

DF EDUCATION

$$P_A = \pi + h_o \rho_o g$$

$$P_B = \pi + h_w \rho_w g$$

$$P_A = P_B$$

$$\pi + h_o \rho_o g = \pi + h_w \rho_w g$$

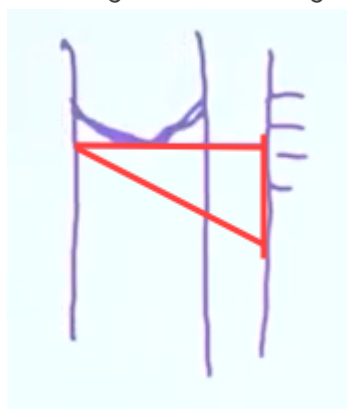
$$h_o \rho_o g = h_w \rho_w g$$

$$h_o = \left(\frac{\rho_w}{\rho_o} \right) h_w$$

$$h_w = \left(\frac{\rho_o}{\rho_w} \right) h_o$$

Gradient of the graph h_w against $h_l = \frac{\rho_l}{\rho_w} = \text{Relative density of liquid}$

- (Here in our experiment, we get the relative density of Oil as the gradient.
- Getting the readings using the set square.

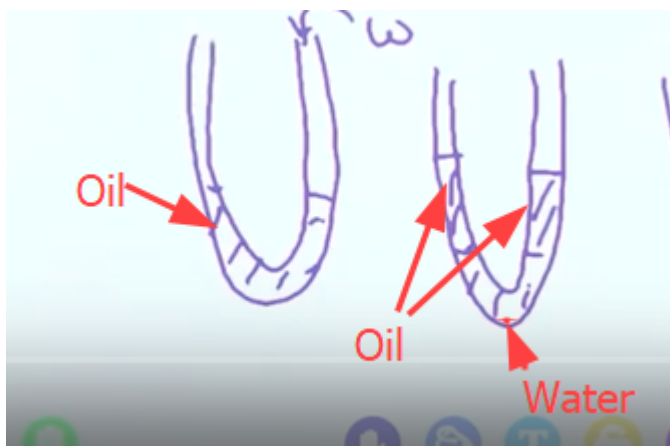


Important points

More dense liquid has to be added first

- Why do we add the more dense liquid first to the U tube?

Because if we add the less dense liquid (oil) first, when we add the high dense liquid (water) after, we won't be able to get a correct common interface due to dividing the oil column in to 2



Only the less dense liquid is added to change the readings

- Why do we add less dense liquid more to get different readings?

When getting different readings, we need to add more oil (less dense liquid). We can't do the other way around because if we add more water to right side, the volume of less dense liquid (oil) won't change meaning the h_0 wouldn't change. Therefore, you will get the same readings for h_0 and h_w

The densities of the 2 liquids we use, should be closer to each other.

- Why should we use 2 liquids whose densities are closer to each other when doing this experiment?

Because if we use 2 liquids with greater density difference (say mercury and water), the volume of less dense liquid that you will have to add to raise the other will be much higher, therefore you won't be able to get more readings to draw the graph

In the mercury water example, to raise the mercury by 1 cm we will have to put 13.5 cm of water (this is calculated by the relative density of mercury - $13500/1000 = 13.5$)

Because of this the fractional error of getting the height of the mercury column will increase

- Why do we use water to find the density of oil?

A liquid (water) whose density is higher than the liquid (oil) that we are going to find the density of should be used

Liquid with less density (oil) has to be used as the independent axis of the graph

(As the gradient, we get the relative density of the certain liquid