Science Class 9 Notes – Properties of Fluids

1. Thrust and pressure : The force applied on a surface in a direction perpendicular (or normal) to the surface is called thrust.

(i) When a body is placed on a horizontal surface, it exerts a thrust equal to its weight on the surface.

(ii) A body resting on a horizontal surface will exert the same thrust irrespective of its orientation. The S.I. unit of thrust is newton (N).

Pressure : Force per unit area of the surface acting in a direction perpendicular (or normal) to it is called pressure (P). If F is the force acting perpendicularly on a surface having an area A, then

Pressure = (Force acting normally on the surface)/(Area A of the surface)

$P = F/A$

The S.I. unit of pressure is Newton per metre square (Nm^{-2}). Another name for the S.I. unit of pressure is pascal (Pa). $1\ Pa = 1\ Nm^{-2}$

2. Pressure in fluids : A substance which can flow is called a fluid. All liquids and gases are thus fluids.

3. Buoyancy : The tendency of a fluid to exert an upward force on a body immersed partly or wholly in it is called buoyancy.. The resultant upward force experienced by a body when immersed in a fluid is called buoyant force or upward thrust.

4. Apparent loss of weight of a body immersed in a liquid : If you weigh a body in air and next when it is immersed in water (or in any other liquid), then you will find an apparent loss in weight of the body. Loss in weight is equal to upward thrust of the liquid on the body, or

Loss in weight = upthrust of the liquid

5. Principle of floatation : When the buoyant force on a body lowered in a liquid is equal to the weight of the body, the apparent weight of the body is zero and the body floats on the surface of the liquid. Submarines are also based on Archimedes' Principle, are ships that can submerge in water and travel underneath.

6. Archimede's principle : When a body is immersed fully or partially in a fluid, it experiences an upward force that is equal to the weight of the fluid displaced by it.
Applications of Archimede's principle : Archimede's principle is applied for

(a) determination of density and relative density of substances and

(b) the design of ships and submarines

7. Relative Density : Relative density of any substance is its density relative to that of water.

Mathematically,

Relative density of a substance

= (Density of the substance)/(Density of water)

Relative density is a pure number. It has no units. We know, density of a substance

= (Mass of the substance)/(Volume of the substance)

So, we can write

Relative density of a substance Relative density of a substance

= (Mass of the substance/volume of the substance)/(Mass of water/volume of water)

If the volume of the water is same as that of the substance

Relative density of a substance

(Mass of the substance/volume of the substance)/(Mass of water/volume of water)

If the volume of the water is same as that of the substance

= (Mass of the substance)/(Mass of same volume of water)

Relative density of a solid can be determined by Archimecje's principle.