Force and Pressure

Pressure Exerted by Liquids & Gases

Take a plastic bottle. You can take a discarded water or soft drink bottle. Fix a cylindrical glass tube, a few cm long near its bottom as . You can do so by slightly heating one end of the glass tube and then quickly inserting it near the bottom of the bottle. Make sure that the water does not leak from the joint. If there is any leakage, seal it with molten wax. Cover the mouth of the glass tube with a thin rubber sheet as you did . Now fill the bottle upto half with water. What do you observe? Why does the rubber 2022-23 FORCE AND PRESSURE 139 A liquid exerts pressure on the walls of the container Note that the rubber sheet has been fixed on the side of the container and not at the bottom. Does the bulging of the rubber sheet in this case indicate that water exerts pressure on the sides of the container as well? Let us investigate further.

Take an empty plastic bottle or a cylindrical container. You can take a used tin can or a used plastic bottle. Drill four holes all around near the bottom of the bottle. Make sure that the holes are at the same height from the bottom. Now fill the bottle with water. What do you observe? Do the different streams of water coming out of the holes fall at the same distance from the bottle? What does this indicate? Can you now say that liquids exert pressure on the walls of the container? Do gases also exert pressure? Do they also exert pressure on the walls of their containers? Let us find out. sheet fixed to the glass tube bulge this time? Pour some more water in the bottle. Is there any change in the bulge of the rubber sheet?

LAWS OF PRESSURE

(i) Pressure exerted by the liquid is the same in all directions about a points

(ii) Pressure exerted is the same at all points in a horizontal plane as well as in a stationary liquid.

(iii) Pressure at a points inside a liquid increases with depth from the free surface.

(iv) Pressure at a particular depth is different for different liquids, i.e. P = hdg where, h = height of the column of liquid. d = density of the liquid g = acceleration due to gravity

(iv) The pressure exerted anywhere in a confined liquid is transmitted equally and undiminished in all directions throughout the liquid which is called 'Pascal's law'.