Dougherty Valley • AP Chemistry

**S-72**

Solutions and Their Properties

STUDY LIST From Paul Groves

Separation Techniques

🞎 Identify the property that is being exploited when using various separation techniques such as decanting, filtration, distillation, chromatography

🞎 Explain the difference between paper chromatography, TLC chromatography, and column chromatography and when you would use one versus the other.

🞎 Identify unknown compounds based on information given about the separation technique. Example – the more polar compound will vaporize at a higher temperature during the distillation process, or the polar substance will travel a shorter distance on a polar chromatography substrate etc.

Concentration Units

🞎 Define solute, solvent, and solution

🞎 Define molarity, molality, mole fraction, weight percent, ppm

🞎 Convert one concentration into another

🞎 Realize that density is sometimes needed for calculations involving molarity

🞎 Dilutions can be calculated using M1V1 = M2V2

Terminology

🞎 Define unsaturated, saturated, and supersaturated. (DEMO—Hand warmer)

🞎 Define and identify electrolytes versus non-electrolytes.

🞎 Compare these terms with dilute and concentrated. (AgNO3 970 g/100g & AgCl .00127 g/100g)

🞎 Solids and gases are called soluble and insoluble.

🞎 Liquids are called miscible and immiscible. (TOY—Ocean Waves)

🞎 Define dissolution versus dissociation.

Solubility

🞎 Some ions result in a compound always being soluble in water. Know that list!

🞎 Identify the ways to change solubility for solids and gases. Changing temperature, pressure, particle size, etc.

🞎 Write net ionic equations including phases by using solubility rules.

🞎 Draw and/or analyze particulate diagrams for solubility questions.

🞎 Describe (and calculate) how the presence of a common ion can effect the degree of dissociation.

Math of the Properties of Solutions

🞎 ~~Henry’s Law—solubility of a gas in a liquid is proportional to the pressure of the gas. S~~~~g~~ ~~= k~~~~H~~~~P~~~~g~~

🞎 ~~Know and be able to do simple problems with Raoult’s Law: P~~~~solvent~~ ~~= X~~~~solvent~~~~P°~~~~solvent~~ ~~to figure out the vapor pressure~~ **~~above~~** ~~a solution~~

~~🞎 Recognize that a volatile solute (esp. alcohol) will add to the vapor pressure and LOWER the BP whereas solutions of solids in water RAISE the BP.~~

~~Colligative Properties – More Math~~

~~🞎 Elevation of the BP, ΔT~~~~b~~

 ~~ΔT~~~~b~~ ~~= k~~~~b~~ ~~· m (k~~~~b~~ ~~= the molal boiling point elevation constant = ΔT~~~~b~~ ~~@ 1 m)~~

~~🞎 Depression of the FP/MP, ΔT~~~~f~~

 ~~ΔT~~~~f~~ ~~= k~~~~f~~ ~~· m (k~~~~f~~ ~~= the molal freezing point depression constant = ΔT~~~~f~~ ~~@ 1 m)~~

~~🞎 This can be used to determine molar mass: ~~

 ~~(COMPUTER SIMULATION—RAST)~~

~~🞎 Substances that split into ions have a multiplying effect on colligative properties.~~

 ~~(elevation of BP in sol’n: sugar vs salt)~~

~~🞎 This is called the van’t Hoff factor, i.
Ex. NaCl, i=2; CaCl~~~~2~~~~, i=3
(simple for dilute solutions)~~

Flashback to Thermochemistry

🞎 Heats of solution =

 Requires energy to break solvent-solvent & solute-solute bonds – Energy released by making solute-solvent bonds (esp. hydration)

 (can be exothermic or endothermic) (endothermic implies Entropy is impt)

 (DEMO—baggies of NH4Cl and CaCl2)

Ksp

🞎 Define Ksp and molar solubility.

🞎 Understand the difference between Ksp and molar solubility in terms of why molar solubility can be more useful in a practical way.

🞎 Perform calculations involving Ksp and molar solubility.

🞎 Perform Ksp problems that involve the common ion effect.