CH 21 Solutions

I. Parts of and Solution (Sln) Formation

A. Solution- homogeneous mixture with particles evenly mixed at molecular level

1. Concentration can vary

B. Parts of Sln. Ex) saltwater

1. *Solvent*- the majority component of Sln. Ex) water

2. *Solute*- the minority component that gets dissolved ex) salt

C. Slns can be any phase combo

1. Solid in solid - called an *alloy* ex) brass

D. How substances Dissolve

1. solute- particles are surrounded by solvent particles and carried away

E. Rate of Dissolving:

1. Making solids dissolve better in liquid

a. stir – solute particles come into contact with solvent faster

b. heat – all particles move faster

c. use smaller crystals- increase surface area

II. Solubility and Concentration (conc)

A. *Concentration*- how much solute is dissolved in given amount of solvent

1. concentrated - lots of solute dissolved

2. diluted – only a little solute in lots of solvent

3. percent by volume – a precise way to tell concentration

a. formula:

[volume solute ÷( volume solute + volume solvent)] x 100%

Ex) Many juice drinks contain 10 mL of juice for every 90 mL of sweetened water. Find the percent juice per volume of drink.

10 mL juice x 100% = 10% juice

10 mL juice + 90 mL water

B. *Solubility* - how much solute a given amount of solvent can hold at given temp. and pressure

1. *Saturated Sln*- holds as much solid as possible at certain temp.

a. value for line on chart B at given temp- all solute dissolved

b. any amount above line- will have precipitate present

1) precipitate- undissolved solid at bottom of Sln.

2. *solubility curves* – line graph showing solubility of several solutes vs temperature

a. lets one compare solubility of several substances

3. *Unsaturated Sln*- more solid can be added and still dissolve at temp

a. value below line on chart B

4. *Super saturated sln*- more solid dissolved than chart B says dissolve for temp

a. made by heating then cooling

1) Place more solid in Sln than Chart B says for temp a) precipitate will be present

2) Heat Sln until all precipitate dissolve

3) Cool gently in clean unscratched container

a) Dirt, container scratches, and jolting will cause precipitate to reform resulting in a saturated Sln

C. Some solutes will cause sln to heat when dissolving, others will cause cooling ex) hot and cold packs

D. Solubility of gases – think keeping soda fizzy

1. higher pressure – higher solubility

2. higher temp – lower solubility

3. agitation – stirring, shaking – lowers solubility

III. Particles in Sln.

A. Ions in sln.

1. *electrolyte* – anything that makes ions when dissolving

a. ionic compounds

b. conduct electricity

2. *nonelectrolyte* – makes no ions when dissolving

a. covalent molecules

b. does not conduct electricity

3. *ionization* – a covalently bonded molecule is broken apart into ions

4. *Dissociation* – an ionic compound breaks into ions in sln

B. Effects of Higher Conc.

1. Conducts electricity better

2. Lowers freezing points

3. Raises boiling point

IV. Dissolving Without Water

A. Polar Solvent dissolves polar solute, and nonpolar solvent dissolves nonpolar solute – like dissolves like

1. Water is polar, so dissolves compounds with polar covalent and ionic bonds

2. Some molecules have both polar and nonpolar regions, so dissolve in both

B. Nonpolar Solvents ex) gasoline, oils, paint thinner

1. Drawbacks – flammable, many have toxic vapors

C. Soaps- have both polar and nonpolar ends

1. Polar end dissolves in water

2. Nonpolar end dissolves dirty oils on skin

D. Vitamins- nonpolar ones hold in fat cells

1. nonpolar- vitamins A, D, E, and K

a. can cause overdose because held in body

2. polar- vitamins C, and B’s

a. safer- exit body quickly in urine

b. need to eat more