25 important questions with answers- particulate nature of matter

1 Mark Questions

Q1. What are constituent particles of matter?
Ans: Constituent particles are the basic building blocks of matter which make up a substance. These particles may be atoms or molecules.

Q2. Who was the ancient Indian philosopher who proposed the idea of Parmanu?
Ans: Acharya Kanad, an ancient Indian philosopher, proposed the idea of Parmanu, describing them as indivisible eternal particles of matter.

Q3. Define melting point.
Ans: The melting point is the minimum temperature at which a solid melts and changes into liquid at atmospheric pressure.

Q4. Which state of matter has negligible interparticle attraction?
Ans: Gases have negligible interparticle attraction.

Q5. Give one example of a solid with high melting point.
Ans: Iron, which has a melting point of 1538 °C, is an example of a solid with a high melting point.

Q6. Name the process in which water changes into vapour below its boiling point.
Ans: The process is called evaporation.

Q7. What term is used for the spaces between particles of matter?
Ans: The spaces between particles of matter are called interparticle spaces.

Q8. Why do gases have no fixed shape and volume?
Ans: Because the particles in gases move freely in all directions with negligible attraction, they occupy the entire available space and have neither fixed shape nor fixed volume.

2 Mark Questions

Q1. Why does sugar disappear when dissolved in water even though its taste can still be sensed?
Ans: Sugar particles break down into tiny constituent particles and occupy the interparticle spaces between water molecules. Though invisible, they can be sensed by taste, which is why the solution tastes sweet.

Q2. Differentiate between evaporation and boiling.
Ans:

Evaporation is a slow process that occurs at all temperatures only at the surface of a liquid.

Boiling is a rapid process that occurs at a fixed temperature (boiling point) throughout the bulk of the liquid.

Q3. Why does the fragrance of perfume spread across a room quickly?
Ans: The particles of air are in constant motion. They collide with fragrance particles and carry them in all directions, helping them spread quickly throughout the room.

Q4. Why does ice float on water even though both are solids and liquids of the same substance?
Ans: In ice, the particles are arranged in such a way that there are larger gaps between them compared to liquid water. This makes ice less dense than water, so it floats.

Q5. Why can you easily move your finger through water but not through a solid?
Ans: In water, particles are loosely packed with weaker interparticle attractions, allowing movement. In solids, particles are tightly packed with strong forces of attraction, preventing movement.

Q6. Why does sand not dissolve in water but sugar does?

Ans: Sugar particles are small enough to occupy the interparticle spaces in water and interact with water molecules. Sand particles are large and cannot enter these spaces, so they remain undissolved.

3 Mark Questions

Q1. Compare the interparticle spacing and movement of particles in solids, liquids, and gases.
Ans:

Solids: Particles are closely packed with minimum interparticle space. They only vibrate at fixed positions.

Liquids: Particles are loosely packed with some interparticle space. They can move within a limited area.

Gases: Particles are far apart with maximum interparticle space. They move freely in all directions.

Q2. With the help of an activity, explain why gases are compressible while liquids are not.
Ans: In the syringe experiment, when the plunger is pushed, the air inside compresses because gas particles have large spaces between them. When the same is tried with water, there is almost no compression because liquid particles are already closely packed, leaving little space.

Q3. Describe what happens to the particles of a solid when it is heated till it melts.
Ans: On heating, particles in a solid vibrate faster. At the melting point, vibrations become strong enough to overcome interparticle forces of attraction. The solid then changes to a liquid as particles move past each other.

Q4. Explain, with an activity, how diffusion takes place in liquids using potassium permanganate.

Ans: When potassium permanganate crystals are placed in water, they slowly release purple-coloured particles. Water particles, being in constant motion, pull these particles and spread them uniformly throughout the liquid, showing diffusion.

Q5. Why do solids have a definite shape while liquids and gases do not?
Ans: Solids have strong interparticle forces and fixed particle positions, giving them definite shape and volume. Liquids have weaker attractions, so they take the shape of the container but retain definite volume. Gases have negligible attractions, so they have neither definite shape nor definite volume.

Q6. Draw and explain the arrangement of particles in solids, liquids, and gases.
Ans:

Solid: Particles are tightly packed in an ordered arrangement with little space.
Liquid: Particles are loosely packed, with some freedom to move within a limited space.
Gas: Particles are far apart, free to move randomly in all directions.

5 Mark Questions

Q1. Explain with examples the role of interparticle forces of attraction in deciding the states of matter.
Ans:

In solids, interparticle attraction is maximum, keeping particles tightly packed. Example: iron, wood.

In liquids, the forces are weaker, so particles can move past each other. Example: water takes the shape of its container.

In gases, the attraction is negligible, so particles move freely. Example: oxygen fills the entire room.

Thus, the strength of interparticle forces determines whether a substance exists as solid, liquid, or gas.

Q2. Describe the changes in particle arrangement and movement when ice melts into water and then changes to water vapour. Support with diagrams.
Ans:

Ice (solid): Particles are closely packed and vibrate at fixed positions.

Water (liquid): On melting, particles overcome strong forces, move more freely, and take the shape of the container.

Water vapour (gas): On boiling, particles gain enough energy to break all attractions and move randomly with high speed.
(Diagram: show tightly packed → loosely packed → free particles.)

Q3. With suitable activities, explain how interparticle spacing differs in solids, liquids, and gases.
Ans:

Solids: Close packing, very little space; proven by inability to compress solids.

Liquids: Some space; shown by sugar dissolving in water where sugar particles occupy interparticle gaps.

Gases: Large spaces; shown by compressing air in a syringe, where volume decreases significantly.

Q4. Discuss how thermal energy affects the movement of particles in different states of matter. Give at least two activities as examples.
Ans: Thermal energy increases particle movement.

In solids, heating increases vibrations until particles break free, causing melting.

In liquids, heating increases movement until particles escape as vapour at boiling point.

Example 1: Heating ice causes melting into water.

Example 2: Potassium permanganate spreads faster in hot water than in cold water due to faster particle motion.

Q5. “Matter is made up of extremely small particles.” Justify this statement with at least two activities explained in the chapter.
Ans:

Activity with chalk: Breaking chalk into smaller pieces shows it is made of tiny particles. Grinding it further still gives smaller specks.

Activity with sugar in water: Sugar disappears when dissolved, but taste proves its particles are still present, showing matter is made of extremely small, invisible particles.
Thus, these activities confirm the particulate nature of matter.