Chapter 1: Matter in Our Surroundings

1. Definition of Matter

- Matter is anything that has **mass** and occupies **space**. Everything around us – air, water, books, even our body – is made of matter.

2. Physical Nature of Matter

- Matter is made up of **particles**.
- Particles of matter are **very small** and have **space between them**.
- They are **constantly moving** and have **force of attraction** between them.

3. Characteristics of Particles of Matter

- They have space between them (inter-particle space).
- They are continuously moving (kinetic energy).
- They attract each other (inter-particle attraction).

4. States of Matter

- There are **three main states**:
  - **Solid**
  - **Liquid**
  - **Gas**

5. Solids

- Fixed shape and volume.
- Particles are **tightly packed** and vibrate in fixed positions.
- **Strong intermolecular force** and **negligible compressibility**.

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6. Liquids

- No fixed shape but have **fixed volume**.
- Particles are **less tightly packed** and can move around.
- Moderate intermolecular forces and slight compressibility.

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7. Gases

- Neither fixed shape nor volume.

- Particles are **far apart** and move freely.
- **Weak intermolecular forces** and **high compressibility**.

Change in State of Matter

- Matter can change from one state to another by **changing temperature or pressure**.
- Examples:
  - Ice (solid) melts to water (liquid).
  - Water boils to become steam (gas).

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12. Melting and Melting Point

- **Melting** is the change from solid to liquid.
- **Melting Point**: The temperature at which this change occurs (for ice, it's 0°C).

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13. Boiling and Boiling Point

- **Boiling** is the change from liquid to gas.
- **Boiling Point**: The temperature at which a liquid boils (for water, it's 100°C at normal pressure).

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14. Latent Heat

- Heat energy required to change the state without changing temperature.
  - **Latent Heat of Fusion**: Solid → Liquid.
  - **Latent Heat of Vaporization**: Liquid → Gas.

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15. Sublimation

- Direct change from solid to gas and vice versa.
- Substances like **camphor, naphthalene, and dry ice** show sublimation.

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16. Evaporation

- Surface phenomenon where liquid changes to gas **below boiling point**.

- Example: Wet clothes drying in the sun.

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17. Factors Affecting Evaporation

- **Temperature**: Higher temp = faster evaporation.
- **Surface Area**: Larger area = more evaporation.
- **Wind Speed**: Higher speed = faster evaporation.
- **Humidity**: Less humidity = more evaporation.

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18. Evaporation Causes Cooling

- As particles leave the surface, they take away **heat energy**, cooling the remaining substance.
- Example: Sweating cools the body.

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19. Effect of Pressure on State

- Increasing pressure can bring gas molecules closer, changing them to liquid.
- This is how **liquefied gases** like LPG are stored.

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20. Uses in Daily Life

- Refrigerators use **evaporation cooling**.
- Sublimation is used in **air fresheners**.
- Pressure-based liquefaction is used in **gas cylinders**.

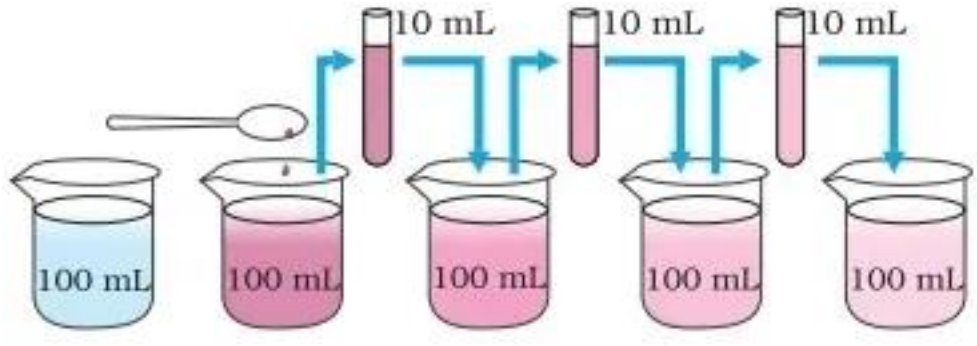
Activity 1: Demonstration of Diffusion in Liquids

Aim: To show that particles of matter are constantly moving.

Materials:

- A glass beaker
- Water
- Few crystals of potassium permanganate ($KMnO_4$)

Procedure:



1. Fill the beaker with water.
2. Gently add crystals of $KMnO_4$ without stirring.
3. Observe the water slowly turning purple.
4. Keep diluting the solution like these 5 to 8 times

Conclusion:

- The color spreads on its own, showing **diffusion** due to particle movement.

Activity 2: Demonstration of Diffusion in Gases

Aim: To show diffusion in gases.

Materials:

- Incense stick (agarbatti) or perfume
- A closed room

Procedure:

1. Light an incense stick or spray perfume in one corner.
2. Wait and see how the smell spreads across the room.

Conclusion:

- Particles of gas move freely and mix – showing **diffusion** in gases.

Activity 3: Change of State by Heating (Melting Ice)

Aim: To observe how solids melt into liquids.

Materials:

- Ice cubes
- Beaker
- Thermometer
- Tripod stand, burner (optional)

Procedure:

1. Put ice in a beaker and insert a thermometer.
2. Heat gently or let it sit at room temperature.
3. Note the temperature when ice starts melting.

Conclusion:

- The temperature remains constant during melting – shows **latent heat of fusion**.

Activity 4: Boiling of Water

Aim: To study boiling and latent heat of vaporization.

Materials:

- Water
- Beaker
- Thermometer
- Burner or stove

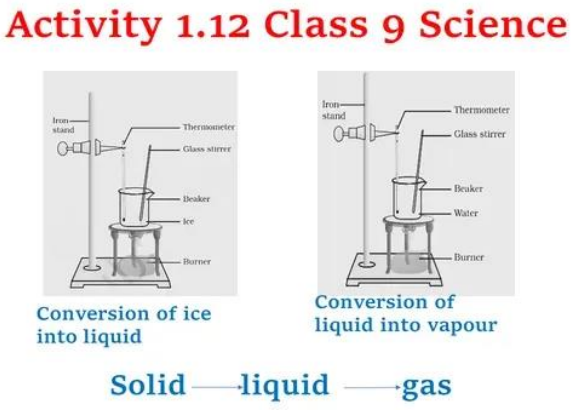
Procedure:

1. Heat water in a beaker and insert the thermometer.
2. Note when water starts to boil (bubbles appear).

3. Observe the temperature during boiling.

Conclusion:

- Temperature stays constant at **100°C** while water turns to steam – **boiling point** and **latent heat of vaporization**.



Activity 5: Demonstrating Sublimation

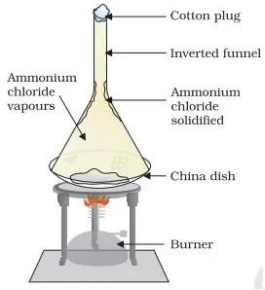
Aim: To observe sublimation – solid to gas.

Materials:

- Camphor or naphthalene balls
- China dish
- Inverted funnel
- Cotton

Procedure:

1. Place camphor in a china dish.
2. Cover with an inverted funnel and plug the stem with cotton.
3. Heat gently and observe.



Conclusion:

- Camphor directly changes into gas – **sublimation**.

Activity 6: Evaporation and Cooling Effect

Aim: To show that evaporation causes cooling.

Materials:

- Water
- Cotton or cloth strip
- Spirit (optional)

Procedure:

1. Dip cloth in water or spirit and wrap around your wrist.
2. Wave your hand or blow air.

Conclusion:

- You feel cool – due to **evaporation removing heat** from your skin.