# Archimedes principle

Archimedes’ principle states that a body that has been immersed in a fluid is buoyed up by a force that is said to b equal to the weight of the fluid that has been displaced. This principle is applicable to both submerged and floating bodies and to all fluids in general. Fluids here refer to both gases and liquids. Buoyancy is this force that is exerted by a fluid that counteracts the weight of the object (Pickover, pp. 12-23). In a fluid column, the pressure increases with the depth of the fluid occasioned by the weight of the overlying liquid or gas. Therefore, a fluid column or an object submerged in a given fluid will experience a greater pressure at the base than at the top. The difference in the pressure amounts to a net force that accelerates the object in the fluid upwards. The magnitude of the upward force is equivalent to the difference between the bottom and the top of the column. This is also equivalent to the fluid weight that would otherwise occupy the column.

While Archimedes principle asserts that the volume of the water displaced from a container when an object is immersed in it is equal to the volume of that object, buoyancy is the weight of that displaced fluid. Archimedes and buoyancy explain the reason why ships float as well as the balloon rise in air as well as the apparent weight loss of objects when they are under water. Therefore, both Archimedes’ principle and buoyancy are backed by Newton’s third law of motion where the mutual forces of action and reaction that exist between two bodies are equal but opposite and collinear (Pickover, pp. 12-23). For the Archimedes’ principle, an object being immersed in a container full of fluid only displaces fluid volume equal to its volume. The up-thrust is an equal but opposite reaction to the weight of the object being immersed. The force that the fluid exerts in reaction to the weight of the object is

exactly equal to the weight of the object. Therefore, Archimedes' principle and buoyancy are based on the law of equal forces acting and reacting in opposite directions.

Both these physical laws are used to explain the law of floatation or in the process of making objects to float on fluids. This is most applicable in fabrication of sea vessels like ships and boats. The law of floatation states that when a body floats, it exactly displaces its own specific weight. The ability of a substance to float after it has been placed in a fluid is known as the buoyant force. This is closely related to density. When an object's density is less compared to the density of the fluid, it is most likely going to float. An object will however sink if it is denser than the fluid (Pickover, pp. 12-23). This is what explains the reason as to why some objects will float on fluid substances while others will sink. For instance, wood floats on a fluid substance like water due to its low density whereas steel sinks due to its high density.

Despite being denser than water, steel ships have been found to float on water. The combined effects of Archimedes' principle and buoyancy have been used make large steel cruise ships float on water. To make steel ships float on water, there is a very tremendous volume of space filled up with air at the ship base that accounts for this. Even though steel is denser than water, the air contained in the tremendous space beneath the ship is of low density compared to water. Therefore, the metal ships can float since their absolute density is less than the density of the water on which they float. To balance these forces, the air bag beneath the ships should be under a tight enclosure. If the enclosure accidentally leaks, water will sip in and replace

the air in the hull of the ship (Pickover, pp. 12-23). The Archimedes' principle and buoyancy forces will take their natural courses and thus the ship will definitely sink. This happens so because the absolute density of the ship changes hence interfering the state of balance and floating that had been facilitated by the air in the ship's hull.