

Chapter 6: Heat and Energy

Heat and Energy

- Heat is a form of **energy** that can be produced by doing work or by converting other forms of energy like **electrical** or **chemical** energy.
- **Internal energy** is the total energy of all the molecules in a body.
- A **hot body** has more internal energy than a cold one. When a hot body touches a cold one, **heat flows** from hot to cold until thermal equilibrium is reached.

Unit of Heat

- Same as energy:
 - **SI unit:** Joule (J)
 - **CGS unit:** Calorie
-

Concept of Temperature

- Temperature tells us the **thermal state** of a body (how hot or cold it is).
- It decides the **direction of heat flow** (from higher to lower temperature).
- Equal temperature doesn't mean equal heat — heat depends on **mass, temperature, and material**.

✓ Units of Temperature:

- **Kelvin (K)** – SI unit
 - **Celsius (°C)**
 - **Fahrenheit (°F)**
-

Thermal Expansion

- Substances expand on heating:
 - **Linear expansion** – Increase in length
 - **Superficial expansion** – Increase in area
 - **Cubical expansion** – Increase in volume
-

Anomalous Expansion of Water

- Water **expands on cooling** from **4°C to 0°C**, which is unusual (anomalous).

✓ Consequences:

1. **Preserves aquatic life** – Ice floats and insulates water below, keeping it at 4°C.
 2. **Bursts water pipes** and **damages crops** in winter – Water expands in pipes/capillaries when frozen.
-

Greenhouse Effect

- Discovered by **Joseph Fourier (1824)**.
 - **Infrared radiation** from Earth's surface is trapped by greenhouse gases like:
 - **CO₂, H₂O vapour, CH₄, N₂O, CFCs, O₃**
 - These gases absorb heat and **keep Earth warm**.
-

Global Warming

- Rise in Earth's average temperature due to increased greenhouse gases.

✓ Causes:

1. Increase in **CO₂** – from burning fuels, deforestation, industries
2. Increase in **CH₄** – from farming, gas leaks, animal waste
3. Increase in **CFCs** – from ACs, refrigerators, sprays

✓ Impacts:

- Climate change
 - Melting glaciers
 - Rising sea levels
 - New diseases
 - Heat-related deaths
 - Disappearance of species
-

How to Reduce Global Warming

1. **Technological:**
 - Use renewable energy
 - Switch to clean transportation
 - Use eco-friendly stoves
 2. **Economic:**
 - Reforestation
 - Carbon tax for industries
 3. **Policy:**
 - Educate for sustainable living
 - Family planning and women empowerment
-

