2.1.3 Particle Theory of Matter (Particle Model of Matter)

Particulate nature of matter means that all matter is made up of discrete tiny particles. Many years later, scientists came back to Democritus' idea and added to it. The theory they developed is called the particle model of matter. The followings are main ideas (postulate) in the particle model of matter:

1. All matter is made up of tiny particles.

2. The particles of matter move continuously.

3. The particles have spaces between them.

4. Adding heat to matter makes the particles move faster.

5. There are forces between the particles.

6. Particles of one substance differ from the particles of other substance.

More about Particle Theory of Matter

The **Particle Theory of Matter** explains that all matter is made up of tiny, invisible particles such as atoms, molecules, and ions. These particles are in constant motion, and the speed of their movement depends on the state of matter. In solids, particles are closely packed and can only vibrate in place, giving solids a definite shape and volume. In liquids, the particles are less tightly packed and can slide past each other, which allows liquids to take the shape of their container while keeping a fixed volume. In gases, particles are far apart and move freely at high speeds, which is why gases have neither a definite shape nor a definite volume.

This theory also states that there are spaces between particles and that these spaces determine the properties of matter. For example, when heat is added to a substance, the particles move faster and the spaces between them increase, which causes expansion. On the other hand, cooling slows down the particles and reduces the spaces, leading to contraction. The Particle Theory of Matter helps us understand many physical changes, such as melting, boiling, evaporation, and condensation, by explaining how particles

behave in different conditions. It provides the foundation for understanding chemistry and physics at a microscopic level.

1. What does the Particle Theory of Matter state about all matter?

a) Matter is made of light

b) Matter is continuous and unbreakable

c) Matter is made up of tiny, invisible particles

d) Matter cannot change form

2. What happens to particles when a substance is heated?

a) They stop moving

b) They move slower

c) They get bigger

d) They move faster

3. According to the particle model, what is the spacing of particles in solids?

a) Very far apart

b) Random and changing

c) Tightly packed and fixed

d) Floating freely

4. Which of the following is NOT a key idea of the particle theory?

a) All matter is made up of particles

b) Particles are in constant motion

c) Particles are always hot

d) Particles attract each other

5. What is the main difference in particle movement between solids and gases?

a) Solids move faster than gases

b) Gas particles are completely still

c) Gas particles move freely; solid particles only vibrate

d) Solid particles move in all directions

6. What happens to the forces of attraction between particles as substances change from solid to gas?

a) They get stronger

b) They remain the same

c) They weaken

d) They become magnetic

7. In which state of matter are particles furthest apart?

a) Solid b) Liquid c) Gas d) Plasma

8. What causes a substance to change state (e.g., from solid to liquid)?

a) Change in shape

b) Change in particle size

c) Change in temperature (energy)

d) Change in color

9. Why do gases fill any container they are placed in?

a) They are sticky

b) They have strong bonds

c) Their particles move freely in all directions

d) They are attracted to the container walls

10. Which of the following best describes liquid particles?

a) Fixed position, no movement

b) Closely packed but can slide past each other

c) Spread very far apart and move freely

d) Not made of particles

11. What does the particulate nature of matter mean?

a) Matter is made of only liquids and gases

b) Matter is made of continuous waves

c) All matter is made up of tiny, discrete particles

d) Matter cannot change its form

12. Who first proposed the idea that matter is made up of tiny particles?

a) Galileo b) Newton c) Democritus d) Dalton

13. What happens to particles when heat is added to a substance?

a) The particles become larger b) The particles disappear

c) The particles slow down d) The particles move faster

14. According to the particle model of matter, what is true about the motion of particles?

a) Particles only move in gases

b) Particles move only when visible

c) Particles are always in motion

d) Particles never move

15. Why are substances different from one another according to the particle model?

a) Their particles are always the same

b) Substances contain air particles

c) The particles of one substance differ from those of another

d) Substances have the same boiling point

16. What do spaces between particles explain about matter?

a) Matter cannot be compressed

b) Matter always sinks

c) Matter can change shape and volume

d) Matter has invisible waves

17. What is the role of forces between particles in matter?

a) They cause particles to stop moving

b) They keep particles together

c) They make particles evaporate

d) They reduce temperature.