

Unit 7: Properties of Matter

Textbook Exercise Questions

7.1 Encircle the correct answer from the given choices.

i. In which of the following state, molecules do not leave their position:

(LHR 2015, 2016)

- (a) Solid ✓ (b) liquid
(c) gas (d) plasma

ii. Which of the substances is the lightest one?

(LHR 2016)

- (a) Copper (b) mercury
(c) aluminum ✓ (d) lead

iii. SI unit of pressure is Pascal, which is equal to?

- (a) 10^{-4} Nm^{-2} (b) 1 Nm^{-2} ✓
(c) 10^2 Nm^{-2} (d) 10^3 Nm^{-2}

iv. What should be the approximate length of a glass tube to construct a water barometer?

- (a) 0.5 m (b) 1 m
(c) 2.5 m (d) 11 m ✓

v. According to Archimedes, upthrust is equal to: (LHR 2014, GRW 2015, 2016)

- (a) Weight of displace body (b) volume of displaced body
(c) mass of displaced liquid (d) none of these ✓

vi. The density of a substance can be found with the help of:

- (a) Pascal's law (b) Hooke's law
(c) Archimedes principle ✓ (d) principle of floatation

vii. According to Hooke's law:

- (a) Stress x strain = constant (b) stress/strain = constant ✓
(c) strain/stress = constant (d) stress = strain

7.2 How kinetic molecular model is helpful in differentiating various states of matter?

Ans: See Q. 1 Long Question

7.3 Does there exist a fourth state of matter? What is that?

Ans: Yes, there exists a fourth state of matter called Plasma.

At very high temperature, atoms lose their electrons and become positive ions. This ionic state of matter consisting of ions and electrons is called plasma.

7.4 What is meant by a density? What is its SI unit?

Ans: Density of a substance is defined as its mass per unit volume.

Density = mass of a substance/volume of that substance

Unit

SI unit of density is kilogram per cubic meter (kg m^{-3}).

7.5 Can we use a hydrometer to measure the density of milk?

Ans: Hydrometer is a device which is used to measure the density of liquids. So it can be used to measure the density of milk.

7.6 Define the term pressure.

Ans: The force acting normally per unit area on the surface of a body is called pressure.

Thus $P = \text{Force/Area}$

Or $P = F/A$

Quantity

Pressure is a scalar quantity.

Unit

In SI units, the unit of pressure is N m^{-2} also called Pascal (Pa). Thus, $1\text{N m}^{-2} = 1\text{Pa}$.

7.7 It is easy to remove air from a balloon but it is very difficult to remove air from a glass bottle. Why?

Ans: Because the atmospheric pressure acts more easily on balloon as compared to glass bottle, so emptying air is easier from balloon than glass bottle.

7.8 What is barometer?

Ans: The instrument used to measure atmospheric pressure is called barometer. One of the simple barometers is mercury barometer. It consists of a glass tube 1m long closed at one end.

7.9 Why water is not suitable to be used in a barometer?

Ans: Mercury is 13.6 times denser than water. Atmospheric pressure can hold vertical column of water about 13.6 times the height of mercury column at a place. Thus, at sea level, vertical height of water column would be $0.76\text{ m} \times 13.6 = 10.34\text{ m}$. Thus, a glass tube more than 10 m long is required to make a water barometer.

7.10 What makes a sucker pressed on a smooth wall sticks to it?

Ans: When a sucker is pressed on a smooth surface, the air pressure below it becomes very small (due to the displaced air) as compared to the air pressure above it. Therefore, it sticks with the smooth surface.

7.11 Why does the atmospheric pressure vary with height?

Ans: As we go high in the atmosphere, the density of the air becomes low. Due to this reason, atmospheric pressure decreases as we go high.

7.12 What does it mean when the atmospheric pressure at place fall suddenly?

Ans: A sudden fall in atmospheric pressure often followed by a storm, rain and typhoon to occur in few hours time.

7.13 What changes are expected in weather if the barometer reading shows a sudden increase?

Ans: A sudden increase in atmospheric pressure means that it will soon followed by a decrease in the atmospheric pressure indicating poor weather ahead.

7.14 State Pascal's law.

Ans: Pressure applied at any point of a liquid enclosed in a container, is transmitted without the loss to all other parts of the liquid.

7.15 Explain the working of hydraulic press.

Ans: See Q.6 Long Question

7.16 What is meant by elasticity?

Ans: The property of matter by virtue of which matter resists any force which tries to change its length, shape or volume is called elasticity.

7.17 State Archimedes principle?

Ans: When object is totally or partially immersed in a liquid, an upthrust act on it equal to the weight of the liquid it displaces.

7.18 What is up thrust? Explain the principle of floatation.

Ans: See Q. 8 & 10 Long Questions

7.19 Explain how a submarine moves up the water surface and down into water.

Ans: See Q. 10 Long Question

7.20 Why does a piece of stone sink in water but a ship with a huge weights floats?

Ans: The upthrust force on stone is much smaller than its weight because weight of the water displaced under stone is very small. While the ships are designed in such a way weight of the water displaced by them is greater than their weight. So upthrust force in case of ships is greater than their weights. So ships float on the surface of water.

7.21 What is Hooke's law? What is meant by elastic limit?

Ans: Hooke's Law

The strain produced in a body by the stress applied to it is directly proportional to the stress within the elastic limit of the body.

Elastic Limit

It is a limit within which a body coves recovers its original length, volume or shape after deforming force is removed is called elastic limit.

When a body crosses this limit, it is permanently deformed and is unable to restore its original state after the stress is removed.

7.22 Take a rubber band. Construct a balance of you own using a rubber band. Check its accuracy by weighing various objects.

Ans: Take a rubber band hang it with a hook. Then pointer is attached at the lower end of it with scale in front of pointer. Different known weights are suspended one by one at the lower end of the rubber band. Mark the pointer positions for each known weight. It is called calibration of scale for weight measurements. This makes a balance for weight measurement.

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Report any mistake at freeilm786@gmail.com