reaction).
10. Given a list of acids (binary and oxyacids), students will be able to label monoprotic, diprotic, and triprotic acids.
11. Students will be able to explain the differences between a strong acid and a weak acid with regard to their ionization.
12. Students will be able to explain the differences between a strong base and a weak base with regard to their ionization.
13. Given a weak acid or weak base, the student will be able to write a balanced equation for the dissociation of the acid or base in water using the appropriate arrows in the equation.
14. Given a strong acid or base, the student will be able to write a balanced equation for the dissociation of the acid or base in water using the appropriate arrows in the equation.
15. Given a strong acid and base, the students will be able to write a balanced equation with the correct productions for a neutralization reaction.
16. Students will be able to write a balanced chemical reaction for the selfionization of water.

17. Given the product ion constant for water (K_w), the formula for the ionization constant for water ($K_w=[OH^-][H_3O^+]$), and one of the concentrations (either OH^- or H_3O^+), the student will be able to solve for the missing concentration.
18. Students will be able to classify (label) substances as an acid, base or neutral depending upon the formula of the compound.
19. Given the pH, pOH, $[H^+]$ or $[OH^-]$ of a solution, students will be able to classify (label) each as an acid, base or neutral.
20. Given the formula $pH= -\log[H^+]$ and the concentration of hydrogen ions, the students will be able to calculate the pH.
21. Given the formula $pOH= -\log[OH^-]$ and the concentration of hydrogen ions, the student will be able to calculate the pOH.
22. Given the formula $[H^+]= 10^{-pH}$ and the pH, the student will be able to calculate the $[H^+]$.
23. Given the formula $[OH^-]= 10^{-pOH}$ and the pOH, the student will be able to calculate the $[OH^-]$.
24. The student will be able to describe how to titrate a strong acid and strong base. Given the concentration of a strong acid, the amount of acid titrated, and the amount of strong bases, the student will be able to calculate the concentration of the base.

Chapter 16

1. Students will be able to define temperature.
2. Students will be able to define heat.
3. Students will be able to define calorimeter.
4. Given the mass, temperature and heat (Joules or Calories) students will be able to calculate the specific heat of a substance.
5. Given the mass, temperature and specific heat of a substance, students will be able to calculate the heat (q).
6. Given the mass, specific heat, and heat absorbed or released students will be able to calculate the temperature change.
7. Students will be able to explain energy (heat) flow between substances.
8. Given a scenario, students will be able to explain whether the substance is undergoing an exothermic or endothermic process.
9. Students will be able to define exothermic.
10. Students will be able to define endothermic
11. Given a thermochemical equation, students will be able to classify the reaction as endothermic or exothermic.
12. Students will be able to define enthalpy (ΔH).
13. Students will be able to label physical changes as either exothermic or endothermic.
14. Given a graph of phase changes, students will be able to calculate the amount of energy absorbed or released.
15. Given a thermochemical equation and the mass of one of the reactants, students will be able to calculate the amount of energy released or absorbed.

16. Students will be able to label an energy scenario as the system, surroundings and the universe.
17. Given a graph of Enthalpy and course of reaction, students will be able to explain whether the chemical reaction is exothermic or endothermic.
18. Students will be able to calculate the enthalpy of a reaction using products minus reactants equation and looking up the enthalpy of formation for various compounds
19. Students will be able to calculate the enthalpy of a reaction using Hess's law.

Chapter 17

1. Students will be able to state the two necessary characteristics of collisions for a chemical reaction to occur: collisions must happen in an effective orientation with an appropriate amount of force.
2. Students will be able to express the reaction rate in appropriate units.
3. Given a balanced chemical reaction, students will be able to identify if increasing or decreasing the concentration of either the reactants or products will speed up the rate of the reaction.
4. Given a balanced chemical reaction, students will be able to identify if increasing or decreasing the temperature will speed up the rate of the reaction.
5. Students will be able to explain the effects of adding a catalyst to a chemical reaction, not only on the reaction rate, but on the activation energy.
6. Students will be able to define activation energy.
7. Students will be able to compare and contrast the activated complex to the reactants and products.
8. Given the starting energy of reactant, products and activation energy, students will be able to draw the appropriate endothermic or exothermic energy profile curve.
9. Students will be able to label the following parts of the energy profile curve: activation energy, activated complex, heat of reaction, the energy axis, the reaction progress, the energy of the reactants, the energy of the products, and the result of adding catalyst.
10. Given an energy profile curve, students will be able to determine how much energy is released or absorbed during the chemical reaction.
11. Given an energy profile curve, students will be able to determine how much energy is required for the chemical reaction to occur.
12. Given an energy profile curve, students will be able to determine the reverse activation energy for the chemical reaction.
13. Given an energy profile curve, students will be able to determine the heat of reaction energy for the chemical reaction.
14. Given an energy profile curve, students will be able to determine the activation energy of the chemical reaction.
15. Students will be able to rate the general rate law for a chemical reaction.

16. Students will be able to determine the order for each reactant and overall order given a rate law.
17. Students will be able to write a rate law for a reaction given that the reaction is a single step mechanism.
18. Students will be able to write a rate law for a reaction given the reaction mechanism and rate determining step.
19. Students will be able to write the rate law for a reaction given the experimental data where certain reactants are kept constant and some are variables.
20. Students will be able to calculate the specific rate constant for a rate law with proper units.

Chapter 18

1. Given a balanced chemical reaction, students will determine the direction in the shift in equilibrium due to the stress of adding a catalyst.
2. Given a balanced chemical reaction, students will determine the direction in the shift in equilibrium due to stress of increasing or decreasing the concentrations of either a reactant or product.
3. Given a balanced chemical reaction, students will determine the direction in the shift in equilibrium due to the stress of adding or removing heat from either an endothermic or exothermic reaction.
4. Given a balanced chemical reaction, students will determine the direction in the shift in equilibrium due to the stress of changing the pressure on either the reactants or the products.
5. Students will be able to explain in writing what it means for a chemical reaction to be at equilibrium
6. Given a sentence describing a forward reaction, students will be able to symbolically write the reverse balance chemical reaction.
7. Given a balanced chemical reaction and the molar concentrations of the reactants and products, students will be able to calculate the equilibrium constant for the equation.
8. From the equilibrium constant calculated for the chemical reaction, students will be able to determine if the reaction favors the reactants or the products.
9. Using the equilibrium constant, students will be able to calculate the concentration of one reactant or product when given the concentrations of the other reactants and products.

Chapter 21

1. Students will be able to define nuclide and nucleon.
2. Students will be able to explain (written) how nuclear forces hold the neutron and protons together in the nucleus.
3. Given the graph called, “The Band of Stability”, students will be able to interpret the relationship between the neutrons to proton ratio in the nucleus.

4. Students will be able to define nuclear reaction.
5. Students will be able to define transmutation.
6. Given an incomplete transmutation nuclear reaction, students will be able to determine the missing product or reactant in the transmutation nuclear reaction.
7. Students will be able to define nuclear radiation and radioactive decay.
8. Given a Periodic Table of Elements, students will be able to give three examples of elements which have a radioactive nuclide.
9. Students will be able to recall the nuclide formula (verbally and written) for the three types of radioactive particles (alpha, beta, gamma).
10. Students will be able to define half-life.
11. Given the half-life and beginning mass of a radioactive substance, the students will be able to calculate the remaining amount of the radioactive material.
12. Given the time and the change in mass of the radioactive material, the student will be able to calculate the half-life of the radioactive substance.
13. Given the initial mass, the final mass, and the half-life, the student will be able to calculate the amount of time for radioactive decay to the final mass.
14. Given a word problem describing a transmutation reaction, the student will be able write a balanced nuclear equation written in nuclide form.
15. Students will be able to list the materials that can block the three most common radioactive particles (alpha, beta, and gamma) can penetrate.
16. Student will be able to describe the process of fission.
17. Students will be able to describe the process of fusion.