

Buoyant Force

⇒ Whenever a body is immersed partially or completely inside a fluid, it experiences an upward force.

⇒ This upward force is called the buoyant force or upthrust, whereas the property of the fluids to apply upward force on the body immersed in it is called buoyancy.

⇒ It is due to the buoyant force (upthrust) that a body submerged partially or wholly in a fluid appears to lose its weight i.e., appears to be lighter.

When a body is immersed in a liquid, two forces act on it:

⇒ W_1 = Weight of the body which act vertically downward.

= True weight of the body

$\Rightarrow W_a = \text{Upthrust}$
 $= \text{Buoyant force}$
 $= \text{Upward force applied by the liquid on the body.}$

Factors On Which The Buoyant Force Depends

The buoyant primarily depends on two factors:-

- \Rightarrow The volume of the body immersed i.e., volume of the fluid displaced.
- \Rightarrow The density of the fluid.

Due to the upthrust, the body appears to be lighter and its weight appears to be its true weight minus the buoyant force.

Apparent weight of the body

$$= \text{Its true weight} - \text{buoyant force}$$

$$= W_1 - W_2$$

$$\text{Apparent weight} = \text{True weight} - \text{Buoyant Force}$$

Buoyant Force = True Weight - Apparent Weight

Buoyant Force = Loss in Weight

Archimedes Principle

The buoyant force primarily depends on two factors :-

⇒ The volume of the body immersed i.e., volume of the fluid displaced.

⇒ The density of the fluid.

$W_1 - W_2$ = Buoyant force when cube is immersed in water.

$W_1 - W_3$ = Buoyant force when cube is immersed in salt solution.

As shown above,

W_1 = Weight of cube in air

W_2 = Weight of cube in water

$W_1 - W_2 = \text{Loss in weight of cube in water}$

$W_1 - W_3 = \text{Loss in weight of cube in salt solution}$

$\text{Weight} = V \rho g$

Loss in weight = Upthrust.
= Upward Force.
= Weight of fluid displaced.

Principle of Floatation

A body floats in a liquid if the weight of the body is equal to the weight of the liquid displaced by it.

Whenever we place a body in a liquid, two forces act on it.

⇒ Weight of the body W_1 acting vertically downwards

⇒ Buoyant force or upthrust W_2 acting vertically upwards.