Solutions

Solution: a mixture that is mixed at the molecular or atomic level, homogeneous, variable composition

Solvent: the component of a solution that is present to the greatest extent, often is water – the universal solvent.

Solute: any component in a solution that is present to a lesser extend than the solvent.

Variable Composition: the components in the solution can have easily variable concentrations.

Aqueous Solution: solution in water (water = aqua)

Miscible: two liquids that can mix in any proportion to form a solution (homogeneous)

eg alcohol and water

eg gas and oil

Immiscible: two liquids that cannot be mix together, form separate layers (heterogeneous)

eg oil and water

eg gasoline and water

Alloy: solid metallic solution, made by melting the component metals, stirring and solidifying (cooling)

Amalgam: alloy of mercury (usually a soft and very workable alloy – used for teeth)

Solution Types:

Unsaturated: could easily dissolve more of a given solute

Saturated: cannot dissolve more solute no way no how, full

Supersaturated: has more solute than is normally possible, beyond saturated (require warming and cooling cycles to produce), unstable, in need of precipitate formation.

Like Dissolves Like

In order for a solution to form:

- attractive forces between solute particles must be broken or overcome (against solution formation), requires energy input
- attractive forces between solvent particles must be broken or overcome (against solution formation), requires energy input
- new forces of attraction form between solvent and solute (for solution formation), energy releasing process – referred to a replacement forces

For a solution to form:

replacement forces > forces overcome

In order to the above condition to be met, solvent and solute particles must be similar in polarity – **LIKE DISSOLVES LIKE**

	water (polar)	hexane – C_6H_{14} (non-polar)
salt – NaCl (so polar that it is ionic)	good solubility	insoluble
wax – $C_{50}H_{102}$ (non-polar)	insoluble	good solubility

- if the solute and solvent have similar properties (i.e. polarity) there is a good chance solubility will be high