Solutions Test Notes 2012

Make sure students know the following:

Definitions:

- Unsaturated
- Saturated
- Supersaturated
- Dilute
- Concentrated
- Miscible
- Immiscible
- Henry's Law
- Colligative properties

Concepts, Calculations:

- temp effects on solubility & rates of dissolution
- Henry's Law calculations & math relationship (direct)
- Interpreting solubility constants

- % v/v problems

Example: Nail polish remover is a 58.0% acetone solution. so if you have a bottle that is 177 ml, how many ml of acetone in the solution?

$$.58 = \frac{x}{177} \qquad x = 102.66 \text{ acetone}$$

- How adding more solute or solvent affects:
  - concentration
  - % v/v
  - molarity

- % m/m problems

Example: What % (m/m) of a water soln that contains 27.5g sugar and the soln's mass is 223.3g?

$$\%\left(\frac{m}{m}\right) = \frac{27.5\,g}{223.3\,g} = .123 \times 100\% = 12.3\%$$

- know all the colligative properties.

- Boiling pts dependent on how many "particles" or atoms dissociate w/ the solute. i.e. $MgCl_2$ dissociates into 3 particles
  KNO_3 dissociates into 5 particles

AT, ST, NT

- Solubility factors gas/liquid ↓ sol. w/ ↑ temp solid/liquid ↑ sol w/ ↑ te
- Rate factors → grinding, stirring, heating
- Comparing concentrations in terms of molarity
- Saturated v. concentrated

PROBLEMS

Solubility proportions

$M_1V_1 = M_2V_2$

Molarity

Henry's Law

Molality

Sturman
Spring 2010

SOLUTIONS TEST NOTES

- ☐ Henry's Law: $\frac{S_1}{P_1} = \frac{S_2}{P_2}$ says what?
  constant temp.

- ☐ ~~$\frac{\text{moles solute}}{\text{kg solvent}}$~~ = molality know $\frac{\text{moles solvent}}{\text{L solution}}$ = Molarity

- ☐ unsaturated v dilute

- ☐ How would you make a soln? Use $M_1V_1 = M_2V_2$

- ☐ Solubility ↓ for gas-liquid soln when temp increases.
  Solubility ↑ for solid-liquid soln when temp increases.

- ☐ Colligative properties consider amount only not nature of solute.

- ☐ solute dissolves in the solvent.

- ☐ Don't underestimate the power of proportions:
  ie. With constant temp if the solubility of a compound is 45.0g/L of water how much of the compound will be needed to saturate the solution w/ 525 mL of H_2O?
  - Convert 525 mL to L → .525 L
  - Proportion: $\frac{45.0\text{g}}{1\text{L}} = \frac{x}{.525\text{L}}$ ⇒ **x = 23.6g of the compound**

- ☐ Find the mass of HCl needed to make 1275 mL of 3.0M HCl solution.

$$3.0 = \frac{x \text{ mol}}{1.275} \Rightarrow x = 3.825 \text{ mol HCl}$$

$$\frac{3.825 \text{ mol HCl}}{1} \cdot \frac{36.5 \text{ g HCl}}{1 \text{ mol HCl}} = 139.6125 \Rightarrow \boxed{140 \text{ g of HCl}}$$