

Unit-II:

Capillary & Capillarity

Applied Physics

B.Sc. (H.Sc.)-II

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WHAT DO YOU SEE ??



Straws



Sponge

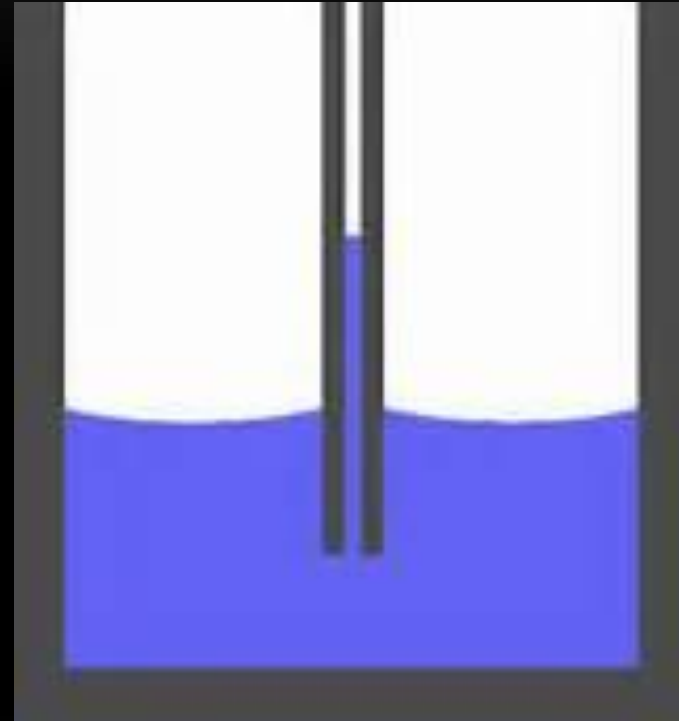


Fountain Pen



Chalks

WHAT HAPPENS WHEN STRAW IS DIPPED IN WATER OR COLD DRINK ??



Water rises in the Straw.

WHAT HAPPENS WHEN SPONGE IS PUT IN WATER ??



Water is absorbed by the Sponge.

Similarly chalk absorbs water, ink etc.

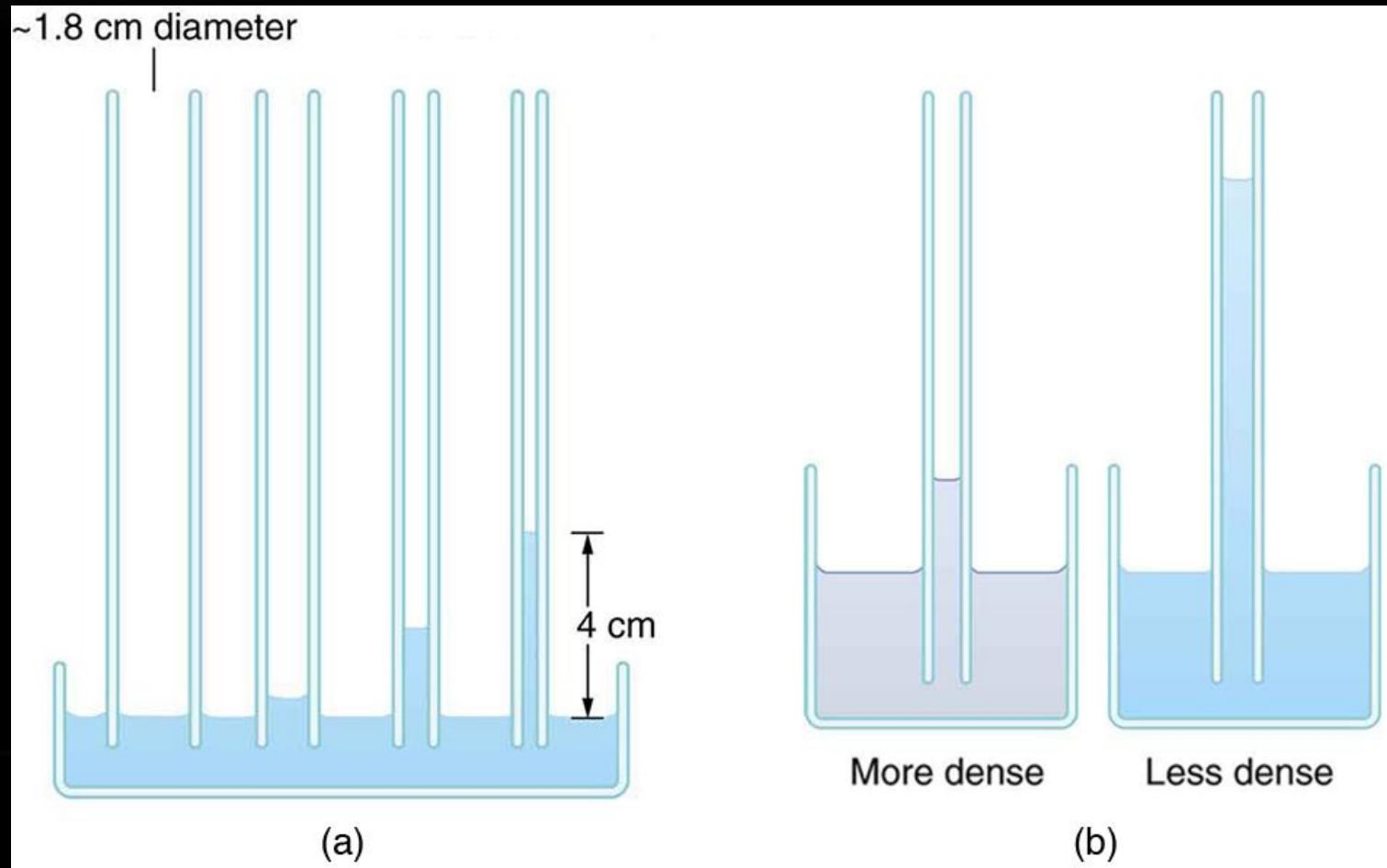
HOW DOES A FOUNTAIN PEN WRITE ??



The tip of the nib of the pen is split to allow the ink flow to the tip.

A tube of very fine and uniform bore and open at both ends, whose diameter is much less as compared to length, is called

CAPILLARY



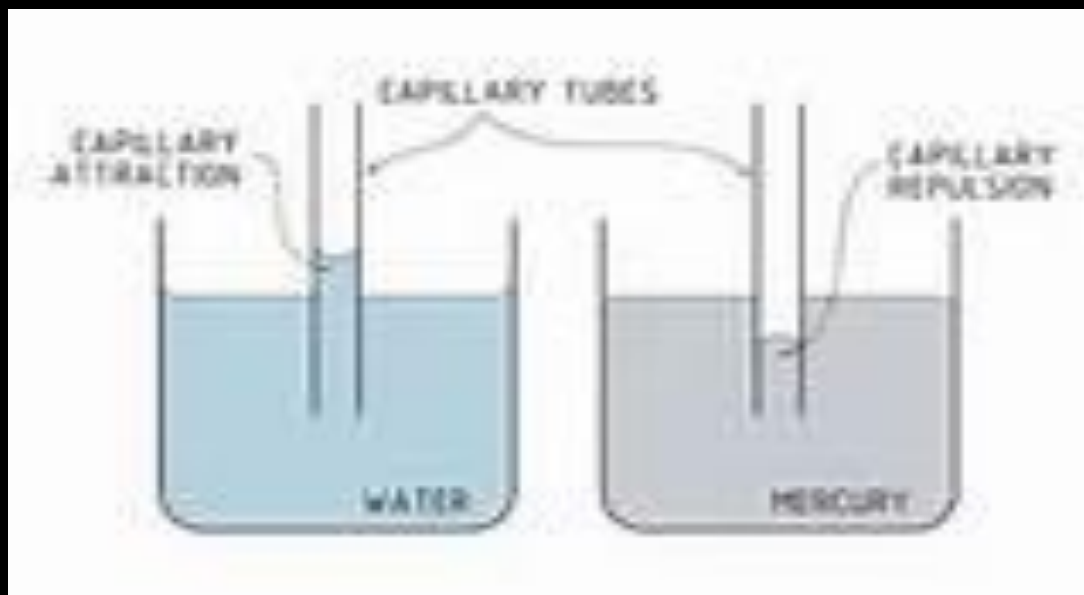
For liquids which wet the walls of the tube

--- liquid rises up in the tube.
e.g.- Straw in water, cold drink etc.

For liquids which do not wet the walls of the tube ---

liquid depresses below the free surface of liquid in the container.

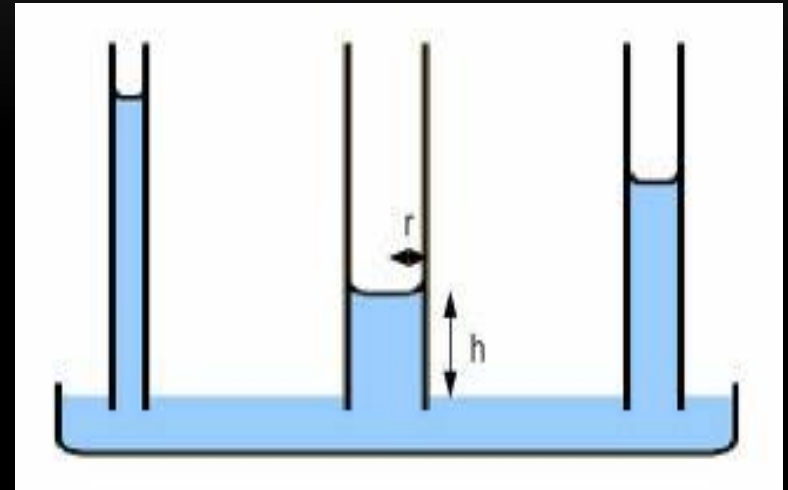
e.g.- Glass tube in mercury.



This rise or fall of liquid in a tube of very fine bore is called

CAPILLARITY

Look at the figures...



What do you see ??

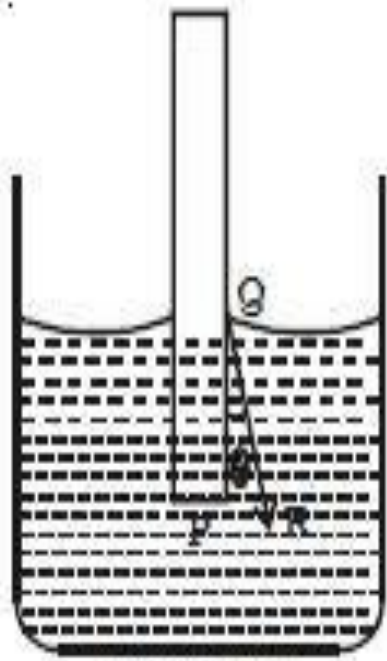
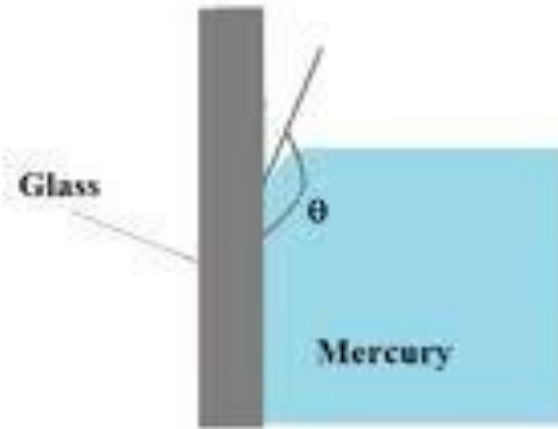
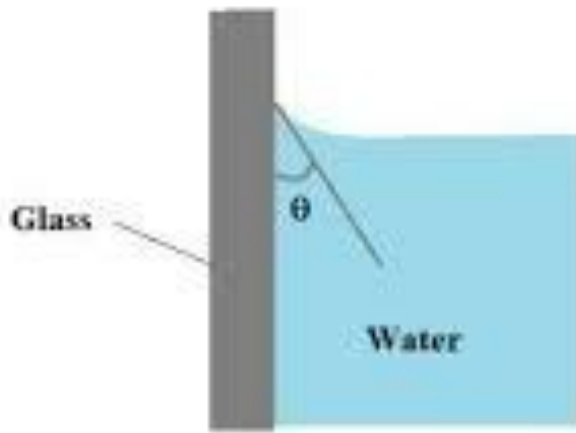
The extent upto which a liquid rises(or depresses) depends upon the radius of the bore of the tube.

The narrower the bore of the tube, the greater is the rise or fall of the liquid in the tube.

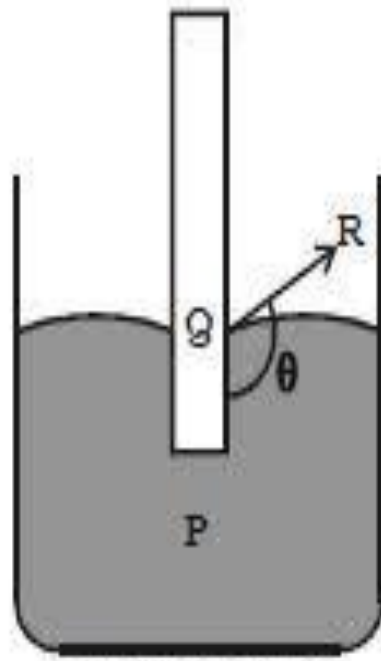
ANGLE OF CONTACT

“The angle, which the tangent to the liquid surface at the point of contact makes with the solid surface inside the liquid, is called the angle of contact or the capillary angle.”

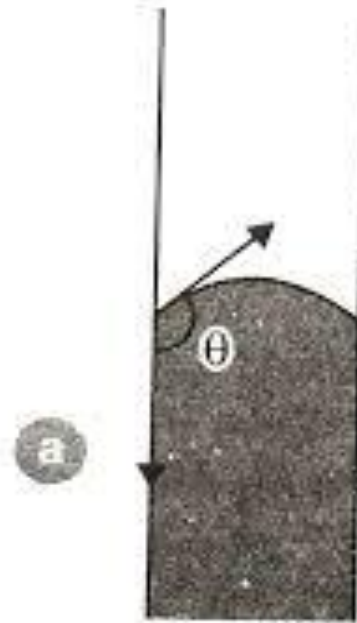
- ❑ When a liquid comes in contact with a solid surface, it is generally curved
- ❑ The angle of contact is acute i.e. less than 90° , in case of liquids which wet the walls of the container e.g. water. Therefore in a glass tube, the meniscus of water is hemispherical
- ❑ For ordinary water and glass the angle of contact is about 8°
- ❑ For pure water and clean glass the angle of contact is zero
- ❑ Angle of contact is obtuse i.e. greater than 90° , for the liquids which do not wet the walls of the container
- ❑ For mercury and glass the angle of contact is 140°
- ❑ For a given solid – liquid pair, the angle of contact is same, whether the liquid is contained in vessel made of that solid material or a rod of that solid material is dipped in the liquid



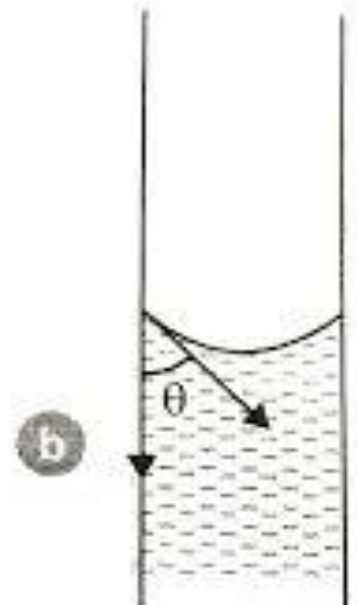
For water



For mercury



a



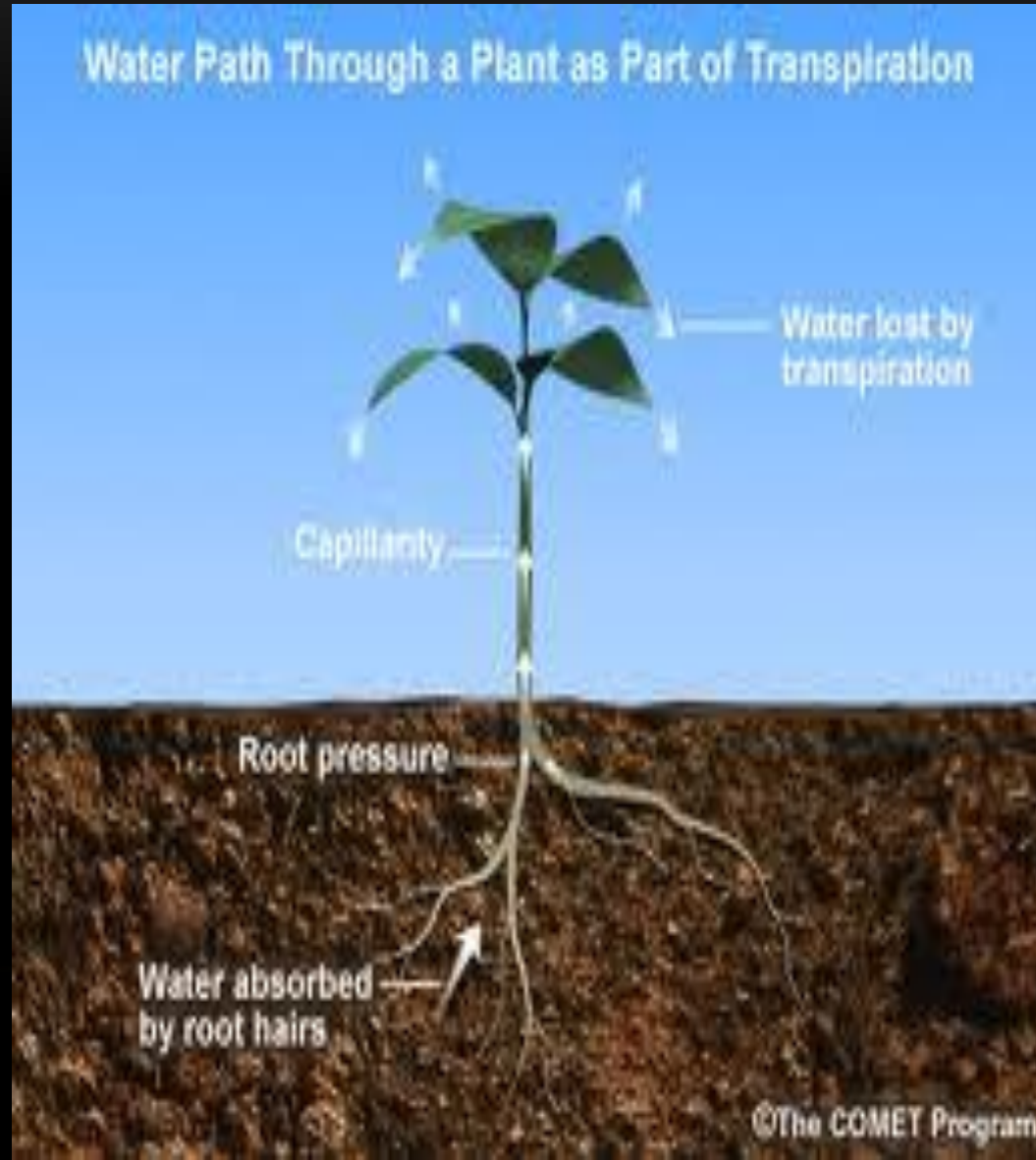
b

PRACTICAL APPLICATIONS OF CAPILLARITY

- (1) Oil rises in the Cotton wick of a Lamp through small capillaries formed by the threads of the wick



(2) It is by Capillary action that Water reaches every branch of a plant or a Tree from the Stalk/ Stem



(3) We use a Towel to dry our body after the bath, which soaks water due to Capillary action



(4) We wear Cotton Clothes in Summer to keep us Cool



Give Reasons / Explain the following:-

1. Earthen Vessels are used in Summers to provide Cold Water.
2. Brick Walls are plastered with Cement.
3. Mercury Barometer always reads less than actual pressure.
4. A piece of Chalk immersed into Water emits Bubbles in all directions.
5. Sand is drier soil than Clay. Why ?
6. Why are fields ploughed?
7. What is the function of Damp Proof Layer on Walls?
8. How will the rise of liquid be affected if the tip of the Capillary Tube is closed ?

ASSIGNMENT

End of Chapter-2
