

THEORY

When a body is placed in a liquid, it experiences an upward force called buoyant force.

This force is equal to the weight of the liquid displaced by the body.

Mathematically, $F_b = \rho_l V g$

where F_b is the buoyant force, ρ_l is the density of the liquid, V is the volume of the liquid displaced, and g is the acceleration due to gravity.

When a body is fully submerged in a liquid, the volume of liquid displaced is equal to the volume of the body.

Therefore, the buoyant force acting on a fully submerged body is given by:

$$F_b = \rho_l V_b g$$

where V_b is the volume of the body.

When a body is partially submerged in a liquid, the volume of liquid displaced is less than the volume of the body.

Therefore, the buoyant force acting on a partially submerged body is given by:

$$F_b = \rho_l V_{sub} g$$

where V_{sub} is the volume of the body submerged in the liquid.

The buoyant force acts through the center of buoyancy, which is the center of mass of the displaced liquid.

When a body is in equilibrium in a liquid, the buoyant force is equal to the weight of the body.

Mathematically, $F_b = W$

where W is the weight of the body.

When a body is in equilibrium in a liquid, it is said to be neutrally buoyant.

When a body is in equilibrium in a liquid, it is said to be positively buoyant if the buoyant force is greater than the weight of the body.

When a body is in equilibrium in a liquid, it is said to be negatively buoyant if the buoyant force is less than the weight of the body.

The buoyant force is a vector quantity and acts vertically upwards.

The weight of a body is a vector quantity and acts vertically downwards.

When a body is in equilibrium in a liquid, the net force acting on it is zero.

Therefore, the buoyant force and the weight of the body are equal in magnitude and opposite in direction.

This is the principle of buoyancy.

It is the reason why objects float or sink in a liquid.

The buoyant force is also the reason why we feel lighter when we are in a swimming pool.

The buoyant force is also the reason why ships float on water.

EXPERIMENT

Aim: To determine the buoyant force acting on a fully submerged body.

Apparatus: Spring balance, beaker, water, solid body, thread.

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The buoyant force is also the reason why balloons rise in the air.

The buoyant force is also the reason why hot air balloons rise in the air.

The buoyant force is also the reason why helium balloons rise in the air.

The buoyant force is also the reason why airships rise in the air.

The buoyant force is also the reason why blimps rise in the air.

The buoyant force is also the reason why dirigibles rise in the air.