Fundamental assumptions of kinetic theory of gases

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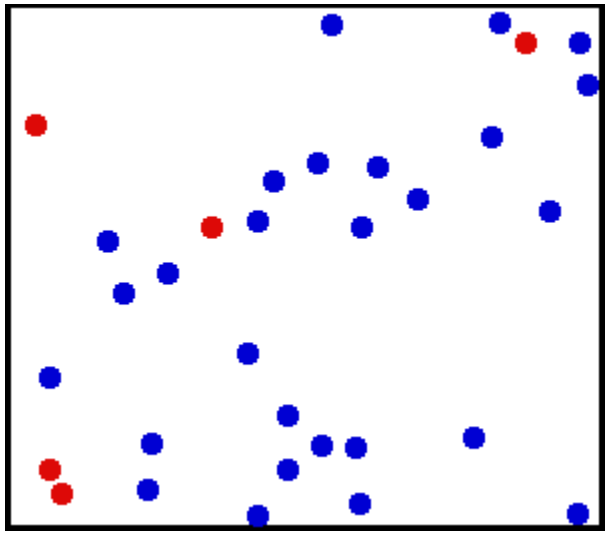
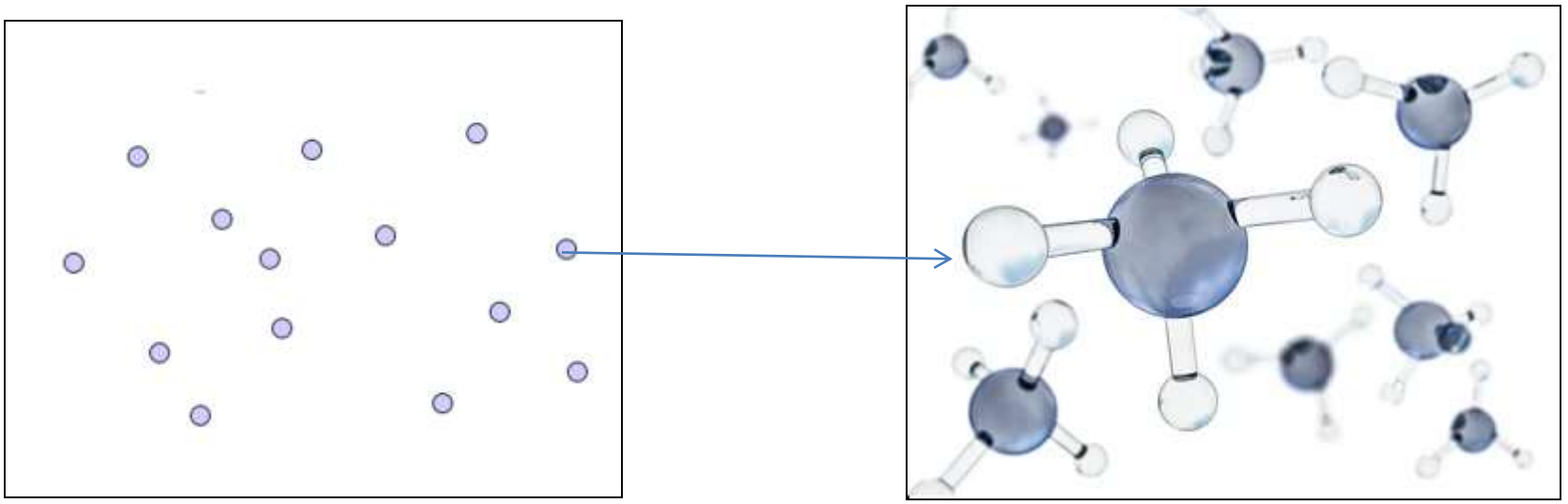
Kinetic Theory of Gases



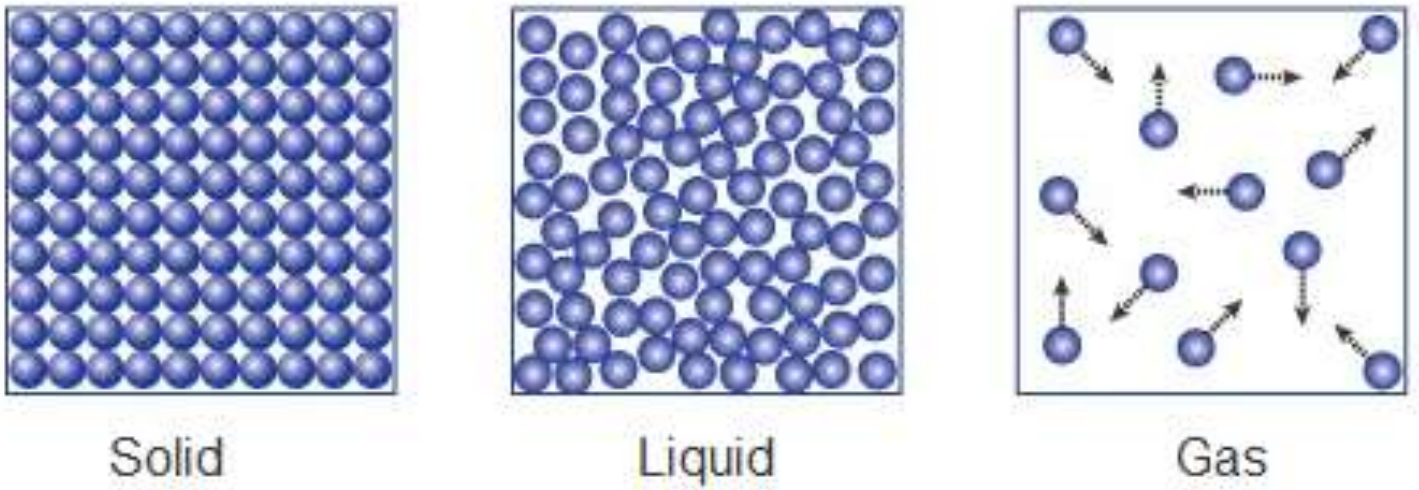
The continuous collision of the molecules of the gas with the walls of the containing vessel and their reflection from the walls results in the change of momentum of the molecules. According to Newton's second law of motion (F=dp/dt), the rate of change of momentum per unit area of the wall surface corresponds to the force exerted by the gas per unit area. The force per unit area measures the pressure of the gas.

Postulates of Kinetic theory of gases

(i). The gas is composed of small indivisible particles called molecules. The properties of the individual molecules are the same as that of the gas as a whole.

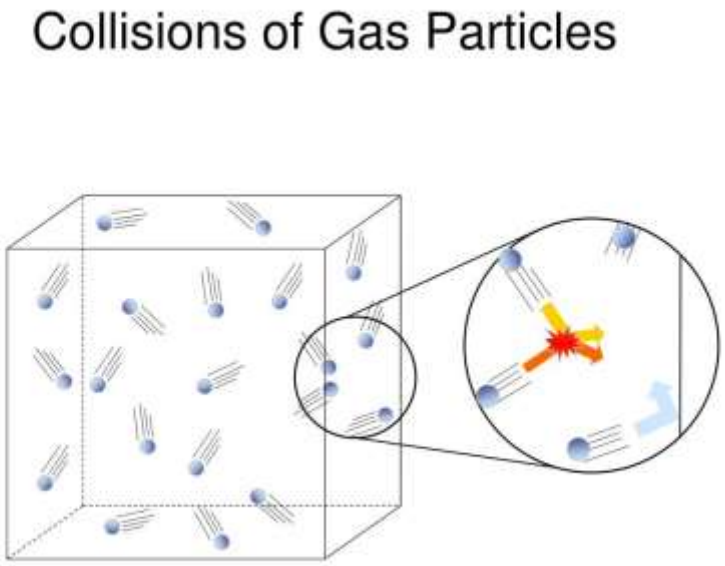


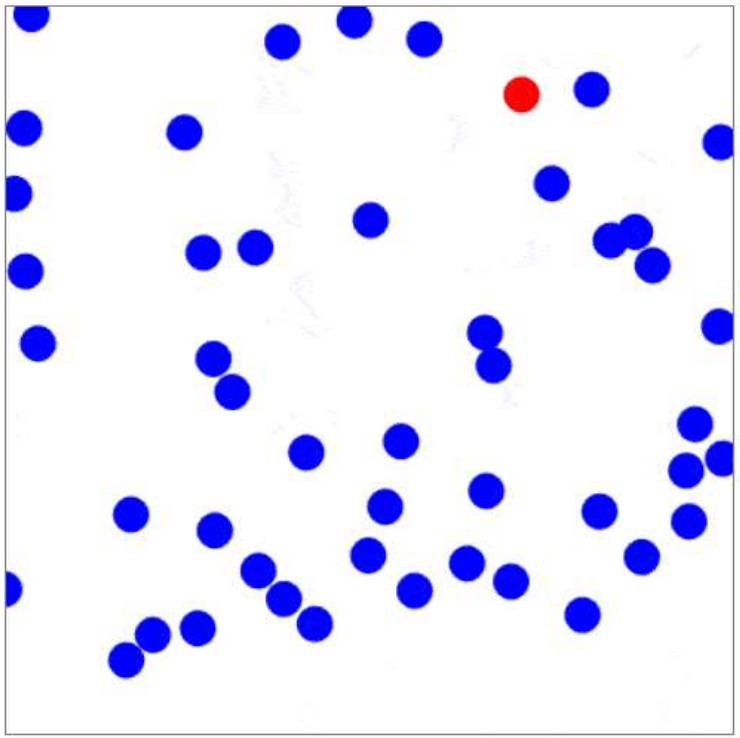
(ii). The distance between the molecules is large as compared to that of a solid or liquid and hence the forces of intermolecular attraction is negligible



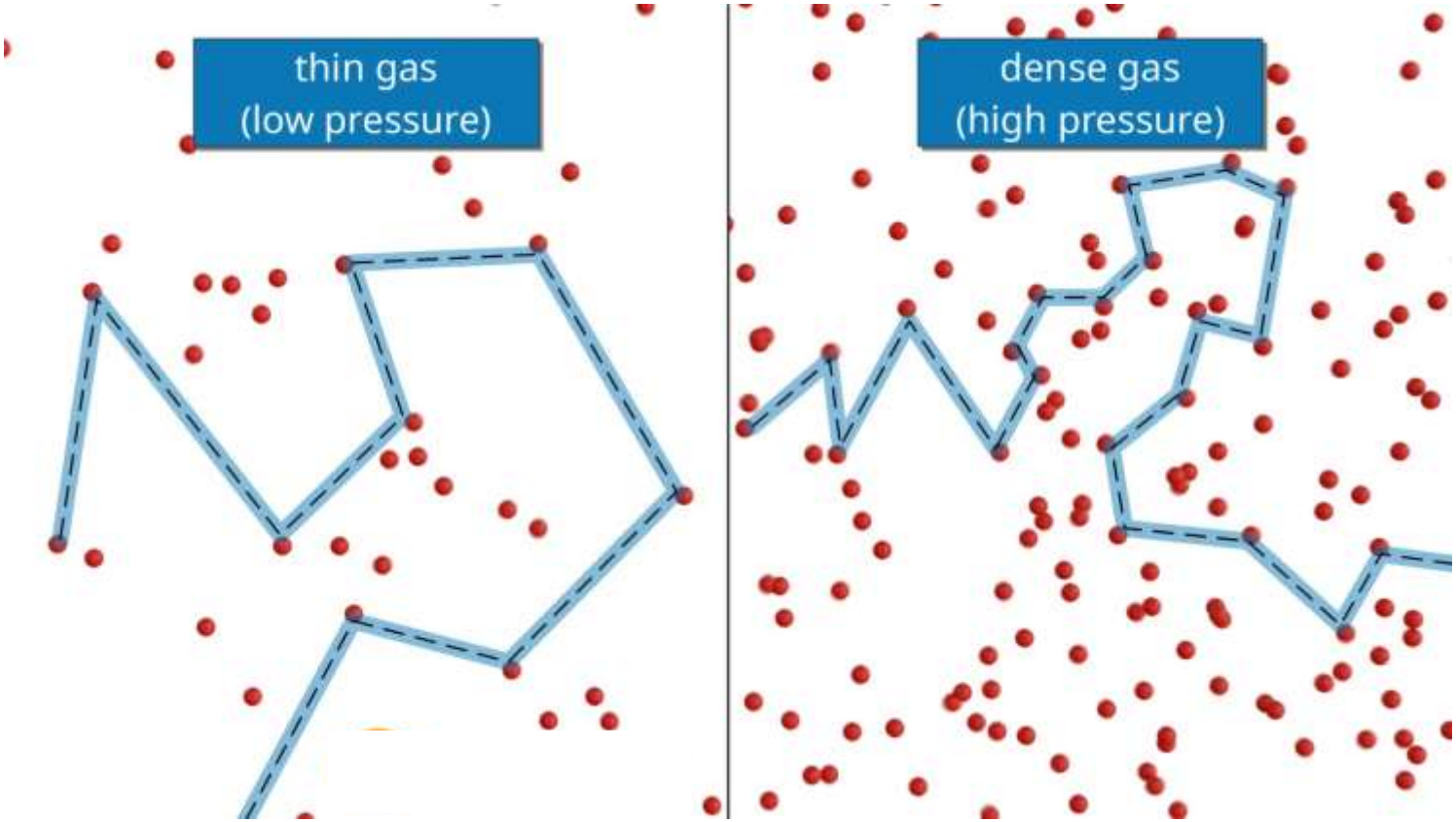
(iii). The are continuously in motion with varying velocities and the molecules move in a straight line between any two consecutive collisions. The collisions do not alter the density of gas.

ie. Same no.s in unit volume and no accumulation





(iv). The size of the molecules is infinitesimally small as compared to the average distance traversed by a molecule between any two consecutive collisions is called *free path* and the average distance is called *mean free path*. The mean free path is dependent on the pressure of the gas. If the pressure is high the mean free path is less and if the pressure is low the mean free path is more.



(v). The time of impact is negligible in comparison to the time taken to traverse to the free path.

(vi). The molecules are perfectly hard elastic spheres and the whole of the energy is kinetic.