

CCS Chemistry Study Guide for Exam IV

Terms you will encounter in the matching section:

1. actual yield
2. percent yield
3. theoretical yield
4. excess reagent
5. limiting reagent
6. mass
7. number of molecules
8. volume
9. Boyle's law
10. Charles's law
11. Dalton's law
12. Graham's law
13. Gay-Lussac's law
14. ideal gas law
15. solvation
16. weak electrolyte
17. aqueous solution
18. electrolyte
19. colloid
20. surfactant

Things to know:

- Be able to determine what is conserved in a reaction if you are given the balanced equation.
- What 2 things are conserved in *every* chemical reaction?
- Know what kinetic theory says about the particles in a gas - all the basic assumptions we discussed.
- Know what instrument is used to measure atmospheric pressure.
- Know how many kPa is 1 atmosphere of pressure.
- Know how atmospheric pressure **below** sea level compares to atmospheric pressure **at** sea level.
- Be able to convert between: atm \leftrightarrow kPa \leftrightarrow mmHg
- Know which of our 3 temperature scales is directly proportional to average kinetic energy.
- Know how average kinetic energy of the particles in a substance is related to temperature.
- If I have two similarly shaped objects that are made of two different materials and they are at the same temperature, how will the avg kinetic energies of their particles compare?
- What is the key difference between a liquid and a gas?
- What happens to the temperature of a liquid as it evaporates?
- What happens to the rate of evaporation of a liquid as the liquid is cooled?
- Will adding energy to a boiling liquid increase, decrease or not change its temperature?
- How could we make water boil at 105 deg C instead of at 100 deg C?
- Know the general properties of solids.
- Complete this sentence with a phrase (not one word): The physical properties of liquids are determined by _____.
- Why does the pressure inside a container of gas increase if more gas is added to the container?

- What happens to the temp of a gas when it is compressed?
- What happens to the pressure of a gas inside a container if the temp of the gas decreases?
- If you double the Kelvin temp of a gas, the particles of the gas _____ .
- Be able to use the combined gas law to answer questions like, "If the volume of a gas is reduced from 4.0 L to 0.5 L while the temp is held constant, how does pressure change?"
- If the atmospheric pressure on Mt. Everest is one-third the atmospheric pressure at sea level, the partial pressure of oxygen on Everest is _____ its pressure at sea level.
- Be able to apply the law of partial pressures to solve problems.
- Know that hydrogen bonds are responsible for 1) holding water molecules together in the liquid state, 2) water's low vapor pressure 3) the high surface tension of water, 4) the high thermal energy required to melt ice.
- Know the definition of surface tension.
- Know the properties of solutions (size of particles < 1nm, can't be filtered, etc.)
- Know that nonpolar substances are able to dissolve other different nonpolar substances because they have similar attractive forces in their molecules (like dissolves like).
- Weak electrolytes are generally ionic compounds that partially (rather than completely) dissociate in water.
- Strong electrolytes: Potassium Sulfate, Sodium Chloride, etc.
- Hydrates: Epsom Salt, Copper Sulfate, etc.
- Which is characterized by a settling of particles? solution, suspension, or colloid
- An emulsion is a colloid.
- What causes Brownian Motion in colloids?
- Be able to name three different allotropes of carbon and describe their physical properties.
- Why is ice less dense than water?
- At what temperature does liquid water have its maximum density?

Calculations:

- If you are given a balanced equation and told how many moles or grams or liters (for gases) of the reactants you have, be able to determine the limiting reagent (if there is one) and from that, how much product will form.
- If you are given a balanced equation and told how many moles or grams or liters (for gases) of *only one of the reactants*, be able to determine from the mole ratio, how many moles/grams/liters of the other reactant are necessary to react completely.
- Vapor pressure is a measure of the force exerted by a gas above its liquid in a closed system. As long as the temperature stays the same, it doesn't matter what volume of liquid you have in the closed system. The vapor pressure will remain the same.
- Be able to use the combined gas law:

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$
- Be able to use the law of Partial Pressures.
- Be able to use the Ideal Gas Law ($PV = nRT$)
- Given the formula of a hydrate, be able to determine how much (mass) you would need to heat to produce a certain mass of water (based on the mole ratio of anhydrate to water).
- Be able to use Graham's Law to calculate how much faster one gas will effuse than another (say for example, F_2 to Cl_2).