

## SOLUBILITY

**Solubility** – the amount of a substance that dissolves in a given quantity of solvent at a given temperature to produce a saturated solution (g solute/100g H<sub>2</sub>O at 25<sup>0</sup>C).

**Saturated Solution** – contains the maximum amount of solute for a given amount of solvent at a constant temperature.

**Unsaturated solution** – contains less solute than a saturated solution.

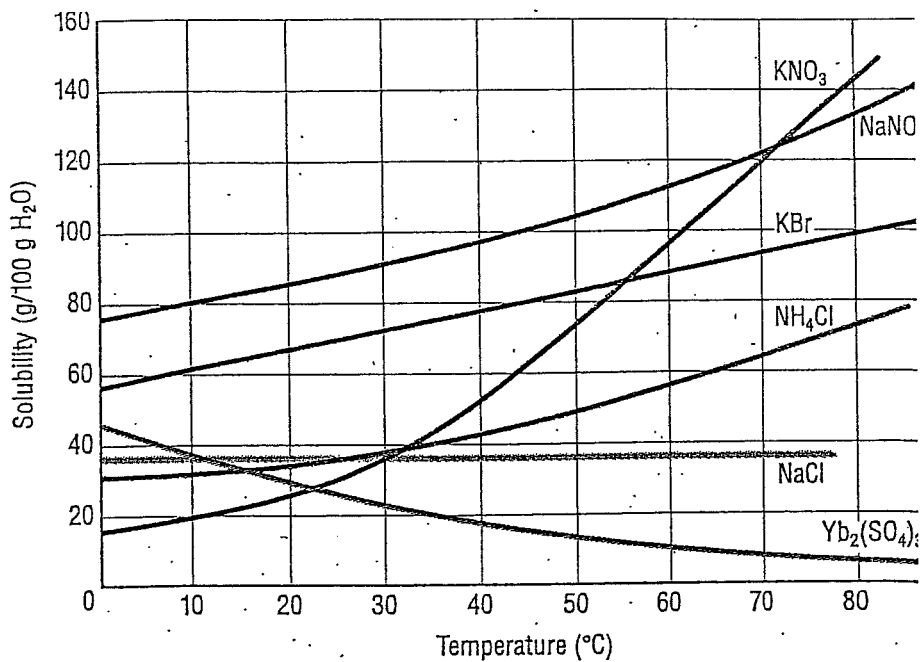
Two liquids are said to be **miscible** if they dissolve in each other eg water and ethanol.

Liquids that are insoluble in each other are said to be **immiscible**.

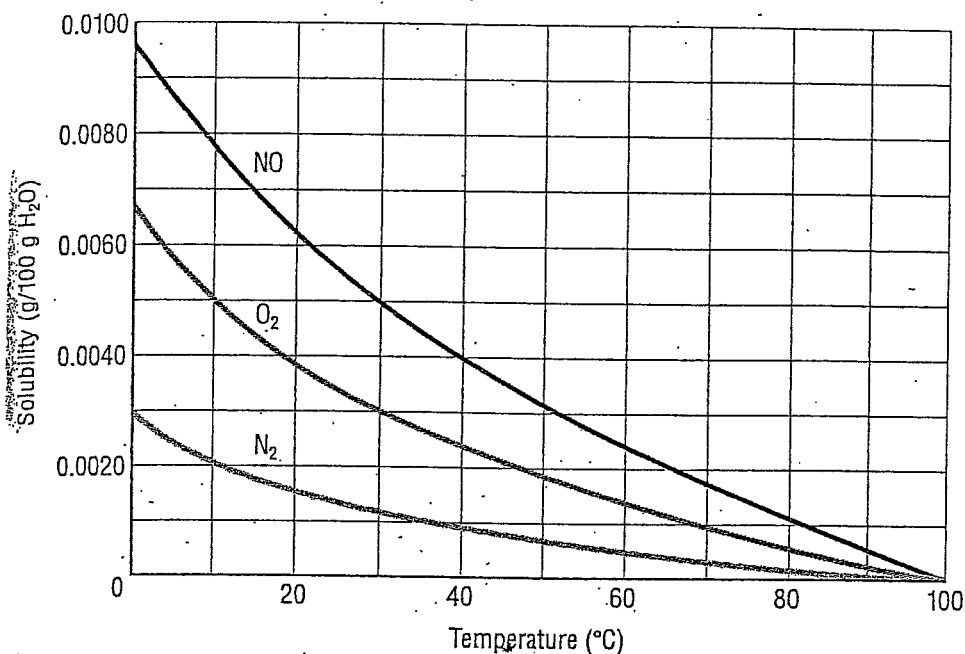
### Factors Affecting Solubility

Temperature

The solubility of most substances increases as the temperature of the solvent increases.



In a few cases the reverse occurs eg ytterbium sulfate. The solubility of most gases is higher in cold water than in hot water. Small bubbles forming in water before it boils are the dissolved atmospheric gases coming out of solution (mainly O<sub>2</sub> and N<sub>2</sub>).



### Pressure

The solubility of a gas is also affected by pressure. Gas solubility increases as the partial pressure of the gas above the solution increases eg carbonated beverages. These drinks contain dissolved CO<sub>2</sub> and are bottled under high pressure causing large amounts of CO<sub>2</sub> to go into solution. When the bottle is opened, the partial pressure of CO<sub>2</sub> above the liquid decreases, and the concentration of dissolved CO<sub>2</sub> decreases. Bubbles of CO<sub>2</sub> escape from the bottle and eventually the drink becomes flat.

**Henry's Law** – states that at a given temperature the solubility of a gas (S) is directly proportional to the pressure (P) of the gas above the liquid.

$$\frac{S_1}{P_1} = \frac{S_2}{P_2}$$

### Supersaturated

A solution that contains more solute than it should theoretically continue to hold at a given temperature is called supersaturated.

Scientific rainmaking is done by seeding clouds which contain air supersaturated with water vapour. Tiny silver iodide crystals are dusted onto a cloud to seed it. Water molecules are attracted to the ionic particles and come together forming droplets which act as seeds for other water molecules.