

## QUESTIONS ON "MATTER AROUND US"

Question1.

### **DIFFUSION**

Diffusion refers to the random, microscopic movement of particles of one substance into other substance.

This motion is named after the **botanist Robert Brown**, who first described the phenomenon in **1827**, while looking through a **microscope** at **pollen** of the **plant *Clarkia pulchella*** immersed in water. In **1905**, almost eighty years later, **theoretical physicist Albert Einstein** published a **paper** where he modeled the motion of the pollen as being moved by individual water molecules, making one of his first major scientific contributions. This explanation of Brownian motion served as convincing evidence that atoms and molecules exist and was further verified experimentally by **Jean Perrin** in **1908**. Perrin was awarded the **Nobel Prize in Physics** in **1926** "for his work on the discontinuous structure of matter".<sup>1</sup>

Use this information to answer the following questions-

1. Diffusion depends upon
  - (a) Temperature
  - (b) Pressure
  - (c) Molecular size
    - (i) Only (a)
    - (ii) Only(b)
    - (iii) Both (a) and (b)

(iv) (a), (b), (c)

2. Does change in temperature affect diffusion? Explain.

3. Which of the following statement is correct?

(i) Diffusion is fastest in gases and slowest in solids.

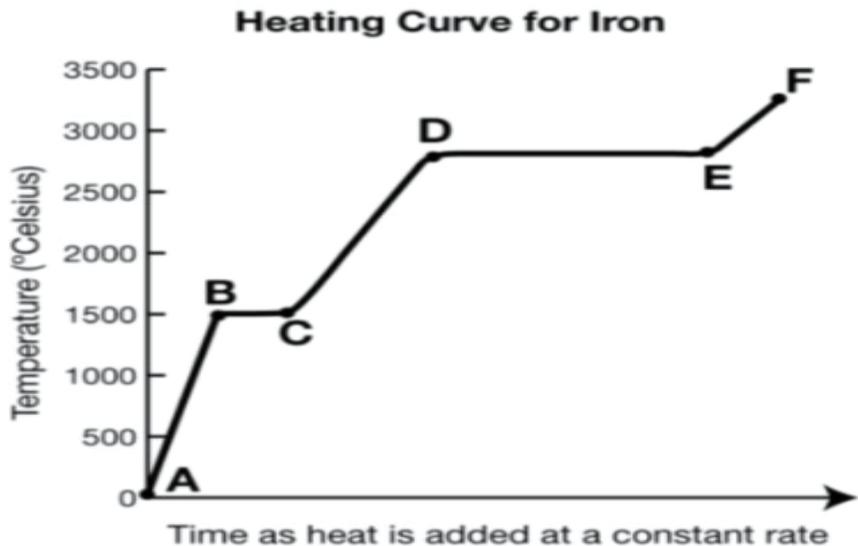
(ii) Diffusion doesn't take place in solids

(iii) Diffusion takes place from lower concentration to higher concentration

(iv) Diffusion is fastest in liquids

4. Which gas will diffuse faster Helium or hydrogen?

Question 2. Different substances have different melting points and boiling points, but the shape of their heating curves are very similar. For example heating curve for iron is shown below-



Answer the following questions-

1. What do the portion BC and DE represent?
2. What are the melting point and boiling point of iron?
3. In portion BC, as the time increases temperature does not change, why?
4. EF represents which phase of iron?

- (i) Liquid phase
  - (ii) Solid phase
  - (iii) Gaseous phase
  - (iv) Solid and liquid phase together
5. Melting points of different compounds are given below. According to the table, in which of the following compounds the force of attraction between the molecules is strongest?
- (i) MgO
  - (ii) Al<sub>2</sub>O<sub>3</sub>
  - (iii) MnO<sub>2</sub>
  - (iv) Co<sub>3</sub>O<sub>4</sub>

Oxide	Melting Point (K)
Al <sub>2</sub> O <sub>3</sub>	2345
MgO	3125
CaO	2837
Cr <sub>2</sub> O <sub>3</sub>	2539
MnO <sub>2</sub>	808
Fe <sub>2</sub> O <sub>3</sub>	1867
Co <sub>3</sub> O <sub>4</sub>	1163-1213
NiO	2257
Y <sub>2</sub> O <sub>3</sub>	2683
CeO <sub>2</sub>	2873
ZrO <sub>2</sub>	2973

### Question3.

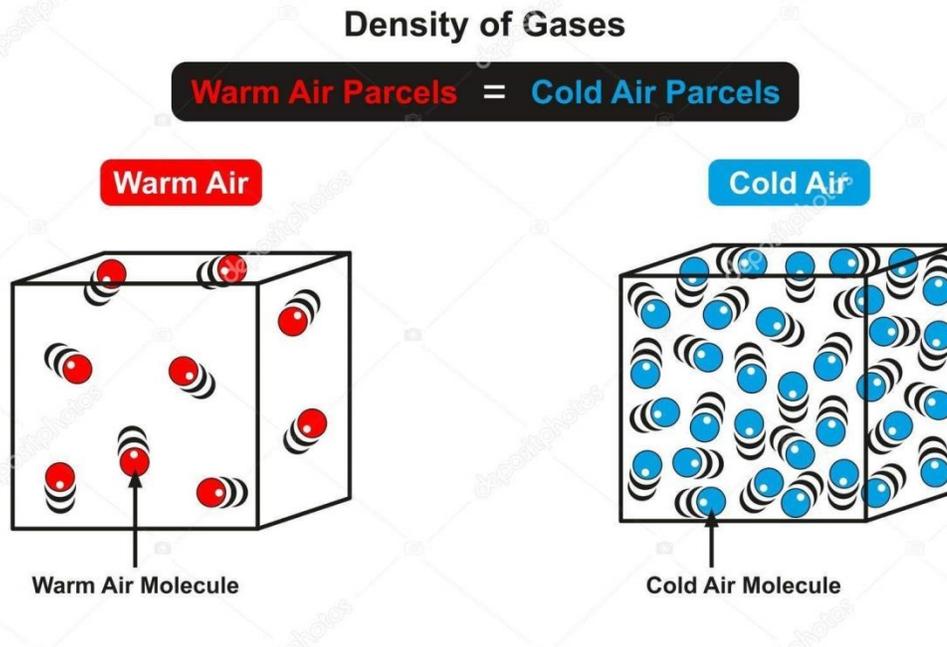
### **THE FACTORS THAT AFFECT DENSITY**

Density is the mass of any material per unit volume. Gases always have much lower density than the condensed phase. Density depends on temperature and pressure. For solids, it's also affected by the way atoms and molecules stack together. A pure substance can take many forms, which don't have the same properties. For example, carbon can take the form of graphite or diamond. Both are chemically identical, but they do not share an identical density value.

1. According to information provided above, on decreasing the temperature, the density of the same mass of the liquid increases. Explain what happens when the temperature of water is decreased?
2. Arrange the following in increasing order of their densities-

smoke, honey, alcohol, wood, cotton, sea water, drinking water.

3. According to the given diagram-
- (a) Volume of warm air = volume of cold air
  - (b) Mass of warm air < mass of cold air
  - (c) Weight of warm air = weight of cold air
  - (d) Density of warm air < density of cold air
- Which of the following is/are correct?



- (i) (a) and (d)
  - (ii) Only (a)
  - (iii) (a), (b), (d)
  - (iv) (a), (b), (c), (d)
4. If a tank of volume  $100 \text{ m}^3$  is completely filled with water, what is the mass of water in it? ( density of water=  $1000 \text{ kg/m}^3$ )
5. Why oil floats on the surface of water?

Question 4.

**PLASMA**

Plasma is when the electrons are freed from their host atoms for a short time, due to high temperature. The state consists of super energetic and super excited particles. These particles are in the form of ionized gases but it is distinct from the gas because it possess unique properties. Free electrical charges cause the plasma to be electrically conductive. The plasma may be formed by heating and ionizing a gas. Fire is plasma.

Lightning is also plasma. When a column of electrons flow from sky to ground, the air that it passes through lights up with energy.



Use the information given above to answer the following questions-

1. Plasma has-
  - (i) Definite volume, definite density, definite shape
  - (ii) Neither definite volume, nor definite shape, but definite density
  - (iii) Indefinite volume, indefinite shape, indefinite density
  - (iv) Definite volume and shape but indefinite density
2. Which of the following is/ are consist of plasma?  
Neon bulb, fluorescent tube, sun, star, ice.
3. Plasma is-
  - (i) Interface between liquid and gas
  - (ii) A type of liquid
  - (iii) Gas
  - (iv) Fourth state of matter
4. Arrange "solid, liquid, gas, plasma" in increasing order of their
  - (i) energy
  - (ii) relative distance between the atoms.

#### Question 5.

#### **EVAPORATION**

Hritik has to go to school tomorrow. But he remembered that his school uniform got wet because of rain while coming from school today. He hung his uniform on a wire on terrace. But he hung his uniform without spreading it properly. His mother told him to spread his uniform otherwise it will take more time to get dry. Hritik wondered why it is so. He asked his science teacher the reason. His science teacher explained this is because of evaporation.

Answer the following questions using above information

1. Why on spreading clothes get dry in lesser time?
2. In which case clothes get dry sooner?
  - (i) If wind speed is large
  - (ii) If humidity is increased
  - (iii) If weather is cold
  - (iv) If clothes are hung in a closed room
3. Which of the following is example of evaporation
  - (A) Ironing of wet clothes
  - (B) Melting of ice cubes
  - (C) Drying of wet hair
  - (D) Sprinkling of water on roof in hot sunny day

Choose correct answer-

  - (i) Only (A)
  - (ii) Only (D)
  - (iii) All of the above
  - (iv) (B) and (C)
4. Why in summers water is used to sprinkle on roof instead of any other liquid?

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