

DIFFUSION:

The term used to describe the spreading of a substance unaided in all directions, from an area of **high concentration** of the substance to an area of **low concentration** of the substance. Since it is a natural process that does not need external energy to occur, it is said to be spontaneous.

The particle theory can be used to explain the concept of diffusion:

Example 1: The odour of a gas spreads slowly and unaided throughout a still room.

- the odour-causing gas particles are far apart and move rapidly in straight lines until they collide with other air particles in the room
- the odour-causing gas particles collide with air particles and bounce off in different directions
- this causes the gas particles to become randomly scattered throughout the room
- gas molecules move very very fast -- this causes huge spaces between them, and therefore a lot of room for diffusion of other gas molecules to occur

Example 2: The colour and taste of tea leaves spread throughout a pot of hot water faster than they do in a glass of ice water.

- the particles of a liquid are in motion, but are closer together and slower than those of in a gas
- the particles in the tea cannot move very far without bumping into neighbouring water particles
- therefore, the particles in the tea spread out slowly
- in hot water, the heat energy from the water causes the particles to move faster
- when the temperature of the liquid is increased, the heat energy of the liquid would increase, and the liquid molecules would be moving much faster -- when these particles move faster they collide harder into one another causing the distances between them to increase, and thus more room for the other liquid particles to move into these spaces
- if the water was cold, the spaces between the particles would be smaller
- then it would be more difficult for the tea particles to move into the spaces of closer water particles

Example 3: Diffusion does not occur in most solid systems.

- the attractive forces between solid molecules are very strong, which makes them hardly move at all -- this causes the spaces between the molecules to be very very small, therefore most particles of one solid are unable to move into particles of another solid
- most particles of one solid are unable to diffuse into the spaces between particles of another solid because they are so small