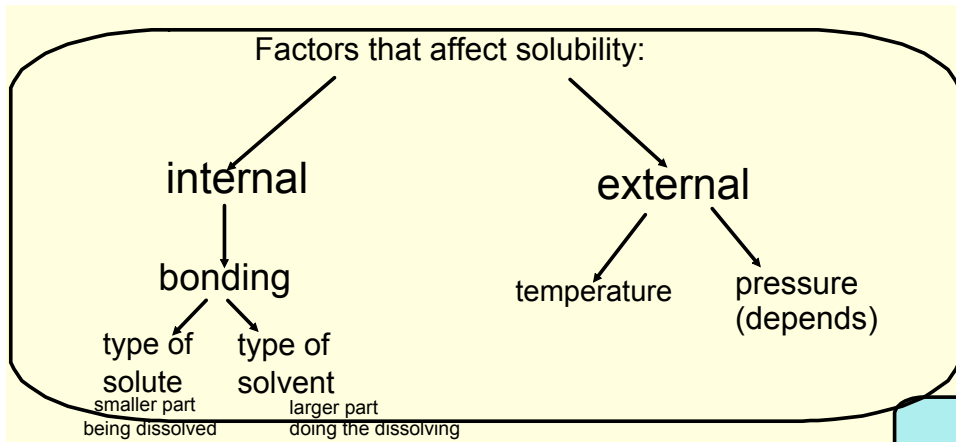


Why is a liquid a liquid?

Internal and external factors

Why do things dissolve?

What factors affect the solubility of solids and gases dissolved in liquids?

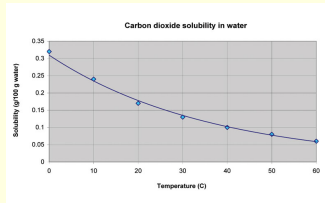
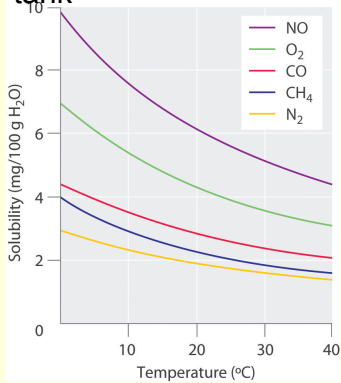


gas dissolved in liquid

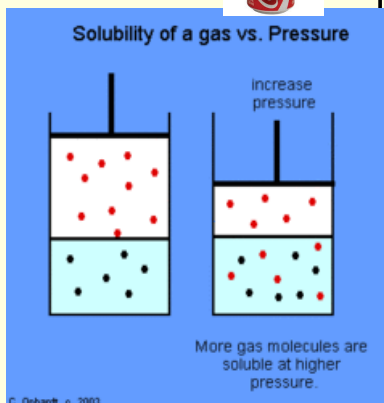
↑ temperature ↓ solubility
 ↑ pressure ↑ solubility



fish tank warm stream cold stream

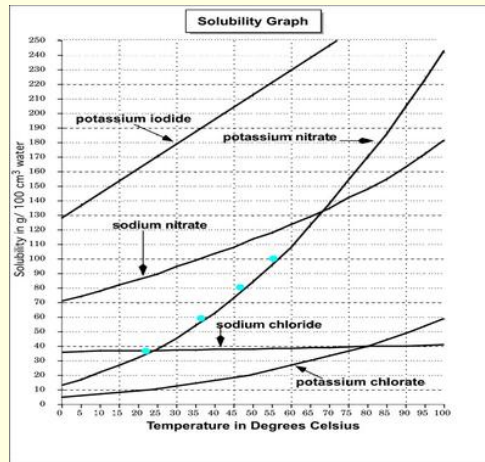
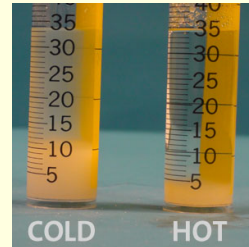


pressure



solid dissolved in liquid

↑ temperature ↑ solubility
 ↑ pressure solubility -no effect



solubility depends on
 type of solid/solvent and
 temperature

Which salt has the
 highest solubility at
 30°C?

KI

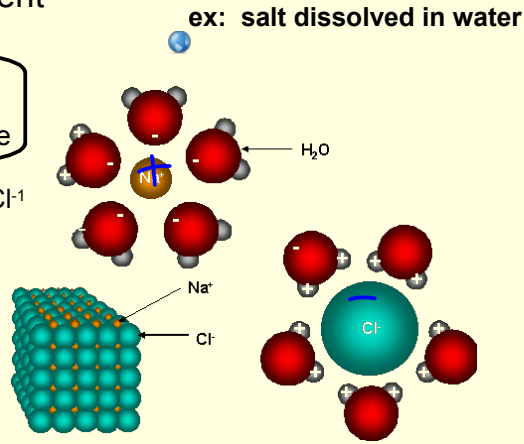
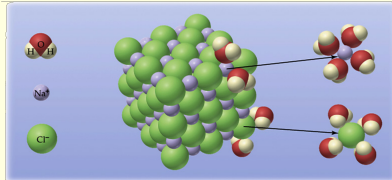
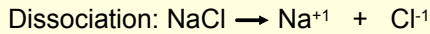
Internal factor - bond type affects solubility

Electrolytes Vs. Nonelectrolytes

Electrolytes:

a substance that dissolves in water to give a solution that conducts electric current

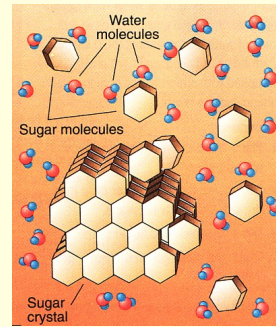
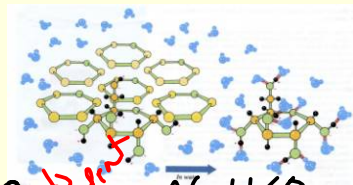
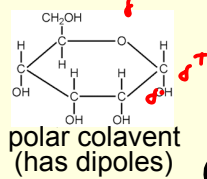
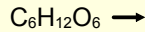
solute (ionic)
 -dissociates - breaks apart
 -water orients with ion charge



NonElectrolytes:

a substance that dissolves in water to give a solution that **does not** conduct electric current

solute (covalent)
 -does not dissociate, sugar stays "whole"
 -H₂O orients with polarity (if present)



O₂ → covalent

NaHCO₃

Na₂CO₃

How does O₂ dissolve?
 O_2
 covalent (does not dissociate)

How does NaHCO₃ dissolve?
 $\text{NaHCO}_3 \rightarrow \text{Na}^{+1} + \text{HCO}_3^{-1}$
 ionic

How does Na₂CO₃ dissolve?
 $\text{Na}_2\text{CO}_3 \rightarrow 2\text{Na}^{+1} + \text{CO}_3^{-2}$

all electrostatic interactions are governed by:

coloumbic attraction: $F = \frac{q^+ q^-}{d^2}$

Obj: Explain the meaning of "like dissolves like" in terms of polar and nonpolar

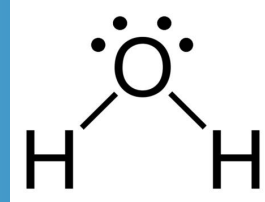
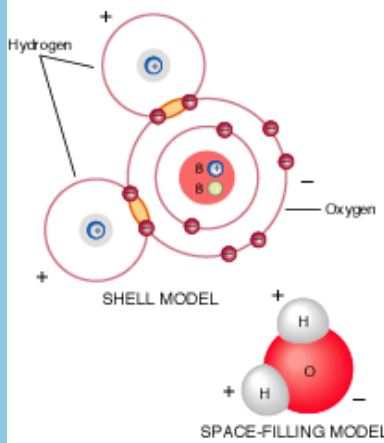
Water - the "universal solvent"

Structure of H₂O

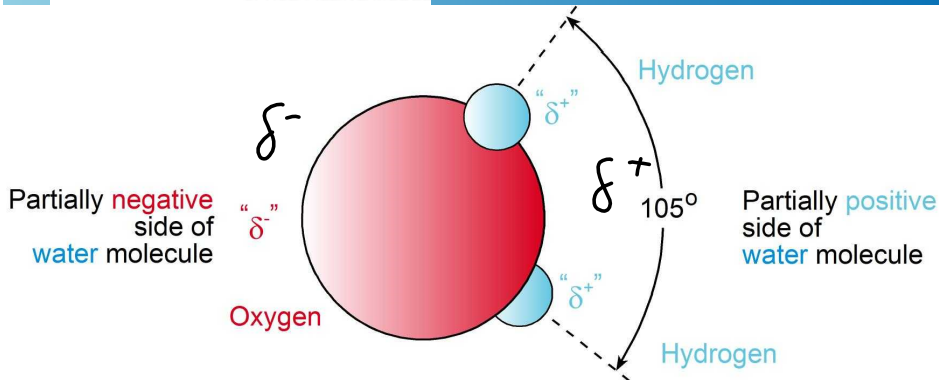
Hydrogens are 105° apart

Polarity of water:

- O -- partial negative charge
- H -- partial positive charge



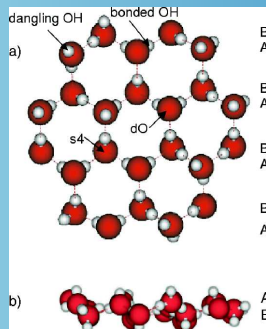
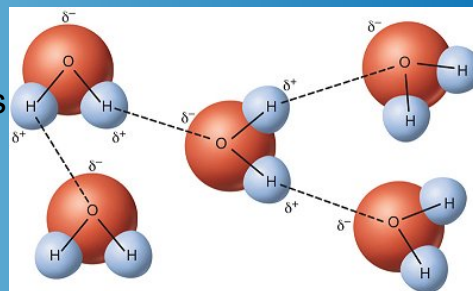
water is polar



Hydrogen bonding

in water, the hydrogen (partial positive) is attracted to the oxygen (partial negative)

- allows ionic substances to dissolve



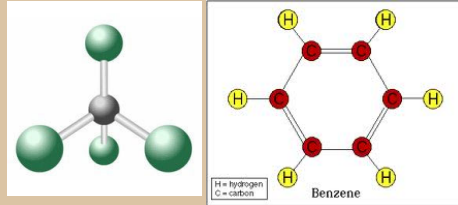
- affects boiling and melting point
- gives properties such as cohesion, adhesion, surface tension
- gives hexagonal arrangement in ice crystals

obj: I can Explain the meaning of "like dissolves like" in terms of polar and nonpolar

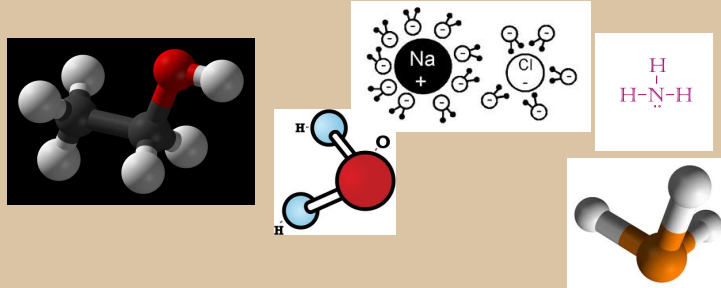
Solubility: "Like dissolves like"

Two substances with similar *intermolecular* forces are likely to be soluble in each other.

- **non-polar** molecules are soluble in **non-polar** solvents
 CCl_4 in C_6H_6



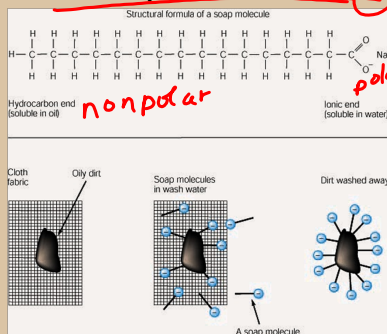
- **polar** (and ionic) molecules are soluble in **polar** solvents
 C_2H_5OH in H_2O , $NaCl$ in H_2O



coloumbic attraction: $F = \frac{q^+ q^-}{d^2}$

Molecules with polar and nonpolar ends:

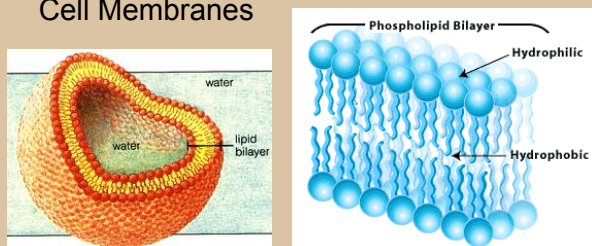
Soap



- Soap cleans oil and grease because
- one end --soluble in water
 - other end -- soluble in oil and grease.

Thus, the soap molecule provides a link between two substances that would otherwise be immiscible.

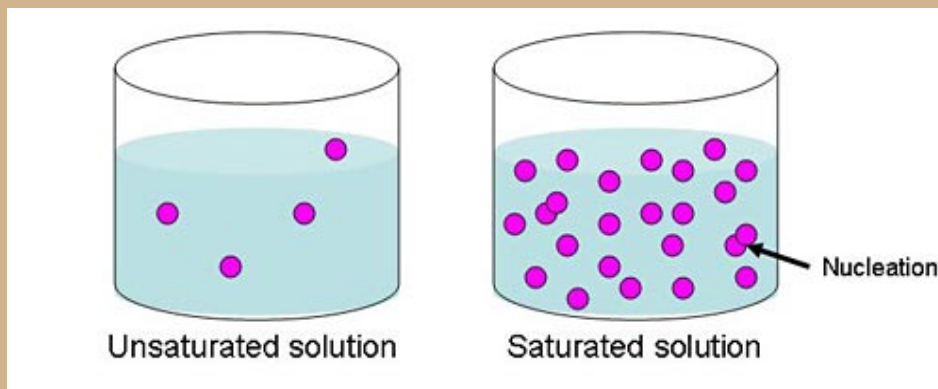
Cell Membranes



Solutions can be classified as **saturated** or **unsaturated**.

Saturated solution -- maximum quantity of solute that dissolves at that temperature.

Unsaturated solution-- less than the maximum amount of solute that can dissolve at a particular temperature



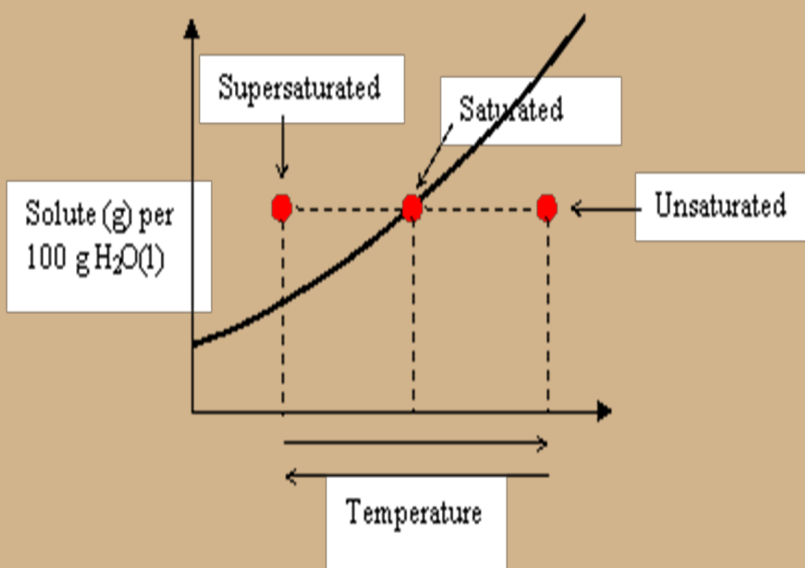
Nucleation is a physical process that occurs when parts of a solution start to precipitate out.

Supersaturated solution-- more than the maximum amount of solute

-unstable.

-2 ways:

- cool saturated solution
- Evaporate some of the solvent carefully

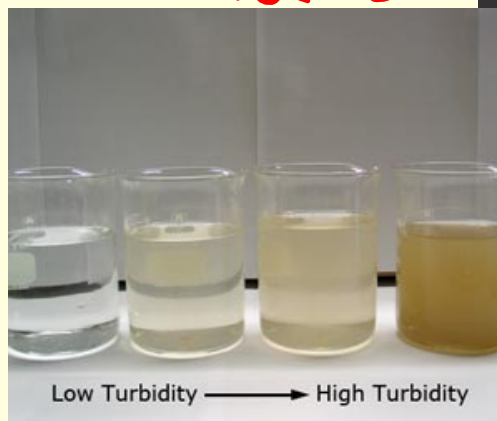
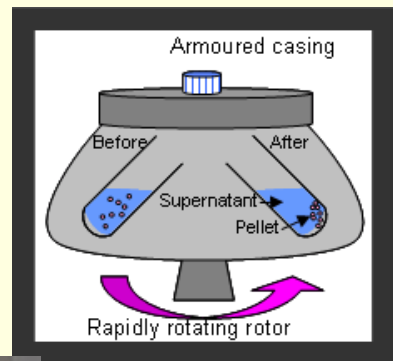
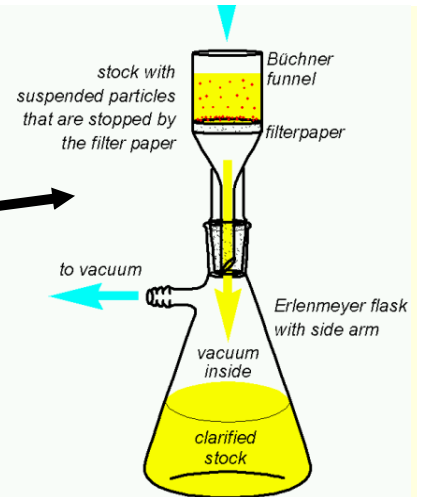


Solution properties

- can filter, clear, can have color
- will not settle-can centrifuge
- does not take up space
(fits between molecules)

suspension
will settle

100 mL H₂O
25 mL NaCl
102 mL



Attachments

watch.webloc