

Paper : Physical Chemistry (IA)

Topic : Physical Properties of liquids.

Dr. Om Prakash Singh
Department of Chemistry,
Maharaja College, Ara.

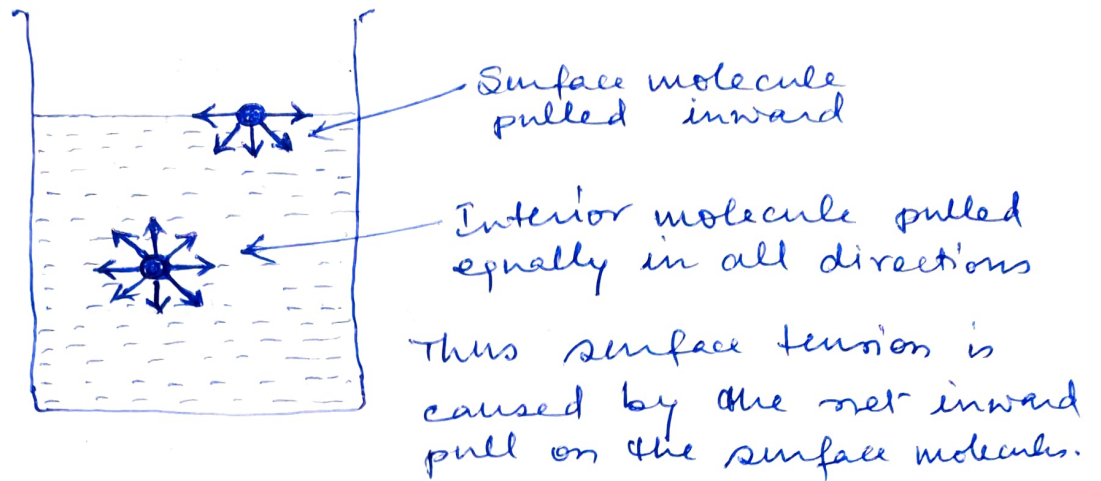
----- continued from page (09)

Surface Tension

This property of liquids arises from the inter-molecular forces of attraction. A molecule in the interior of a liquid is attracted equally in all directions by the molecules around it. A molecule in the surface of a liquid is attracted only sideways and toward the interior. The forces on the sides being counterbalanced the surface molecule is pulled only inward the liquid. Thus there is a tendency on the part of the surface molecules to go into the bulk of the liquid. The liquid surface is, therefore, under tension and tends to contract to the smallest possible area in order to have the minimum number of molecules at the surface. It is for this reason that in air, drops of a liquid assume spherical shapes because for a given volume a sphere has the minimum surface area.

The surface tension (γ) is defined as the force in dynes acting along the surface of a liquid at right angle to any line 1 cm in length.

Besides the symbol of surface tension γ (gamma) ⁽¹¹⁾ alternate symbols are also used and they are σ (sigma) or τ (tau).



The inward forces on the surface molecules minimise the surface area and form a drop.

Unit of Surface Tension :- The unit of surface tension in cgs system is dynes per centimetre (dyne cm^{-1}). In SI system the unit is Newton per metre (Nm^{-1}) (i.e. the force per unit length). Both these units are related to :

$$1 \text{ dyne cm}^{-1} = 1 \text{ m Nm}^{-1}$$

Effect of Temperature on Surface Tension :-

A change in temperature causes a change in surface tension of a liquid. When temperature increases, there is an increase in kinetic energy of liquid molecules, thereby decreasing inter-molecular forces. It results in decrease in the inward pull functioning of the surface of the liquid. In other words, surface tension decreases with increase in temperature.

to be continued.....