

9TH CLASS

➤ Buoyancy:

1. Definition:

Buoyancy is the upward force exerted by a fluid (liquid or gas) on an object immersed in it. This force opposes the weight of the object and allows it to float.

2. Archimedes' Principle:

The buoyant force acting on an object in a fluid is equal to the weight of the fluid displaced by the object. This principle was discovered by the ancient Greek scientist Archimedes.

3. Buoyant Force Equation:

The buoyant force (B) can be calculated using the formula: $B = \rho \cdot V \cdot g$ where

- ρ is the density of the fluid,
- V is the volume of the fluid displaced by the object,
- g is the acceleration due to gravity.

4. Floating and Sinking:

- An object will float in a fluid if its density is less than the density of the fluid.
- An object will sink in a fluid if its density is greater than the density of the fluid.

5. Apparent Loss of Weight in a Fluid:

When an object is submerged in a fluid, it experiences an apparent loss of weight equal to the weight of the fluid it displaces.

6. Factors Affecting Buoyancy:

- **Density:** Objects with lower density than the fluid will float.
- **Volume:** Increasing the volume of an object increases its buoyant force.
- **Gravity:** The strength of the gravitational field affects the buoyant force.

7. Applications:

- **Ship Design:** Understanding buoyancy is crucial for designing ships that can float and carry heavy loads.
- **Hot Air Balloons:** The principle of buoyancy is applied in hot air balloons, where the hot air inside the balloon is less dense than the surrounding air.
- **Submarines:** Buoyancy is manipulated to control the depth of submarines by adjusting their ballast tanks.

8. Buoyancy and Gases:

- Gases exhibit buoyancy as well. For example, helium balloons rise in the air because helium is less dense than the surrounding air.

9. **Buoyancy in Chemistry Labs:**

- Understanding buoyancy is essential in laboratory experiments involving liquids to ensure accurate measurements.