

Reviewer in Science 8  
Phase Properties of Matter  
Physical Changes

Do not focus only on memorizing terms. Make sure that you understood the processes taking place. You may also study the activities that we did, especially the tables and diagrams. Best of luck! ♥ - Ma'am Erica

PHASE PROPERTIES OF MATTER

Particle nature of matter:

- ✓ Matter is made up of tiny particles.
- ✓ Particles of matter are moving all the time.
- ✓ These particles have spaces between them.
- ✓ The particles of matter attract each other.

Solid

It has definite shape and volume because its particles are closely packed together in a fixed position. These particles vibrate and are held together by strong attractive forces. It is difficult to compress the particles.

Liquid

It has a definite volume and takes the shape of the container. Liquid flows easily because its particles have enough space and have less attractive force. The spaces in the particles allows particles to be compressed a little bit.

Gas

It takes the volume and shape of the container. Gas particles are far from each other that is why they have the weak attractive force and can flow easily. They occupy the entire space available. The large spaces in between particles allows particles to be compressed easily.

Matter is made up of tiny particles. It has three states; solid, liquid, and gas.

Solid particles have definite shape and volume. These particles vibrate and held together by strong attractive forces.

Liquid particles have definite volume and take the shape of the container. These particles have less attractive forces and they easily flow.

Gas particles take the volume and shape of the container. Gas particles are far from each other and have weak attractive force. They easily flow in any direction faster than liquid particles and occupy the entire space available.

- The order of intermolecular distance is:- Solid < Liquid < Gas
- Energy order in particles :- Solid < Liquid < Gas
- Solid particles can only vibrate around their mean location because they have limited mobility.
- Because gaseous particles have a large Kinetic energy, they can move very quickly.
- The volume of gas is infinite because it can fill the entire container.
- Because it can accommodate the geometry of the container, the shape of liquid and gas is infinite.

Solids

Paper, bricks, wood, metal, and ice are all solid materials. Because the particles of solids are so close together, they cannot normally be squeezed or squashed. The forces of attraction between the particles keep them together and in place.

Liquids

There are several liquids, including water, oil, fruit juice, and many others. Liquid particles are randomly distributed and close together, touching several of their neighbors. There are some gaps, but liquids are typically unable to be crushed or squashed.

Gases

There are several gases, including the air we breathe and the helium used to fill balloons. Because gas particles are widely

separated and irregularly structured, they can be easily squeezed or squashed.

PHASE CHANGES

**Melting** happens when solid turns to liquid. When solid is heated, it absorbs energy enough to overcome the force that holds the particles together. The attraction between particles becomes less allowing them to move freely. When this happens, the melting point of the solid is reached and the solid melts. **Melting point** is the temperature at which solid turns into a liquid.

Further cooling of the liquid causes **freezing** or solidification. This process allows the particles to get closer and have rigid position. The particles can no longer move freely instead, they will just vibrate. The temperature wherein a liquid solidifies is called **freezing point**.

Evaporation and condensation are two processes through which matter changes from one state to another. Matter can exist in three different states: solid, liquid or gas. In evaporation, matter changes from a liquid to a gas. In condensation, matter changes from a gas to a liquid. All matter is made of tiny moving particles called molecules. Evaporation and condensation happen when these molecules gain or lose energy. This energy exists in the form of heat. **Evaporation** happens when a liquid is heated. For example, as the sun heats water in a puddle, the puddle slowly shrinks. The water seems to disappear, but it actually moves into the air as a gas called water vapor. This is an example of evaporation.

**Condensation** happens when molecules in a gas cool down. As the molecules lose heat, they lose energy and slow down. They move closer to other gas molecules. Finally these molecules collect together to form a liquid.

Changes in physical state from solid to liquid and to gas or vice versa are common. However, some substances change from *solid to gas* without passing through the liquid state. This change is called **sublimation**. Examples of substances that undergoes this kind of changes are dry ice, mothballs, toilet bowl deodorizer.

A reverse reaction in which a *gas changes directly to solid* without passing through the liquid state also happens and this is called **deposition**. An example of this changes is when water vapor changes directly into frost formation.

Phase	Volume and Shape	Motion	Density	Compressibility
Solid	fixed volume and shape	atoms or molecules vibrate in a fixed position relative to one another	high	difficult to compress
Liquid	fixed volume, shape conforms to the container	atoms or molecules are close together, but can still move around in a disordered way	moderate	minor compressibility
Gas	volume and shape conform to the container	particles are in constant motion, sliding past each other	low	easy to compress

Phase Change	Original Phase	Final Phase
Melting	solid	liquid
Freezing	liquid	solid
Condensation	gas	liquid
Evaporation (or vaporization)	liquid	gas
Sublimation	solid	gas
Deposition	gas	solid