Answer on Question #36963, Physics, mechanics.

Water flows at a speed 5 cm/s through a pipe of radius 2cm .the viscosity of water is 0.001 Pl. The Reynolds number and the nature of flows are respectively.....?

Solution

For flow in a pipe, the Reynolds number is defined as

$$Re = \frac{\rho v D_H}{\mu},$$

where $\rho = 1000 \frac{kg}{m^3}$ - density of water, $\mu = 0.001$ Pa · s - dynamic viscosity of the water, $v = 5 \frac{\text{cm}}{\text{s}} = 0.05 \frac{m}{s}$ - a speed of flow, D_H - the hydraulic diameter of the pipe (for a circular pipe, the hydraulic diameter is exactly equal to the inside pipe diameter$D_H = D = 2R$).

The Reynolds number is

$$Re = \frac{1000 \frac{kg}{m^3} \cdot 0.05 \frac{m}{s} \cdot 2 \cdot 0.02\, m}{0.001 \text{ Pa} \cdot \text{s}} = 2000.$$

The Reynolds number $Re = 2000$. Its transition region or critical region – flow can either be laminar of turbulent – difficult to pin down exactly.
Answer: 2000; flow can either be laminar of turbulent.