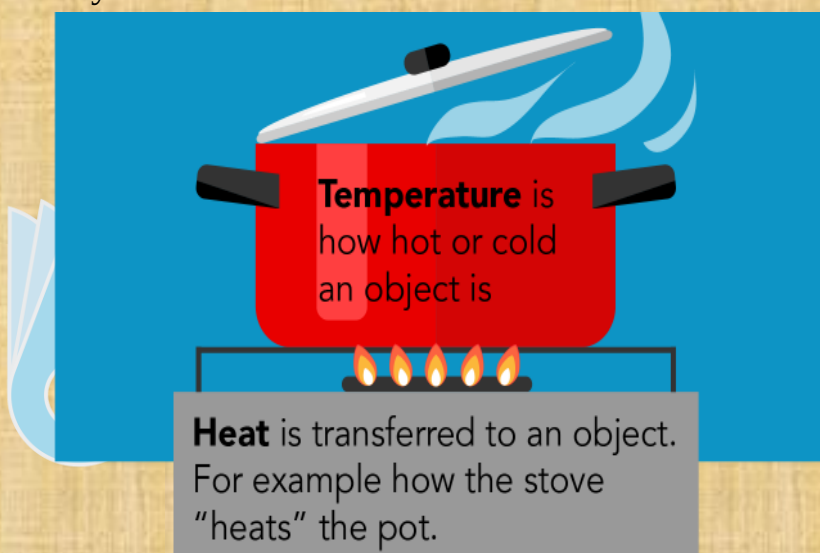


CHAPTER 05

HEAT - MEASUREMENT

Heat is a form of energy that transfers from one body to another due to difference in temperature. Energy transfers from hotter body to colder. It results in the increase in the temperature of colder body and decrease in the temperature of hotter body to attain the state of equilibrium.

Heat and temperature are different. Heat is a form of energy and temperature is a measure of amount of energy present in a body.



Consider a very hot cup of milk placed on a metal table. Cup of milk has a temperature of 70°C and the room temperature is 25°C . At 70°C , will you dare to drink the milk? NO! Because at these high temperatures both the milk and milk cup are very hot to touch. Overtime both the milk and milk cup will cool down and reaches to drinkable temperature. If you allow it cool down for a while it reaches the room temperature. So, the milk cools from 70°C to 25°C .

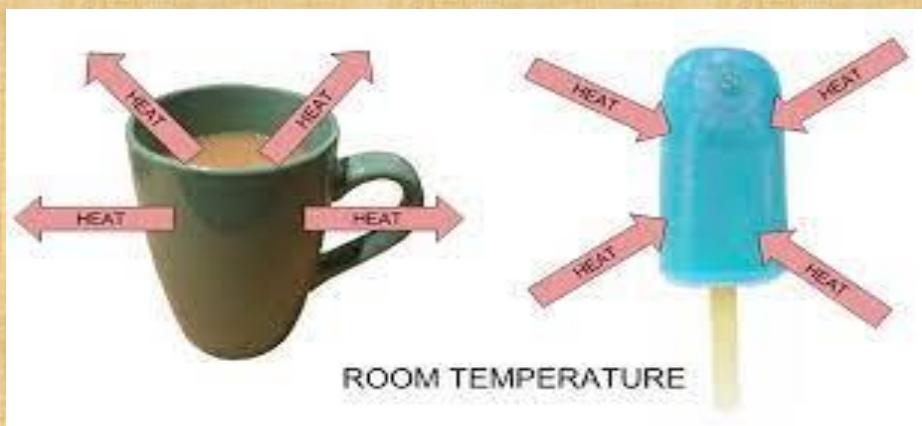
By observing this we can say that milk and milk cup are transferring heat to their surroundings. The transfer of heat occurs from hot cup of milk to surrounding air. The milk is losing

energy and there is decrease in temperature. The lost energy transfers to the colder surroundings.

Heat is simply the transfer of energy from a hot object to a colder object.

If you place a cool drink on a metal table, which is taken out from refrigerator, its temperature is 4°C and room temperature is 25°C . What will happen? The cool drink and the bottle will warm up to room temperature.

There is a transfer of heat. This time the heat transfers from surroundings to cool drink and its temperature rises from 4°C to 25°C . Energy transfers from the surroundings to the colder object in the form of heat.



Simply heat, defined as the transfer of energy from the higher temperature object to a lower temperature object. The heat energy can be converted into other forms of energy like electrical energy in case of thermal power stations and electric energy can be converted to heat in case of electric heaters.

Not only electric energy, heat energy can be converted to other forms of energy and vice versa.

Temperature is a measure of the degree of hotness or coldness of an object. Generally, thermometers are used to measure the temperature.

HOW TO MEASURE TEMPERATURE?

Temperature is a measure of the heat energy in a body and indicates the ability of a body to give heat to another body or absorb heat from another body. We use thermometers to measure the temperature.

There are many different types of thermometers used to measure temperature. They can measure the temperature of a solid such as food, a liquid such as water or a gas such as air.

The three most common units of measurement for temperature are Celsius, Fahrenheit and Kelvin.

- Zero degrees Celsius is the freezing point of water and 100 degrees Celsius is the boiling point of water.
- In Fahrenheit units water freezes at 32 degrees Fahrenheit and boils at 212 degrees Fahrenheit.

Thermometer:

A common form of thermometer contains a liquid in a narrow glass tube. Liquid expands at a regular, measurable rate when it is heated. Mostly used liquid in thermometers is Mercury. Other liquids like ethanol, kerosene are also used in thermometers.

When heat rises, the liquid expands from a bulb into the empty area, climbing up the tube. When the temperature falls, the liquid contracts and goes back down.

These thermometers include both Celsius and Fahrenheit temperature scales which display on either side of tube. Each long line is for 1°F temperature. The four shorter lines between each long line are for 0.2°F of a degree of temperature.



Clinical thermometer:-

Is used to measure a person's body temperature. Normal body temperature is about 98.6°F or 37°C . It often varies from 1° to 2°F .

Scale of clinical thermometers range from 35°C to 45°C .

As mercury is toxic and cannot fall easily when temperature lowers, digital thermometers are being used widely these days.



Digital thermometers:

These are most accurate and quick. Digital thermometers work by using heat sensors that determine body temperature. Digital thermometers provide accurate readings in about 1 minute or less by displaying the reading digitally.



Thermister

thermometer:-

It is available in market to measure the human body temperatures, particularly for infants and children.

Laboratory thermometers:

Laboratory thermometers measure temperature with a high level of precision for experiments. It is used in laboratories for scientific purposes with a scale generally ranging from -10°C to 110°C . They have silver bulb at one end generally pointed towards mercury which expands with rise in temperature and contracts on lowering the temperature. These are used to check the boiling points, freezing points and temperatures of different solutions in experiments in laboratories.





**Medical
Clinical
Thermometer**



**Laboratory
Thermometer**



**Engine
Oil
Thermometer**



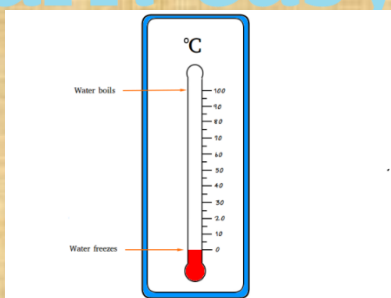
**Aquarium
Thermometer**

- Heat is a form of energy that transfers from one body to another due to difference in temperature.
- Heat is simply the transfer of energy from a hot object to a colder object.
- Temperature is a measure of the degree of hotness or coldness of an object.
- Heat is a form of energy and temperature is a measure of amount of energy present in a body.
- We use thermometers to measure the temperature.

- The three most common units of measurement for temperature are Celsius, Fahrenheit and Kelvin.
- Mercury and alcohol are the commonly used thermometric liquids.
- Normal human body temperature is about 98.6°F or 37°C. It often varies from 1° to 2°F.
- Digital thermometers are most accurate and quick.
- Thermister thermometer are measure the human body temperatures, particularly for infants and children.
- Laboratory thermometers measure temperature with a high level of precision for experiments in laboratories.

Glossary

- Celsius scale – A temperature scale having 0°C for freezing point of water and 100°C as boiling point of water.



- Clinical thermometer – A device used to measure human body temperature.



- Expansion – The increase in volume or size of a substance.
- Fahrenheit scale – A temperature scale-using degree Fahrenheit as the unit.
- Heat energy – A form of energy transferred between objects of different temperatures.
- Temperature – A measure of the degree of hotness or coldness of an object.
- Thermometer – A device used to measure the temperature.

