Kinetics and Equilibrium Review

1. Collision Theory: in order for a chemical reaction to happen there must be an effective collision between reactant particles.
2. Collisions are effective if particles have sufficient kinetic energy and proper orientation.
3. Rates of chemical reactions: how fast products are produced. The more effective collisions that take place the faster the rate.
4. Factors that affect the rate of a chemical reaction.
   a. Temperature: high temps = faster rate
   b. Concentration of reactants: the more concentrated the faster the rate
   c. Nature of reactants: Ionic compounds react faster than covalent compounds (organic) because covalent bonds are stronger than ionic bonds.
   d. Surface Area: smaller particles = greater surface area = faster rate
   e. Phase of reactants: gases and aqueous solutions react faster than solids.
   f. Catalyst: a catalyst lowers the activation energy which speeds up reaction rates
   g. Inhibitors slow down reaction rates.

   a. Exothermic: products have less PE than reactants. Products are stable.
      Delta H is negative. Delta H = PE products – PE reactants
   b. Endothermic: products have more PE than reactants. Delta H is positive
   c. Delta H also called heat of reaction or enthalpy of reaction
   d. The value of Delta H is given in kilojoules per mole so adjust for coefficients if needed.

6. Activation Energy is the energy to start a chemical reaction. The higher the Ea the slower the reaction

7. Be able to identify, draw in and calculate values from a graph for PEproducts, PEractants, Ea forward, Ea reverse, delta H, position of activated complex.

8. Equilibrium is when the rates of two opposing processes occur at the same rate

9. Types of Equilibrium:
   a. Phase equilibrium: during phase changes. (Matter and Energy)
   b. Solution equilibrium: saturated solutions (Solutions)
   c. Chemical equilibrium: rate of forward reaction = rate of reverse reaction, Concentrations remain constant. Visible changes are no longer happening. ↔ appears in the rxn.

10. How stresses affect a system at equilibrium: LeChatelier’s Principle

11. Catalysts do not shift the equilibrium they only speed up rates.

12. How do Temp. changes affect equilibrium?

13. How do Pressure changes affect equilibrium?

14. How do concentration changes (both incr. & decr.) affect equilibrium?

15. Spontaneous reactions occur when energy is released and entropy increases.
16. Entropy is disorder. Gases have higher entropy than liquids. Liquids have more entropy than solids.
17. High temp. has more entropy than low temp.