

THEORY

When a body is placed in a fluid, it experiences an upward force called buoyant force. This force is equal to the weight of the fluid displaced by the body. If the buoyant force is greater than the weight of the body, the body will float. If the buoyant force is less than the weight of the body, the body will sink. If the buoyant force is equal to the weight of the body, the body will be suspended in the fluid.

The buoyant force is given by the equation:

$$F_b = \rho_f V_d g$$

where F_b is the buoyant force, ρ_f is the density of the fluid, V_d is the volume of fluid displaced, and g is the acceleration due to gravity.

For a body to float, the buoyant force must be equal to the weight of the body. This can be expressed as:

$$\rho_f V_d g = \rho_b V_b g$$

where ρ_b is the density of the body and V_b is the volume of the body. Simplifying this equation, we get:

$$\rho_f V_d = \rho_b V_b$$

This equation shows that the volume of fluid displaced is proportional to the volume of the body and the ratio of the densities of the body and the fluid.

For a body to sink, the buoyant force must be less than the weight of the body. This can be expressed as:

$$\rho_f V_d g < \rho_b V_b g$$

Simplifying this equation, we get:

$$\rho_f V_d < \rho_b V_b$$

This equation shows that the volume of fluid displaced is less than the volume of the body and the ratio of the densities of the body and the fluid.