Grade 11 - Science
Assignment 04 - Heat

Thermal expansion

The increase in dimensions of a substance subjected to an increase in temperature is known as thermal expansion.
that is, the increase in its length, area of volume.
Similarly, the decrease in in in dimension of a substance subjected to a decrease in temperature is known as contraction.(Decrease in in its length area of volume)

Q : Two glasses are washed and one inserted inside the other And they are found to be stuck together. The two glasses can be separated by pouring cold water into the inner glass and inserting it in the outer glass in a vessel containing warm water. explain this briefly.

Thermal expansion occurs in three instances.

1. expansion of solids
2. expansion of liquids
3. expansion of gases

1. **Expansion of solids**
   - **Q :** Draw the Apparatus of activity 9.3. write the observations and conclusions.
   - **Q :** Write some influences and applications of expansion of solids.
   - **Q :** What is a bimetallic strip?
   - **Q :** Explain the operation of a bimetallic strip using a diagram.

2. **Expansion of liquids**
   - **Q :** Draw the Apparatus of activity 9.4. write your observation and conclusion.
   - **Q :** Name some applications of expansion of liquids.

3. **Expansion of gases**
   - **Q :** Draw the Apparatus of activity 9.5. write your observations and conclusion.
   - **Q :** Name some applications of expansion of gases.

Heat transfer

Heat passing from one place to another is known as heat transfer.

The heat transfer occurs from the place with the higher temperature to the place with the lower temperature.

The thermal energy (heat) of an object is actually present as the kinetic energy resulting from the random motion of the particle that forms the object.

There are three methods of transferring heat.

1. Conduction
2. Convection
3. Radiation

1. Conduction

The main method of heat transfer through solid is conduction.

conduction is the spreading of the kinetic energy of atoms and electrons throughout the substance due to pollution among the particles.

Q : What are good conductors of heat?

Q : Give 5 examples for conductors of heat.

Q : What are insulators of heat?

Q : Give 5 examples for insulators of heat.

Q : Explain the conduction through a metal rod when it is heated from one end using the figure 9.27.

2. Convection

Q : What is convection?

Q : Draw a simple Apparatus that can be used to observe convection current in the laboratory.

Q : Explain the conventional current.

Q : Explain that the changes happen when an immersion heater used to heat up water.

Q : Explain the formation of sea breeze and land breeze using proper diagrams.

3. Thermal radiation

The propagation of heat in the form of electromagnetic radiation from a warm body without the aid of matter is known as thermal radiation.

For heat transfer by radiation, a material medium is not required.

for conduction or convection, particles of a medium essential.

Examples :

Feeling warmth when walking to a fire

Transferring heat from Sun

Releasing of heat in the form of rays(waves) from any heated object

Absorption and reflection of thermal radiation

- The absorption of thermal radiation is high from
    1. darker surfaces(black)
    2. rough surfaces

- Reflection of thermal radiation is high from
    1. shining surfaces
    2. polished surface
    3. White Surfaces

Q : Write some situations where thermal radiation is important in day to day life.

Q : Do the exercise given at the end of the lesson.