Chapter- 5

# Solids, Liquids and Gases

**STUDY NOTES**

***Let's Learn***

**Matter:**

- Anything that occupies space and his weight is called matter.
- Matter can be a solid, a liquid or a gas.
- All matter is made above very tiny units that are not visible to the naked eyes. These units are called molecules.
- Molecule is the smallest unit of a substance that has all the properties of that substance.
- For example, a salt molecule is the smallest particle of salt. Each salt molecule has a property of salt.

**Molecules are made up of atoms:**

- A molecule can be further broken down into still smaller units called atoms.
- Atoms are the building blocks of matter.
- All kind of matter in the world is made up of around 117 kinds of atoms.
- Atoms of the same kind forms elements.
- Atoms of different kinds combine to form compounds.

**More about molecules:**

- Molecules are always in a state of motion.
- They constantly attract each other.

| Solids | Liquids | Gases |
|---|---|---|
| Molecules are tightly packed | Molecules are loosely packed | Molecules are far apart |
| Molecules attract each other with great force | Molecules attract each other with a lesser force | Attraction between the molecules is least |
| Molecules in solid doesn't move | Molecules in liquid can move around freely | Molecules in gases move faster than the molecules in a solid or a liquid |
| Solids have a definite shape and volume | Liquids have a definite volume but no definite shape | Gases neither have a definite shape nor have a definite volume |

**Solids in water:**

- Substances like sugar, salt and potassium permanganate can mix with water completely.
- They are soluble in water.
- Their molecules find space between the molecules of water.

**Liquids in water:**

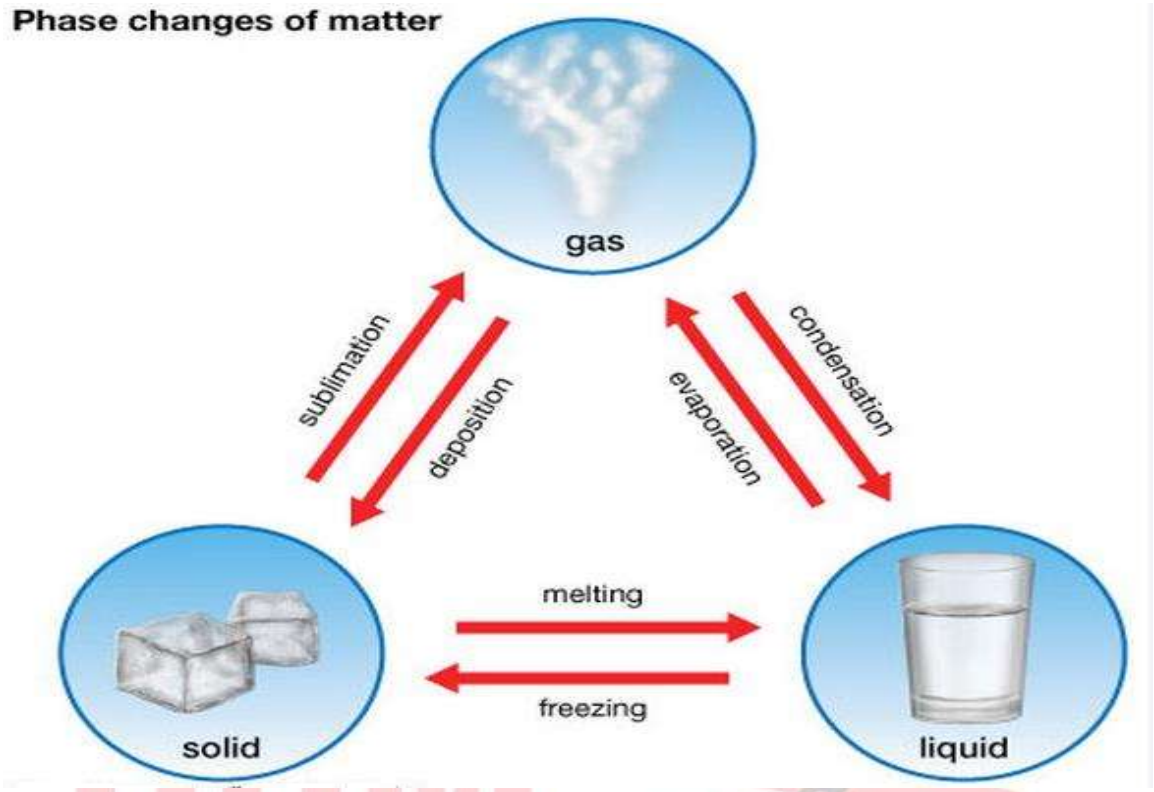
- Substances like alcohol, lemon juice, etc. can completely mix with water.
- Two liquids that can dissolve with each other and appear as one liquid are said to be miscible liquids.
- Oil, butter, turpentine, paints cannot dissolve in water therefore they are immiscible liquids in water.

**Gases in water:**

- Gases like oxygen, nitrogen, ammonia and carbon dioxide can dissolve in water.
- Fish and other animals that live in water breathe in the oxygen dissolve in water.
- When water starts boiling bubbles are formed on the sides of the vessel and at the bottom of the water. These bubbles are the dissolved gases that separate from the water on heating.
- The gas that bubbles out of an aerated drink is carbon dioxide which is dissolved in water under great pressure.

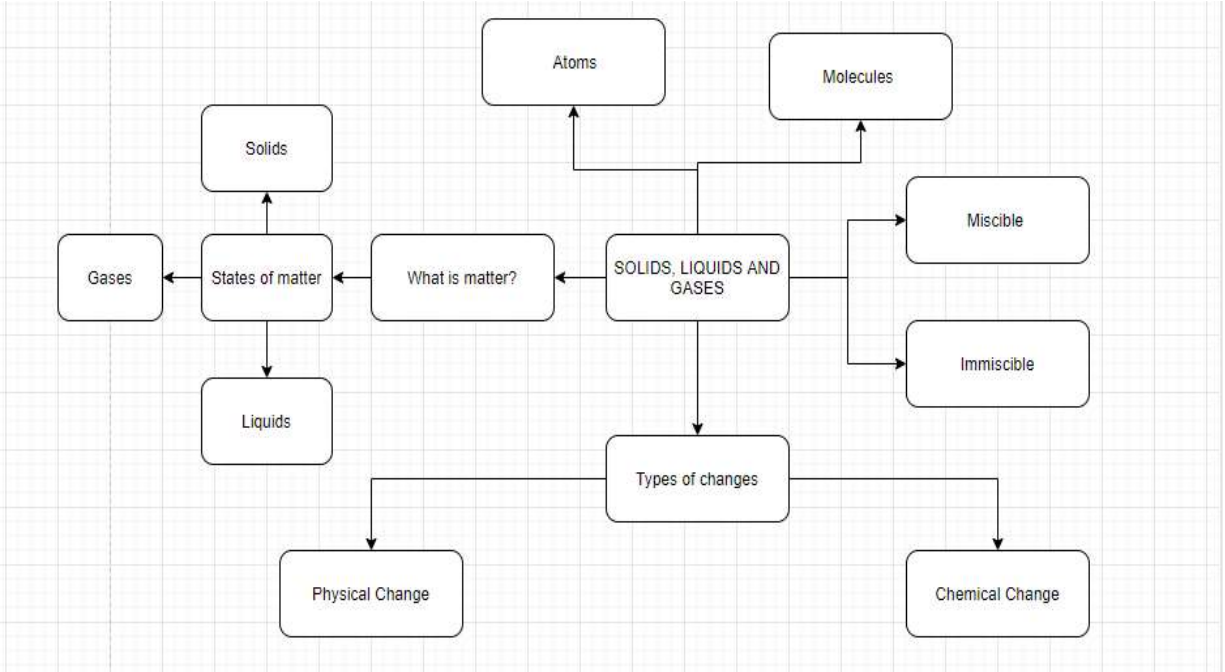
**Change of state of matter:**

- By heating or cooling we can change the state of matter of a substance.
- The process of change of ice into water on heating is called melting.
- The process of change of water into steam on heating is called evaporation.
- The process of change of water vapour into water on cooling is called condensation.
- The process of change of water into ice on cooling is called freezing.
- The process of change of solid into gas on heating is called sublimation.
- The process of change of gas into liquid on cooling is called deposition.
- Sometimes matter changes all together to form a new substance as well.




| Physical Change | Chemical Change |
|---|---|
| 1. Physical change is a temporary change.<br>2. It can be reversed.<br>3. There can be a change in state<br>4. No new substances are formed.<br>5. For example, changing of water to ice. | 1. Chemical change is a permanent change.<br>2. It cannot be reversed.<br>3. There can be change in state as well.<br>4. Completely new substances are formed.<br>5. For example, burning of paper. |

MEMORY MAP




***Let's Know More***

**I. Choose the correct answer.**

1. Matter /Atom / molecule is anything that occupies space and has weight.
2. Molecules/ atoms/ elements are the building blocks of matter.
3. In solids/ gases/ liquids molecules are separated by large empty spaces.
4. When two liquids mixed together, they are set to be miscible/ immiscible/ reversible.



***Let's Do***

**A. Tick the correct answer.**

1. Which of the following is a physical change?
   - **a.** Melting of butter
   - **b.** rusting of iron
   - **c.** burning of paper
   - **d.** changing of wheat to bread
2. Milk turning sour is a
   - **a.** physical change
   - **b.** reversible change
   - **c.** chemical change
   - **d.** none of these
3. _____ and salt are soluble in water.
   - **a.** sugar

**b.** Chalk
**c.** Sand
**d.** kerosene

**4.** In ice, the water molecules are/ can
**a.** Stuck together
**b.** very close to each other
**c.** move around freely
**d.** move very fast

**5.** The gas that bubbles out of an aerated drink is
**a.** Nitrogen
**b.** Oxygen
**c.** Hydrogen
**d.** carbon dioxide

**B. Match each word with its description.**

| | |
|---|---|
| **1.** Matter | **a.** Has a definite shape and volume |
| **2.** Molecule | b. has no definite shape, but a definite volume |
| **3.** Gas | **c.** Sugar |
| 4. Miscible in water | d. attraction between the molecules is the least |
| **5.** Solid | **e.** anything that takes up space and has weight |
| **6.** Liquid | **f.** smallest unit of a substance |

***Understand and Answer***

**C. Write short answers.**

**1.** What is matter?
**2.** What are molecules?
**3.** What are molecules made of?
**4.** Name any two solids, two liquids and two gases that can dissolve in water.

**D. Answer these questions.**

**1.** Why do solids have a fixed shape?
**2.** Why do liquids flow?
**3.** Write two differences between liquids and gases.
**4.** When do we say that liquids are miscible?
**5.** What is a physical change? Give two examples.
**6.** What is a chemical change? Give two examples.
**7.** Give three characteristics feature of a chemical change.

***Teacher's Note***

- Make a poster on changes in states of matter.

***Improve Your GK***

- Plasma is the fourth state of matter.
- Water is a compound made up of hydrogen and oxygen.

***Answer Key***

**I.**

**1.** Matter
**2.** Atoms
**3.** Gases
**4.** Miscible

**A.**

**1.** Melting of butter
**2.** chemical change
**3.** Sugar
**4.** move around freely
**5.** carbon dioxide

**B.**

| | |
|---|---|
| 1. Matter | a. anything that takes up space and has weight |
| 2. Molecule | b. smallest unit of a substance |
| 3. Gas | c. attraction between the molecules is the least |
| 4. Miscible in water | d. sugar |
| 5. Solid | e. has a definite shape and volume |
| 6. Liquid | f. has no definite shape, but a definite volume |



**C.**

**1.** Matter is anything that occupies space and has weight.
**2.** A molecule is the smallest unit of a substance that has all the properties of that substance.
**3.** Molecules are made up of atoms.
**4.** a. Two solids that can dissolve in water are sugar and salt.
a. Two liquids that can dissolve in water are lemon juice and Vinegar.
b. Two gases that can dissolve in water are oxygen and nitrogen.

**D.**

**1.** Solids have a fixed shape because the molecules are very close to each other and they have a very great force of attraction between the molecules.
**2.** In liquids, the molecules are less closely packed and the attraction between the molecules is also less. Molecules can move around freely. That is why liquids can to flow.
**3.** a. Liquids have a definite volume but gases do not have a definite volume.

b. Molecules in liquid are less closely packed whereas molecules in gases are far apart.

4. When two liquids mixed together and appear as one liquid. They are said to be miscible liquids.
5. A change in which no new substance is formed and it is temporary and can be reversed is called a physical change. For example, melting of ice, freezing of water.
6. A change in which completely new substances are formed and it is permanent and cannot be reversed is called a chemical change. For example, burning of paper, spoiling of food.
7. Some of the characteristic features of a chemical change are:
    a. It is a permanent change.
    b. It cannot be reversed.
    c. Completely new substances are formed.