

# Physical Science

## Chapter 19 Acids & Bases

### Solutions and Suspensions

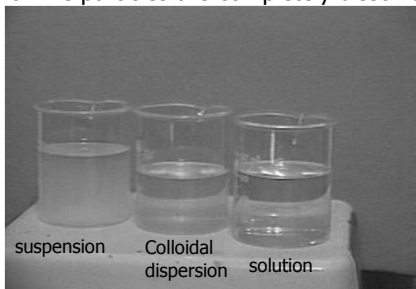
**Suspension** - the particles are temporarily suspended in the liquid & are large enough to collectively make the material appear cloudy. They will settle out after a while.

**Colloidal dispersion** - very small particles spread throughout the liquid which are large enough to reflect light, but not large enough to be seen individually. It may look either clear or cloudy in ordinary room light. The particles in a colloidal dispersion remain dispersed in the liquid and will not settle out.

A **solution**, on the other hand, will appear clear even when a light is shown through it. The particles are completely dissolved & never settle out.



A mixture of flour & water



suspension

Colloidal  
dispersion

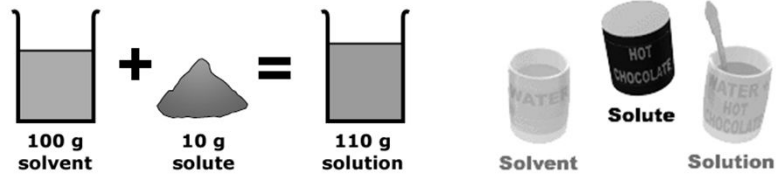
solution



Colloidal dispersion  
spreads the light out

## Solvents and Solutes

- Solvent – the part of the solution that is present in the largest amount
- Solute – the part of the solution present in the least amount



## Types of Solutions

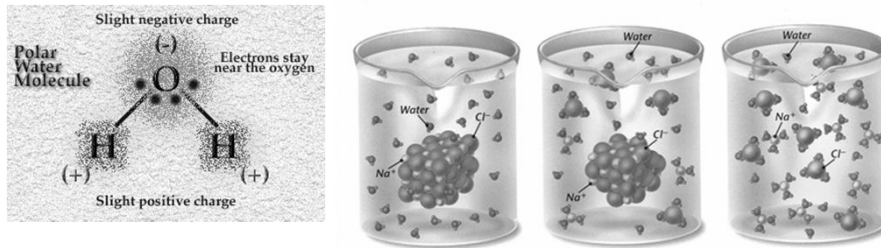
- Solutions can be made from different states of matter:

Solute	Solvent	Solution
Oxygen – gas	Nitrogen – gas	Air – gas
CO <sub>2</sub> – gas	Water – liquid	Soda Pop
Glycol – liquid	Water – Liquid	Antifreeze – liquid
Salt – solid	Water – liquid	Ocean water - liquid
Zinc – solid	Copper – Solid	Brass - Solid

Ding-a-ling: I would know this if I were you

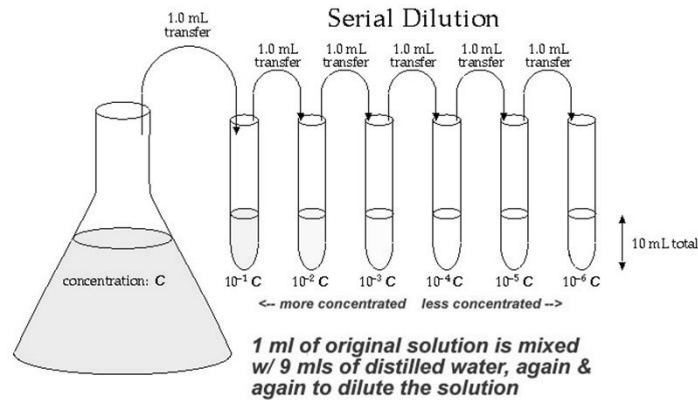
# Particles in solution

- Solute particles are separated from each other and are surrounded by solvent particles.
  - a. Water is polar and easily dissolves ionic compounds i.e. NaCl
  - b. Water can also dissolve many “nonpolar” particles because these particles may have a slight polar side of the molecule which allows the polar water to be attracted to these surfaces.
  - c. Remember that most molecular bonds are a gradient between pure ionic and pure covalent types of bonds.



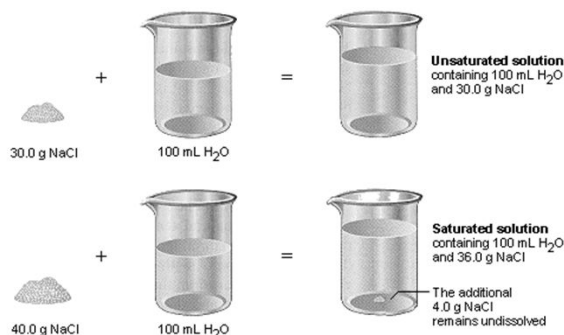
# Concentration

- a. Dilute – weak solution “less” solute present
- b. Concentrated – strong solution “more” solute present



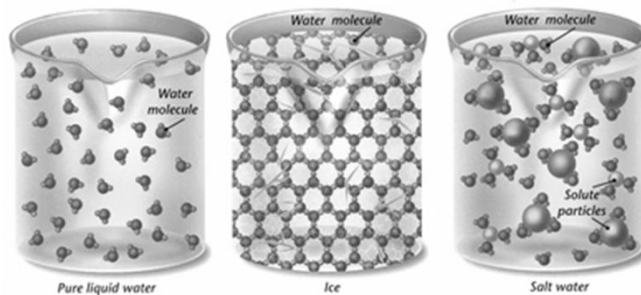
## Solubility

- Solubility – the amount of solute that will dissolve in a solvent at a given temperature.
- Saturated – point when no more solute can dissolve into the solvent at the given temperature
- Unsaturated Solutions - Generally speaking:
  - 1. Higher temperatures will allow more of a solid to dissolve into a liquid
  - 2. Higher temperatures will hold less gas in solution than colder temperatures



## Effects of Solutes on the Solvent:

- Increased concentrations of solute in a solution will lower the freezing point and increase the boiling point of the pure solvent



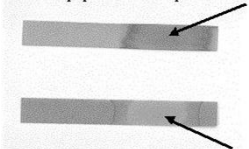
- i. Salt spread over icy roads to melt the ice and turn it into water
- ii. Salt placed into cooking water will increase the temperature of the water before it starts to boil, i.e. decreasing cooking time of pasta as it cooks in hotter water.

## Properties of Acids

- Properties of Acids – compounds that:
  - Release free Hydrogen ions into solution (H<sup>+</sup>)
  - Reacts with metals and carbonates
  - Turns blue litmus paper red
  - Tastes sour (never taste)
  - Are corrosive, eating away



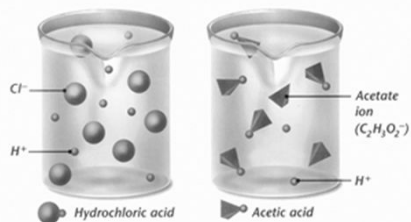
Red litmus paper with a drop of base here



Blue litmus paper with a drop of acid here



### Strong and Weak Acids in Solution



"Need-to-Know "Acids":

Hydrochloric	HCl
Nitric Acid	HNO <sub>3</sub>
Sulfuric Acid	H <sub>2</sub> SO <sub>4</sub>
Carbonic Acid	H <sub>2</sub> CO <sub>3</sub>



## Properties of Bases

- i. Bases are compounds that:
  - 1. Release hydroxide ions (OH<sup>-</sup>) into solution
  - ii. Has a bitter taste (never taste any solution unless told to do so)
  - iii. feels slippery
  - iv. Reacts with indicators like litmus by turning red litmus blue
  - v. has a pH greater than 7.0

