

When a liquid travels along a tube, it may do so in either of two ways. It may travel by means of **laminar flow** or **turbulent flow**. These two forms of flow can be demonstrated by an experiment in which a very fine stream of coloured ink is injected into a tube of water. When the pressure of this jet of ink is at the correct level, the ink will form a uniform stream which passes through the water without mixing with it. It remains a separate layer, or **lamina** of liquid—hence the term **laminar flow**—and the force of the liquid is used to push it forward through the water. None of the force is used to push the liquid sideways into the water. However, if the pressure of the flow of ink is increased beyond a certain value, the ink will mix with the water as soon as it enters the tube. Much of the force of the liquid is in this case used in side-to-side movement in mixing with the water

and striking the sides of the tube. The ink becomes thoroughly mixed with the water, and in this case the flow is known as **turbulent flow**.

Various factors will determine whether the flow of liquid through a tube will be turbulent or laminar. As will be seen if the pressure of the ink is increased as it enters the water, the greater the force of the liquid, the more likely turbulence is to occur. If the experiment is carried out with tubes of different diameter while the pressure of the liquid is kept constant, it will be seen that the diameter of the tube has an effect on whether laminar or turbulent flow takes place.

It will be found that turbulent flow is more likely to occur as the tube becomes narrower. Thirdly, if the diameter of the tube is irregular, or if the tube is bent, turbulent flow is more likely to occur than in a uniform diameter tube.

