

Characteristics of particles of Matter

The important characteristics of particles of matter are the following:

1. The particles of matter are very, very small.
2. The particles of matter have space between them.
3. The particles of matter are constantly moving.
4. The particles of matter attract each other.

The particles of matter are very, very small:

The very, very small size of particles of matter can be shown by performing the following experiment by using potassium permanganate and water.

- Take 2-3 crystals of potassium permanganate and dissolve them in 100 ml of water in a beaker. We will get a deep purple colored solution of potassium permanganate in water.
- Take out approximately 10 ml of this solution and put it into 90 ml of clear water in second beaker. Due to this dilution, the color of potassium permanganate solution in the second beaker becomes a bit lighter.
- Take out 10 ml of this solution and put it into another 90 ml of clear water in third beaker. The color of solution will become still lighter.
- Keep diluting the solution like this 5 to 8 times.
- In this way, we get a very dilute solution of potassium permanganate in water but the water is still colored.
- This experiment shows that just a few crystals of potassium permanganate can colour a large volume of water.
- So we conclude that there must be millions of tiny particles in just one crystal of potassium permanganate, which keep on dividing themselves into smaller and smaller particles.

The particles of matter have space between them:

- The spaces between the particles of matter can be shown by performing the following experiment by using water and sugar.
- Take a 100 ml beaker.
- Fill half the beaker with water and mark the level of water.
- Dissolve some sugar (50gm) with the help of a glass rod.
- We will find that the level of sugar solution in the beaker is at the same mark where water level was initially in the beaker.
- When sugar is dissolved in water, its crystals separate into very fine particles. These particles of sugar go into the spaces between the various particles of water due to which there is no change in the volume of water on dissolving sugar in it.
- The fact that there is no change in volume on dissolving sugar in water tells us that there are spaces between the particles of water.

The particles of matter are constantly moving:

- The best evidence that particles of matter are constantly moving comes from the experiments on diffusion and Brownian motion.
- The particles of matter are constantly moving can be shown by performing the following experiment by using potassium permanganate and water.
- As in above.
- If we carry out this experiment by using hot water in the beaker (or gas jar), we will find that the water turns purple at a faster rate. This is because, on heating, the particles of water and that of potassium permanganate gain kinetic energy and move faster. And due to faster movements, they mix into each other more quickly.

The particles of matter attract each other:

- There are some forces of attraction between the particles of matter which bind them together.
- The force of attraction between the particles of the same substance is known as cohesion.
- If we take a piece of chalk, a cube of ice and an iron nail, and beat them with a hammer, we will find that it is very easy to break the piece of chalk into smaller particles, it requires more force to break a cube of ice, whereas the iron nail does not break at all even with a large force.
- This shows that the force of attraction between the particles of chalk is quite weak; the force of attraction between the particles of ice is a bit stronger whereas the force of attraction between the particles of iron nail is very, very strong.
- Note: In general, the force of attraction is maximum in the particles of solids matter and minimum in the particles of a gaseous matter.
- Note: rigid means 'unbending' or 'inflexible'. A stone is rigid because it is unbending or inflexible.

Fluid means a material which can flow easily and requires a vessel to keep it.