

CHAPTER 08

FLOATING BODIES

Explanation of floating and sinking of objects:

Generally, the bodies whose relative density is more than 1 sink in water. But this is not true in all cases, sometimes substances with relative density > 1 also float.

Consider an example of aluminium, if we take small sheet of aluminium foil and folded into small volume will sink into water whereas the same foil taken in the form of a bowl will float on the surface of water.

Why it is so?

Because, in the first case volume is less therefore

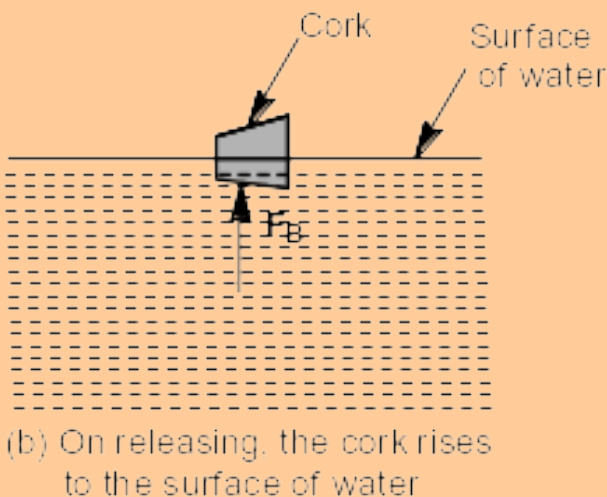
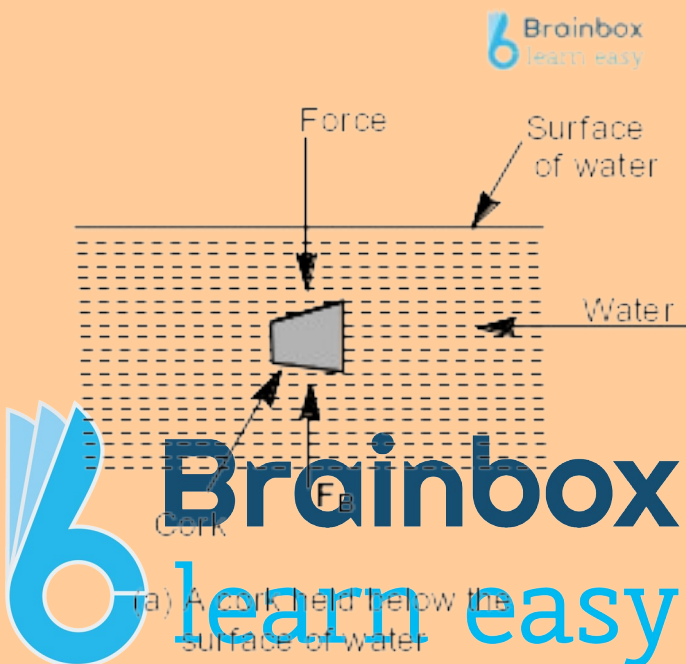
density increases $\left[\because d \propto \frac{1}{V} \right]$ hence sinks. But in the case of bowl, volume is more therefore floats.

This phenomenon can be well explained with the help of a concept called Buoyancy or Upthrust.

Upward force in liquids:

Buoyancy of Upthrust:

The tendency of a fluid to exert an upward force on a body immersed partly or wholly in it is called buoyancy. The upward force experienced by a body when immersed in a fluid is called buoyant force F_B or upthrust.



Factor affecting Buoyancy:

The magnitude of buoyant force depends upon the following factors.

Size or Volume of the body immersed in a fluid:

The buoyant force is directly proportional to the size or volume of the body immersed in a fluid. That is,
(Buoyant force (or upthrust) $\propto$ Volume of the body immersed in a fluid)

Thus, larger the size or volume of the body immersed in a fluid, greater is the buoyant force (or upthrust) acting on the body.

Density of the fluid in which the body is immersed:

The buoyant force (or upthrust) is directly proportional to the density of the fluid in which the body is immersed. That is,
(Buoyant force (or upthrust) $\propto$ Density of the fluid in which it is immersed)

Thus, greater is the density of the fluid in which the body is immersed, greater is the buoyant force acting on the body.

Acceleration due to gravity at the place:

The buoyant force (or upthrust) is directly proportional to the acceleration due to gravity at the place of measurement. That is,
(Buoyant force (or upthrust) $\propto$ Acceleration due to gravity)

Thus, a body when immersed in the same liquid will experience lesser buoyant force on the moon than on the earth.

Temperature:

The buoyant force (or upthrust) is inversely proportional to the temperature of the fluid in which the body is immersed. That is,

$$(\text{Buoyant force (or upthrust)}) \propto \left(\frac{1}{\text{Temperature of the fluid}} \right)$$

This is because an increase in temperature decreased density of the fluid.

