

# SURFACE TENSION

## Questions on Surface Tension, Paper 1

1. One end of a towel dips into a bucket full of water and other end hangs over the bucket. It is found that after some time the towel becomes fully wet. It happens **(CPMT 86)**
  - (a) Because viscosity of water is high
  - (b) Because of the capillary action of cotton threads
  - (c) Because of gravitational force
  - (d) Because of evaporation of water.**Answer: (b)**
2. For tap water and clean glass, the angle of contact is
  - (a)  $0^\circ$
  - (b)  $90^\circ$
  - (c)  $140^\circ$
  - (d)  $8^\circ$**Answer: (d)**
3. Water rises up to a height  $h_1$  in a capillary tube of radius  $r$ . the mass of the water lifted in the capillary tube is  $M$ . if the radius of the capillary tube is doubled, the mass of water that will rise in the capillary tube will be
  - (a)  $M$
  - (b)  $2M$
  - (c)  $\frac{M}{2}$
  - (d)  $4M$**Answer: (b)**
4. Water rises through a height  $h$  in a capillary tube of internal radius ( $r$ ). if  $T$  is the S.T. of water, then the pressure difference between the liquid level in the container and the lowest point of the concave meniscus is
  - (a)  $\frac{T}{r}$
  - (b)  $\frac{r}{T}$
  - (c)  $\frac{2T}{r}$
  - (d)  $\frac{r}{2T}$**Answer: (c)**
5. A number of small drops of mercury coalesce adiabatically to form a single drop. The temperature of drop **(MHT-CET-2008)**
  - (a) Increases
  - (b) Is infinite
  - (c) Remains unchanged
  - (d) May decrease or increase depending upon size**Answer: (d)**
6. The angle of contact between a glass capillary tube of length 10 cm and a liquid is  $90^\circ$ . If the capillary tube is dipped vertically in the liquid, then the liquid
  - (a) Will rise in the tube
  - (b) Will get depressed in the tube
  - (c) Will rise up to 10 cm in the tube and will overflow
  - (d) Will neither rise nor fall in the tube**Answer: (d)**
7. When there are no external forces, the shape of a liquid drop is determined by
  - (a) Surface tension of the liquid
  - (b) Density of liquid
  - (c) Viscosity of liquid
  - (d) Temperature of air only**Answer: (a)**
8. If  $T$  is surface tension of soap solution, the amount of work done in blowing a soap bubble from diameter  $D$  to a diameter  $2D$  is **(PMT MP 90)**
  - (a)  $2\pi D^2 T$
  - (b)  $4\pi D^2 T$
  - (c)  $6\pi D^2 T$
  - (d)  $8\pi D^2 T$**Answer: (c)**
9. Choose the wrong statement from the following.
  - (a) Small droplets of a liquid are spherical due to surface tension
  - (b) Oil rises through the wick due to capillarity
  - (c) In drinking the cold drinks through a straw, we use the phenomenon of capillarity
  - (d) Gum is used to stick two surfaces. In this process we use the property of Adhesion**Answer: (c)**
10. If the surface of a liquid is plane, then the angle of contact of the liquid with the walls of container is **(MHT CET 2004)**
  - (a) Acute angle
  - (b) Obtuse angle
  - (c)  $90^\circ$
  - (d)  $0^\circ$**Answer: (d)**
11. A capillary tube when immersed vertically in a liquid records a rise of 3 cm. if the tube is immersed in the liquid at an angle of  $60^\circ$  with the vertical, then length of the liquid column along the tube will be **(MHT-CET 1999)**
  - (a) 2 cm
  - (b) 3 cm
  - (c) 6 cm
  - (d) 9 cm**Answer: (c)**
12. If sap bubbles of different radii are in communication with each other **(PMT MP 88, NCERT 80)**
  - (a) Air flow from the larger bubble into the smaller one until the two bubbles are of equal size
  - (b) The sizes of the bubbles remain unchanged.
  - (c) Air flows from the smaller into the larger one and larger bubble grows at the expense of the smaller one
  - (d) Air flows from the larger into the smaller one becomes equal to that of the larger one and the larger one equal to that of the smaller one.**Answer: (c)**

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13. A capillary tube of radius  $r$  can support a liquid of weight  $6.28 \times 10^{-4}$  N. If the surface tension of the liquid is  $5 \times 10^{-2}$  N/m, the radius of capillary must be

**(CPMT 88)**

- (a)  $2.5 \times 10^{-3}$  m      (b)  $2.0 \times 10^{-4}$  m  
(c)  $1.5 \times 10^{-3}$  m      (d)  $2.0 \times 10^{-3}$  m

**Answer: (d)**

14. The work done in blowing a soap bubble of radius  $R$  is  $W_1$  and that to a radius  $3R$  is  $W_2$ . The ratio of work done is

- (a) 1:3                      (b) 3:1  
(c) 1:9                      (d) 9:1

**Answer: (c)**

15. When the angle of contact between a solid and a liquid is  $90^\circ$ , then

- (a) Cohesive force > Adhesive force  
(b) Cohesive force < Adhesive force  
(c) Cohesive force = Adhesive force  
(d) Cohesive force  $\gg$  Adhesive force

**Answer: (c)**

16. Rain drops are spherical in shape because of **(MHT-CET 2000)**

- (a) Surface tension  
(b) Capillary  
(c) Downward motion  
(d) Acceleration due to gravity

**Answer: (a)**

17. A sheet can be made water proof by coating it with a substance that changes the angle of contact

- (a) to  $\frac{\pi}{2}$   
(b) To zero  
(c) From acute to obtuse  
(d) From obtuse to acute

**Answer: (c)**

18. Water rises in a capillary tube to a certain height such that the upward force due to surface tension is balanced by  $75 \times 10^{-4}$  N, forces due to the weight of the liquid. If the surface tension of water is

$6 \times 10^{-2}$  N/m, the inner-circumference of the capillary must be **(CPMT 88, 86)**

- (a)  $1.25 \times 10^{-2}$  m      (b)  $0.50 \times 10^{-2}$  m  
(c)  $6.5 \times 10^{-2}$  m      (d)  $12.5 \times 10^{-2}$  m

**Answer: (d)**

19. What is the change in surface energy, when a mercury drop of radius  $R$  splits up into 1000 droplets of radius  $r$ ?

- (a)  $8 \pi R^2 T$                       (b)  $16 \pi R^2 T$   
(c)  $24 \pi R^2 T$                       (d)  $36 \pi R^2 T$

**Answer: (d)**

20. Which of the following is not based on the principle of capillarity **(MHT CET 2005)**

- (a) Floating of wood on water surface  
(b) Ploughing of soil  
(c) Rise of oil in wick of lantern  
(d) Soaking of ink by blotting paper

**Answer: (a)**

21. The rise of a liquid in a capillary tube does not depend upon

- (a) Angle of contact  
(b) Density of the liquid  
(c) Radius of the capillary tube  
(d) Atmospheric pressure

**Answer: (d)**

22. The height of water in a capillary tube of radius 2 cm is 4 cm. What should be the radius of capillary, if the water rises to 8 cm in tube? **(MHT-CET-2001)**

- (a) 1 cm                      (b) 0.1 cm  
(c) 2 cm                      (d) 4 cm

**Answer: (a)**

23. The work done to get 'n' smaller equal size spherical drops from a bigger size spherical drop of water is proportional to **(EAMCET 91)**

- (a)  $\frac{1}{n^3} - 1$                       (b)  $\frac{1}{n^3} - 1$   
(c)  $\frac{1}{n^3} - 1$                       (d)  $\frac{4}{n^3} - 1$

**Answer: (c)**

24. For a liquid, which is rising in a capillary tube, the angle of contact is

- (a)  $90^\circ$                       (b)  $180^\circ$   
(c) Acute                      (d) Obtuse

**Answer: (c)**

25.  $W$  is the work done, when a bubble of volume  $V$  is formed from a solution. How much work is required to be done to form a bubble of volume  $2V$ ?

- (a)  $2W$                       (b)  $W$   
(c)  $2^{1/3}W$                       (d)  $4^{1/3}W$

**Answer: (d)**