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physic objective

Feb 28 at 12:51 AM

this is 1st year federal board objective which is confused me pls reply right answer

The drag force between the layers of moving fluid _____

a) increases b) decreases c) constant d) none of these

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Correct Answer is (d) none of these.

Explanation

The drag force between the layers depends upon some factors. So it may increase , decrease or remain constant, depending upon imposing factors.

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The drag force between adjacent small elements of neighboring layers is given by force per unit area:

$$F/A = \eta dv(y)/dy$$

where y-direction means perpendicular to the small element of the layer.

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... The frictional forces that try to prevent different layers of fluid from sliding past each other are called viscous forces. **Viscosity** is a measure of a fluids resistance to relative motion within the fluid. **Drag** is produced by friction **between layers** of **fluid**

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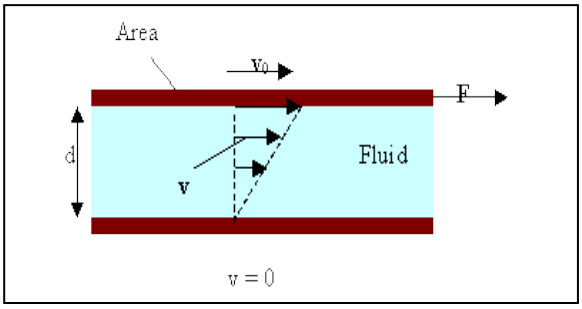
The viscosity of fluids depends strongly on temperature.



A real fluid flowing (say) in a pipe experiences frictional forces. There is friction with the walls of the pipe, and there is friction within the fluid itself, converting some of its kinetic energy into thermal energy. The frictional forces that try to prevent different layers of fluid from sliding past each other are called viscous forces.

We can measure the viscosity of a fluid by measuring the viscous drag between two plates.

If you measure the force to keep the upper plate moving with constant velocity $\mathbf{v}_0$, you find it is proportional to the area of the plate, and to v_0/d, where d is the distance between the plates.

$$\mathbf{F}/A = \eta \mathbf{v}_0/d \text{ or } \mathbf{F}/A = \eta \Delta \mathbf{v}/\Delta y.$$

The proportional constant η is called the viscosity. The units of η in SI units are Pa-s.

- The viscosity of a liquid **decreases** with increasing temperature.
- The viscosity of a gas **increases** with increasing temperature.

In liquids viscosity is due to the cohesive forces between the molecules and in gases the viscosity is due to collisions between the molecules. The work done by viscous forces converts ordered energy into thermal energy.

Viscosity of air (20°C) is 1.83×10^{-5} Pa-s = 1.83×10^{-5} N.s.m^{-2} (1 Pa = 1 N/m^2)

Viscosity of water (at 20°C) is 1.00×10^{-3} Pa-s; Viscosity of honey at 20°C is 1000 Pa-s