General Chemistry II Chapter-by-Chapter detailed learning objectives

Are you ready to learn chemistry?

If you want to do well, focus on learning and put you grade anxiety aside. The homework and class-work assigned is the most important place where you develop brain connections between concepts, applications and problem solving. Your active engagement in problem solving should Identify any weakness areas you may have (and we all have them!) so that you can work on them before upcoming tests. You can pass this course with a "C" but the level of your learning will be minimal and your confidence, low. Typically, considering the competition and the state of the physical and economic resources, average people with average grades get average jobs if they get lucky, until they are replaced by computers, automation and smarter employees. Don't settle for less; build your brain connections; question everything you are learning and practice every chance you get. You may ask, why work so hard? The answer is simple, because you can and your future and happiness depends on it!

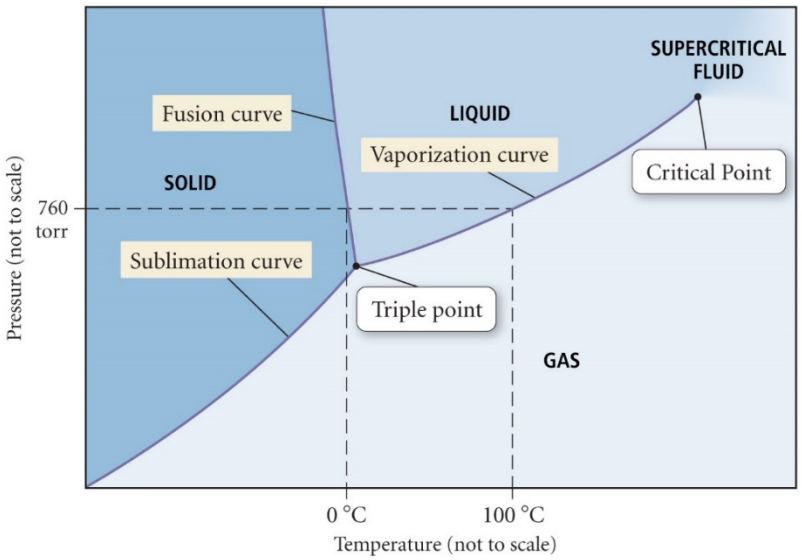
Note: If you see a term shown in quotation please know that the specific term or description is not currently/commonly used in textbooks. I prefer to introduce these terms because they are either more correct, clear and overall do a better job of conveying their conceptual meaning.

Solutions and Properties

1. Define concentration and specific concentration definitions: molarity, molality, % (by mass or volume), ppm, ppb.
2. Determine major (strongest) intermolecular forces given the structural formula (ex. CH_3OH or $CHCl_3$) of matter.
3. Define forces between particles ("interparticle") of matter including solutions:
    a. dipole-dipole (permanent dipole),
    b. "proximity" dipole-dipole (dispersion or van der Waals),
    c. "Hydrogen-to-lone-pair" (H-bonding)
    d. ion-ion (ex. NaCl),
    e. ion-dipole (Na^+---OH_2 and Cl^----H_2O),
4. Review solution energetics processes as well as ideal versus non-ideal solutions. If a solution process is exothermic (heat released upon mixing) what does that indicate in terms of relative strength of interparticle forces. Analyze an endothermic solution process accordingly.
5. Review Henry's law which mathematically describes solubility of a gas in a solvent as a direct function of the partial pressure of the as over the solution. The math relationship is a linear function, y=m.x with m being the Henry's law constant (K_H) at a particular temperature. It is best to use dimensional analysis when solving these problems as the Henry's constant is reported in a variety of units.
6. Review colligative properties of a solution (BP, FP, VP, OP) and their dependence on solute particle (ion or molecule) concentration.

7. Define osmotic pressure. Apply and memorize the osmotic pressure equation (π.V=n.R.T) which resembles the ideal gas law equation (P.V=n.R.T). If you express the osmotic pressure equation in terms of molarity, it will become π=M.R.T
8. Review a typical phase diagram (PT diagram) and moving along isobaric and isothermal paths (lines) for processes such as freezing/melting, boiling/condensation and sublimation/deposition. Also, recall how the phase diagram of a solution is superimposed on the pure solvent's phase diagram.

A pure solvent (water in this case) phase diagram and terminology.



A pure solvent's phase diagram (solid lines) compared to a solution (dashed lines)