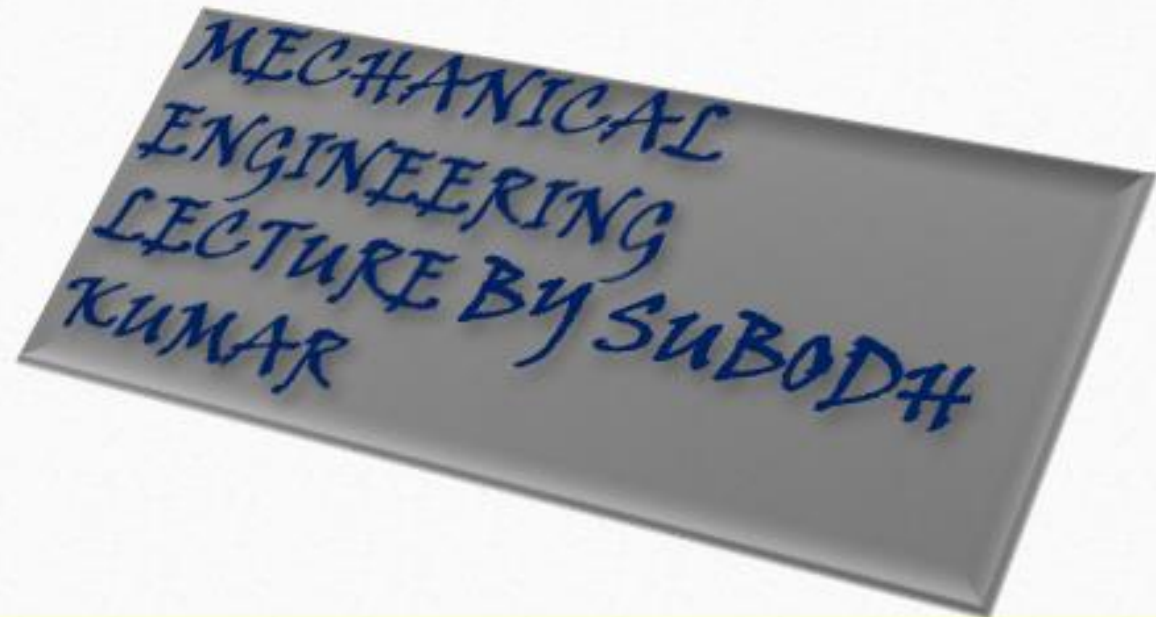




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ASSISTANT PROFESSOR



# SURFACE TENSION

- Surface tension is **defined as the tensile force acting on the surface of a liquid** in contact with a gas or on the surface between two immiscible such that the contact surface **behave like a membrane under tension**.
- Surface tension **is due to cohesion between the liquid molecules** and the surfaces.
- Surface tension is that property of liquids owing to which they tend to **acquire minimum surface area**

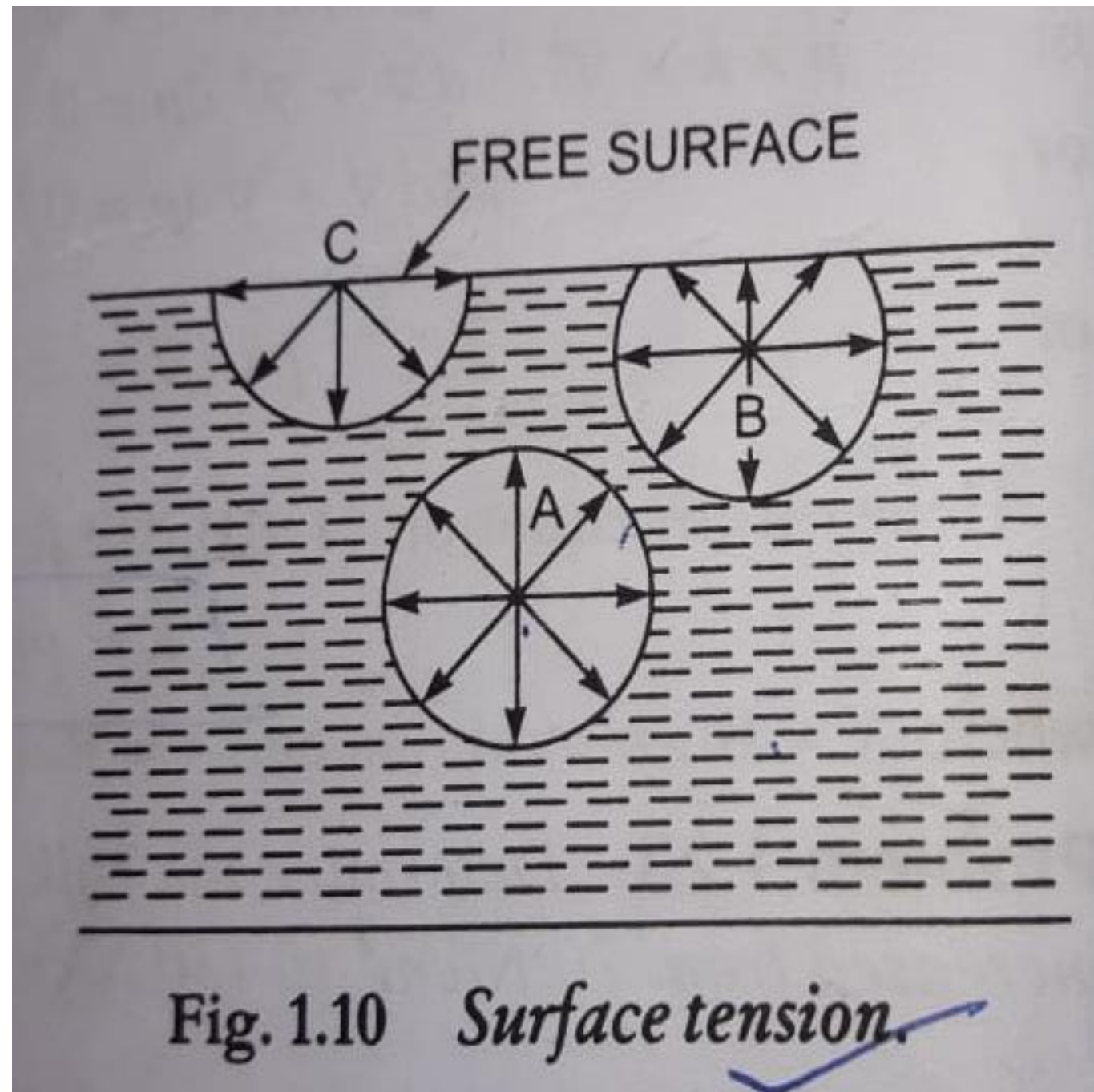


- It is denoted by Greek letter  $\sigma$  (sigma)
- Surface tension is defined as, The ratio of the surface force  $F$  to the length  $L$  along which the force acts

$$\text{surface tension} = \frac{F}{L}$$

- The SI units of surface tension is N/m.

- The phenomenon of surface tension is explained by given Fig. Consider three molecules A,B,C of a liquid in a mass of liquid.
- The molecule A is attracted in all directions equally by the surrounding molecules of the liquid. Thus the resultant force acting on the molecule A is zero.



- **Molecule B** , which is situated near the free surface, is acted upon by upward and downward forces which is unbalanced.
- Thus a **net resultant force on molecule B** is acting in the **Downward direction**.
- The molecule **C**, situated on the free surface of liquid , does experience a resultant downward force.
- **All the molecules on the free surface** experience a downward force.
- Thus the free surface of the liquid acts like a very thin Film under tension of the surface of the liquid act as though it is an elastic **membrane under tension**.

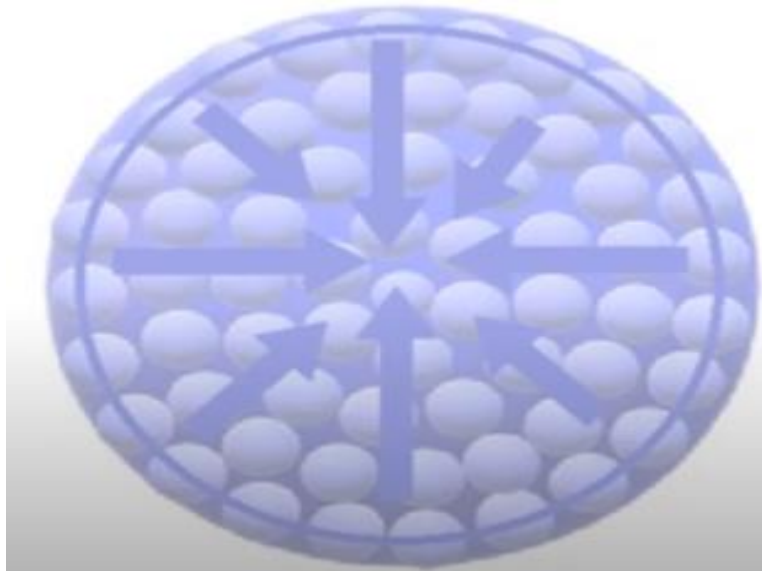
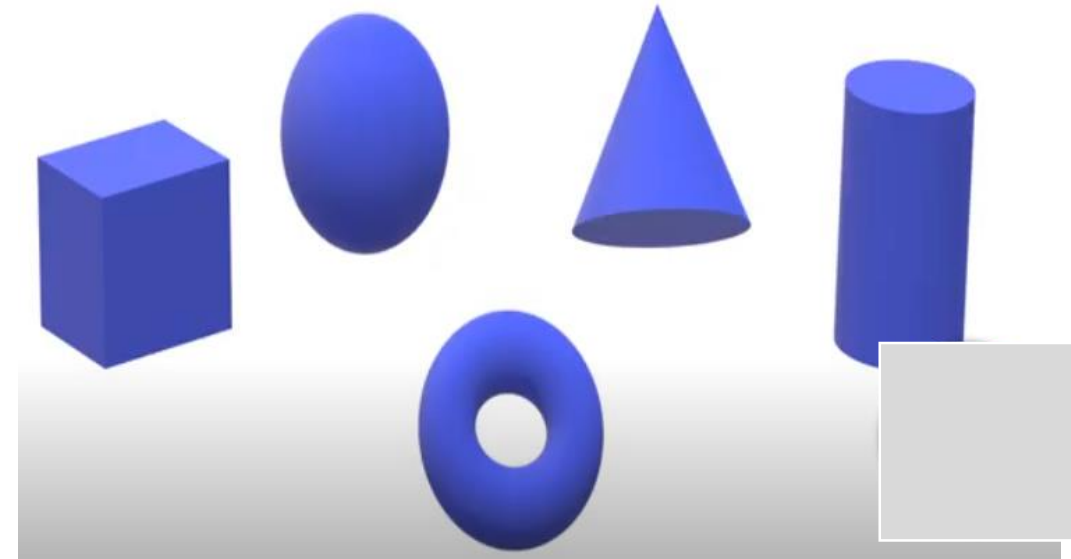
## Why the needle is floating in water?

- Needle (or paper clip) floating on water.
- Even though the **density of these objects is greater than water**,
- The surface tension along the depression is enough to counteract the force of gravity pulling down on the metal object.



## What is the shape of the water drop?

Surface tension is responsible for the shape of liquid droplets. Although easily deformed, droplets of water tend to be pulled into a spherical shape by the **cohesive forces** of the surface layer. In the absence of other forces, including gravity, drops of virtually all liquids would be approximately spherical



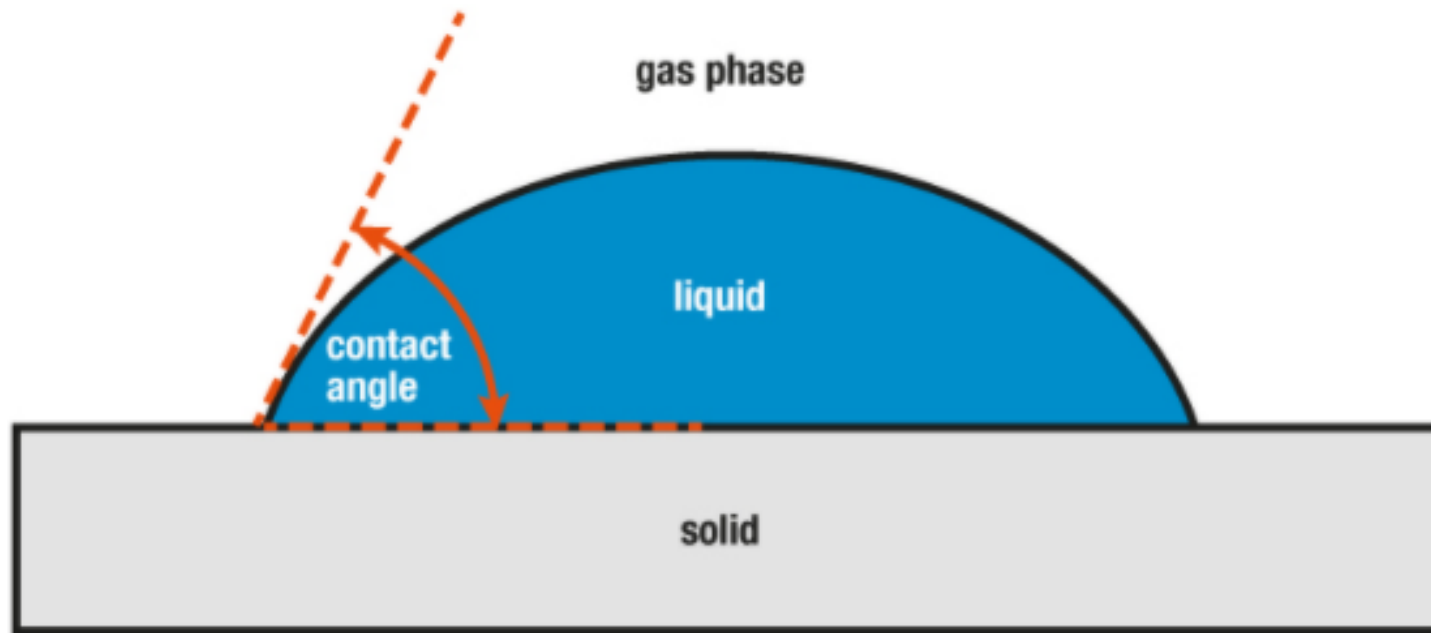
## Does the insect is walking on the water?

Water striders are small insects that are adapted for life on top of still water, using surface tension to their advantage so they can “walk on water.” Water acts different at the surface. **Water molecules are attracted to each other and like to stay together, especially on the surface where there is only air above**



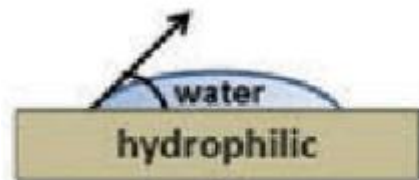


# Contact angle

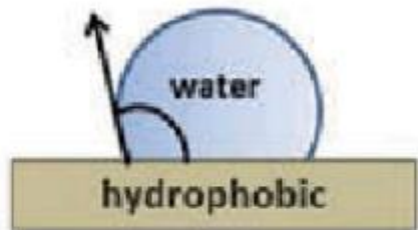


Explanation contact angle

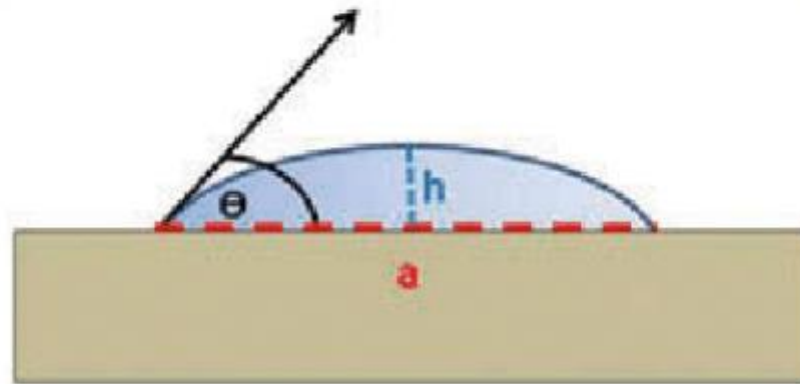
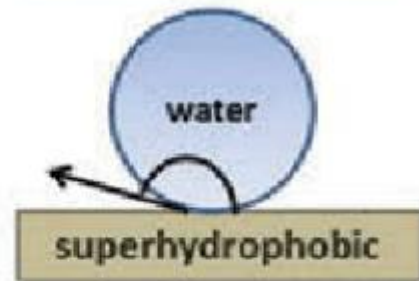
$$0^\circ < \theta < 90^\circ$$



$$90^\circ < \theta < 150^\circ$$



$$\theta > 150^\circ$$



THANKYOU