



PRESENTED BY
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DÉMONSTRATION OF VORTEX FORMATION,PRESSURE CHANGE AND VISCOSITY IN FLUID

INTRODUCTION

Fluid dynamics is an important branch of physics that deals with the study of fluids in motion. In this presentation, we will explore the fascinating world of vortex formation, pressure change, and viscosity in fluids.

We will start by discussing the basic concepts of fluid dynamics and then move on to more advanced topics such as the turbulence.



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VORTEX FORMATION

A vortex is a region in a fluid where the flow revolves around an axis line, forming a whirlpool-like structure. Vortices can be observed in many natural phenomena such as tornadoes, hurricanes, and whirlpools.

In fluid dynamics, vortices are created when there is a difference in velocity between adjacent layers of fluid. This creates a shearing force that causes the fluid to rotate, forming a vortex.





PRESSURE CHANGE

Pressure is defined as the force per unit area exerted by a fluid on its surroundings. Pressure changes can occur due to a variety of factors such as changes in velocity, elevation, and temperature.

One example of pressure change is the Bernoulli's principle, which states that as the velocity of a fluid increases, its pressure decreases. This principle is often used in aviation to explain lift and drag forces acting on an aircraft.

VISCOSEITY

Viscosity is a measure of a fluid's resistance to flow. It is caused by internal friction between adjacent layers of fluid and depends on factors such as temperature and pressure.

Viscosity plays an important role in many industrial processes such as oil drilling, polymer processing, and food production. Understanding viscosity is also crucial in the design of fluid systems such as pipelines and pumps.



TURBULENCE

Turbulence is a chaotic and unpredictable state of fluid flow that occurs when the Reynolds number exceeds a critical value. It is characterized by irregular fluctuations in velocity, pressure, and other flow properties.

Turbulence is a phenomenon that can be observed in many natural and man-made systems such as rivers, oceans, and aircraft wakes. Despite its complexity, turbulence remains a subject of intense research in fluid dynamics.





PROCEDURE

2Water bottles (1.25ltr.)

200ml water ,2mm dia. punch pin

Formula - $\rho gh^*(\text{area of bottle}) = (\text{air pressure inside empty bottle })^*\text{area}$

Viscous force(F) = $\eta \cdot A \cdot \Delta v / \Delta z$

STEP 1

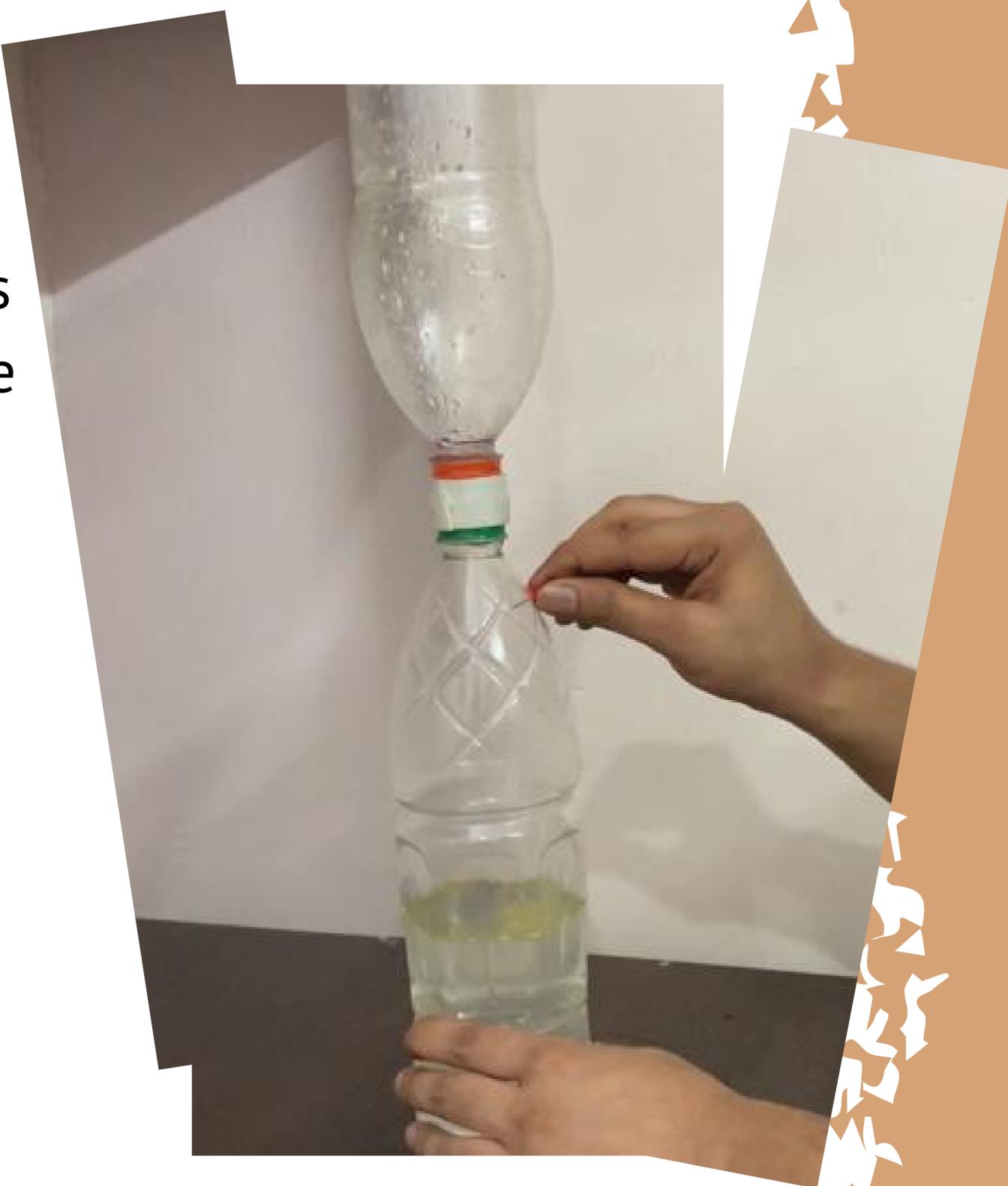
Fill a bottle with water and screw the empty bottle on top .then flip it over you will notice right away. that the water is not flowing down to the empty bar that is because there's air pressure that is pushing upward by the way of the water is pushing downward .as it meets in an equilibrium state there are two forces as shown in this picture .the bottom force is pointing upward is the force exerted by the air pressure inside the empty bottle .multiplied by the area of the bottom ,while the other force is pointing downward hydrostatic pressure which is ρgh multiplied by the area of the bottle.

PROCEDURE

2) if we shake the bottle in a circular motion a turbulent flow will cause a vortex to occur inside the bottle as it acts as a pipe to allow water to go down and air to come on the vortex is fixed with Saturn axis due to centripetal force .

Step2-PUNCH-2mm diameter

if we punch two holes .one at the top one on the who knows by the way that the water is flowing down very fast, there is due to atmospheric pressure going through the top pushing the water, tap water pressure is leaving the bottom from the bottom to differentiate the voltage from the water.



OIL MIX WITH WATER

however oil is more viscous than water and it will not flow nicely as shown ,however colored lamp oil which has the same viscosity as water will flow smoothly and will indicate the vortex in the bar that is because flow does depend on the viscosity of the liquid.





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