

Characteristics of fluid due to pressure difference

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Abstract

This research paper is on pressure and why pressure is on earth. We will discuss on below topic:-

1. Gravitational force and pressure
2. Pressure difference
3. Why solid-solid is not mixed in each other
4. Why oil float on water

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I. Introduction

We can walk, jump, run but we can't fly, but why? It's answer is gravity, density. We can swim, because of water and our body's density is near by come. We can't fly in air because of our body have higher density than air.

So many scientist research on gravity and gave his theory. If gravity is not on earth so what happen?

1. Human will be blast because of if gravity is not, so force is zero and pressure will also zero and our body have high pressure and our blood and all types of fluid like acid will go high pressure to low pressure.
2. Every substance will go in straight direction because of no one force is apply on it and don't have resistance, so this substance will maintain his motion.
3. Earth will totally blank, nothing will be on earth, air will go in space and vacuum will create on earth.

✓ **Gravitational force and pressure**

See in figure, Earth have surface area. Here at point-1 is surface area of earth and we consider at surface area's pressure P_1 . At point-2 now we cover up point-1 with any gases, air so we will find pressure at point-2 P_2 . At point-2 have low pressure because of Newton gravitational equation, distance is long. Now repeat again and again. This force is applied earth's every direction.

See in figure-2 in figure at point 1, 1' and 1'' at every point pressure will equal. At point 5, 5' and 5'' pressure will equal.

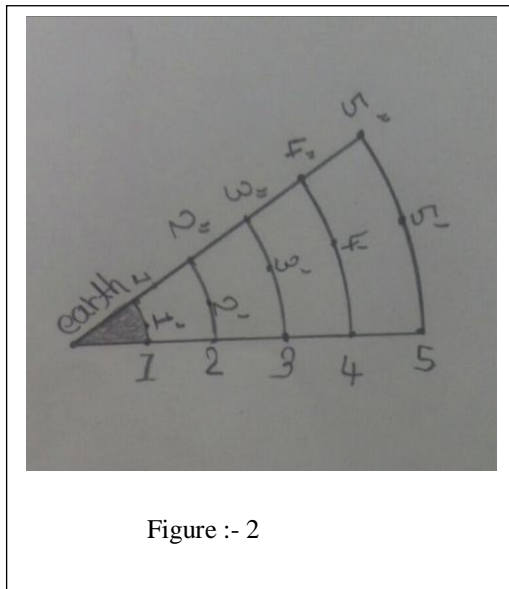


Figure :- 2

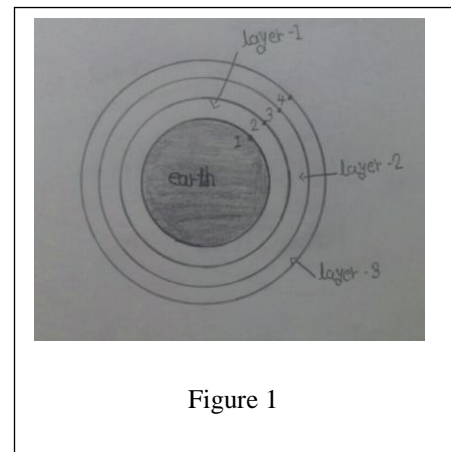


Figure 1

$$P_1 = P_{1'} = P_{1''}$$

$$P_2 = P_{2'} = P_{2''}$$

$$P_3 = P_{3'} = P_{3''}$$

$$P_4 = P_{4'} = P_{4''}$$

$$P_5 = P_{5'} = P_{5''}$$

Now we can say "The pressure is constant at any horizontal plane parallel to the earth's surface, but it varies with the height"

✓ **Pressure difference**

Pressure always go high pressure to low pressure. For example Fill up bottle with water and hole in bottom of the bottle. Open the bottle now fluid will flow through hole. Now see in figure-3 at point-1 pressure is equal in inside and outside of the bottle. At point-2 water have higher pressure then air pressure because of density. So water will flow.

If we absorb pressure in bottle, see in figure 4 at point-1 have different pressure inside of the bottle have low pressure and outside have high pressure. So now at point-2 water have low pressure and air have high pressure, so now air is also one type of fluid, air will flow inside of the bottle.

See in figure-2 at point-1 and 4 have pressure difference. At point-1 have high pressure because of high force and small area and point 4 have low pressure because of large area and low force.

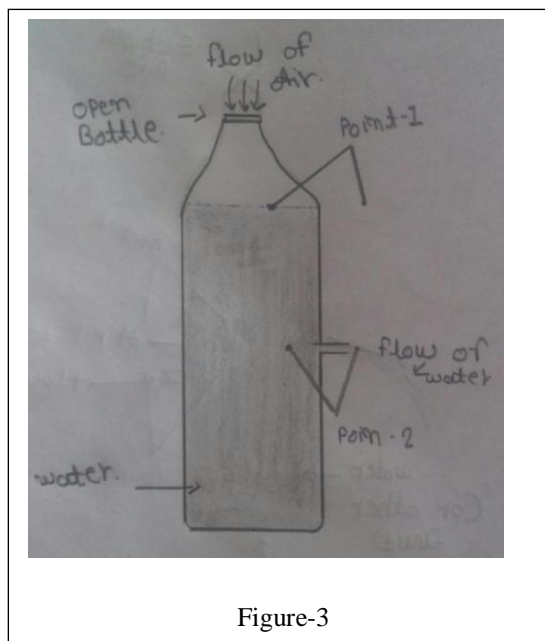


Figure-3

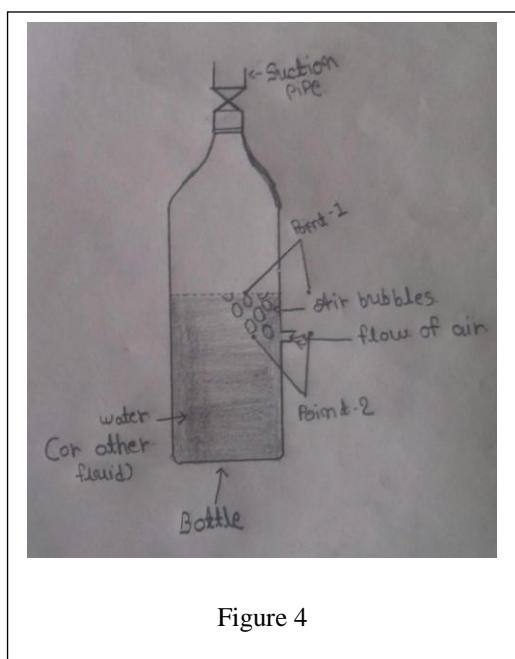


Figure 4

✓ **Why two immiscible liquid separate by Density difference?**

Or

Why oil float on water

For example we get oil and water. When we drop oil in water oil will float due to density difference. Here separation is possible to one more terms is pressure difference.

See in figure-5 here oil drop is in water. Point-1 is top point of water layer and oil drop and point-2 is bottom point of water layer and oil drop. At point-1 the pressure is also constant because of horizontal plane parallel to the earth's surface. At point-2 water have high density than oil, so at point-2 water's pressure is high and oil have low density so oil's pressure is low, so here water will move high pressure to low pressure and slowly oil will float. See in figure-7

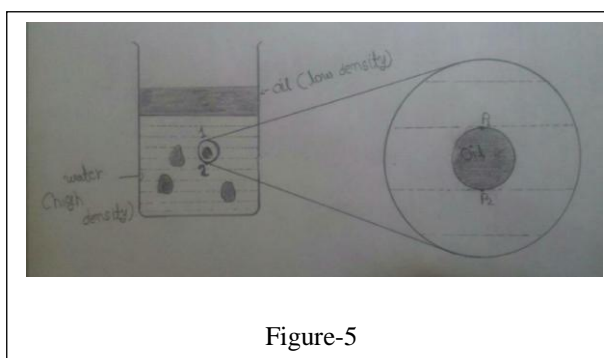


Figure-5

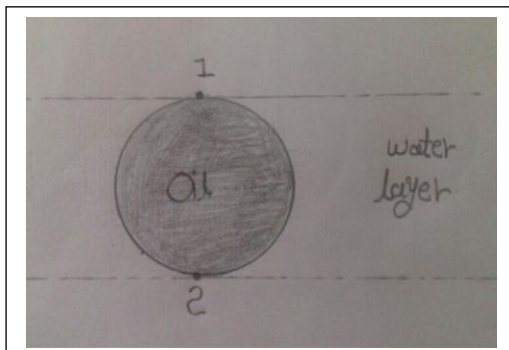


Figure 6

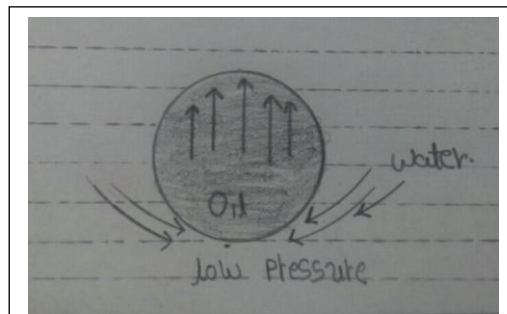


Figure 7

✓ **Why two solid substance is not mixed in each other if substance have same density?**

If liquid or gas have same density so both are mixable in each other but this is not applied in solid. But why? Now liquid molecule have space each molecule. And this space create pressure difference, so due to pressure difference two liquids are mixable and this is also applied in gas. But solid molecule have approximately like zero space so solid don't have pressure difference, so solid-solid are not easily mixed. But when we welding in solid now molecule will be heating so molecule will vibrant and create space and also create pressure difference and solid will joint or mixed in each other.

✓ **Symbol**

- P_1 = pressure at point-1
- $P_{1'}$ = pressure at point-1'
- $P_{1''}$ = pressure at point-1''
- P_2 = pressure at point-2
- P_3 = pressure at point-3
- P_4 = pressure at point-4
- P_5 = pressure at point-5