Chem 103 lecture 1a

Orientation

Syllabus

Chapt 15

Do Electronic Homework

Have your password ready

Register if you're not yet registered.

The eHW is posted - it's normally due on Mondays at 8am pacific time.

What to expect in Chem 103

We'll combine concepts learned before especially:

Equilibrium concepts, K, and ICE-type calculations

We'll learn new basic concepts involving:

a) Acids and bases; buffers; solubility

b) Thermodynamics and free energy

c) Electrochemistry and redox reactions

d) Nuclear chemistry

What I expect of you

Be punctual for each class. Inactivate cellphones.
Respect what I or your fellow students say.
Come prepared on the day's assignments. Ask and answer.
Concentrate exclusively on Chem 103 during class hours.
Study for about 10 hours per week or more.
In lab…
Have detailed flowcharts done before lab.
Adhere to lab timetable and deadlines.
Strictly follow safety procedures in lab. Help clean up.
Always have notebook, pen, adhere to data collection rules.
Learn good laboratory practice

You can expect from me:

-Be punctual and prepared for each class.
-Give each student a fair share of my attention.
-Prepare you fully for your quizzes and exams.
-Grade you fairly.
-Return graded work within a reasonable time.
–Help you succeed in this class.
-Be present to help you during office hours.
–Be available by appointment (if offc hrs inconv.).

Contact information

About me:

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Offc hours: MW 9-11; F:11-12. Or by appointment

gsantil@calstatela.edu

(when you email: "Chem 103-*your name*"

Website: www.calstatela.edu/dept/chem/09summer/103/

Textbook: Moore, Stanitski and Jurs.

15.1:Solutes & Solutions

What is a solution? It's a homogeneous mixture.

Solution = solute (often a solid) + a solvent (usually a liquid)

What are the intermolecular interactions found in aqueous solutions?

H-bonding, ion-ion, dipole-dipole, dispersion forces

Like dissolves like: Polar substances dissolve polars

Nonpolars dissolve nonpols but pols don't dissolve nonpolrs

15.2 Enthalpy(ΔH) & Entropy(ΔS)

$\Delta H_{solution}$ = heat transferred upon dissolution of substance.

$\Delta H > 0$ (positive) means heat is absorbed: endothermic

$\Delta H < 0$ (negative) means heat is released : exothermic

Exothermic processes are usually more favorable.

Entropy = measures dispersion of energy (& thus matter)

$\Delta S > 0$ (positive) means more dispersal of energy,

$\Delta S > 0$ is usually more favorable.

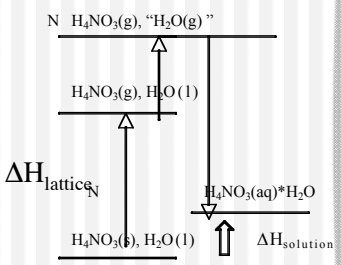
ΔH and ΔS must be considered to determine favorability

$\Delta H_{solution} = \sum \Delta H_i$

Eg ammonium nitrate in water ;

$\Delta H_{solution} = \sum \Delta H_i$:

$= \Delta H_{lattice}$ (+) + $\Delta H_{solvent}$ (+) + $\Delta H_{solvation}$(-)



15.3 Solubility & equilibrium

Solubility = max amt of solute dissolved/ 100mL

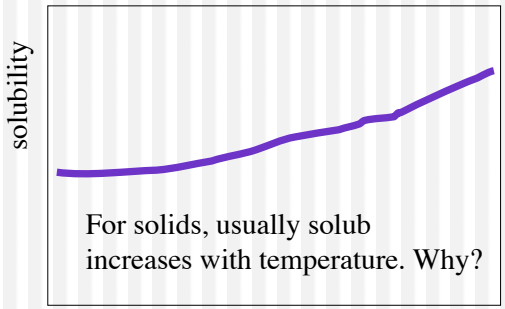
Saturated solutions are at solubility

Thus they are at equilibrium: both solid form and dissolved form coexist, for example:

$AgCl(s) <= => Ag^+ (aq) + Cl^- (aq)$

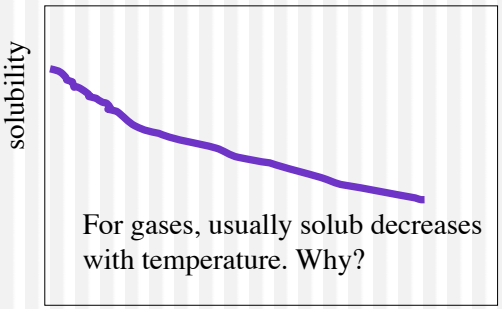
If more AgCl is added what happens to the solution?

Solubility vs T:(for solid solutes)



Because $\Delta H_{solution}$ is usually >0

Solubility vs T:(for gas solutes)



Because $\Delta H_{solution}$ is usually < 0

Examples: Temperature effect

Example: Trout live in cold mountain streams but not in warm lowland ponds. Why?

Trout require certain [O_2] to live. At lower temperatures, [O_2] is higher in the water. (depends on aquatic species)

Thermal pollution of rivers and lakes by industry.

Temperature rise in the water causes aquatic life to die.