



Learning Objectives



At the end of this lesson, students will be able to

- ◆ Understand the concept of heat and temperature
- ◆ Know the absolute scale of temperature
- ◆ Understand the thermal energy and the thermal equilibrium
- ◆ Classification of expansion of substances
- ◆ Know the fundamental laws of gases
- ◆ Distinguish between real gas and ideal gas
- ◆ Derive the ideal gas equation
- ◆ Solve the numerical problems

INTRODUCTION

Sun is the primary source of thermal energy for all living organisms. Thermal energy is the cause and temperature is the effect. All living organisms need a particular temperature for their survival. In the kitchen, a container with a steel bottom is placed on the induction stove. Do you know why? All of us have a common man's understanding of thermal energy and temperature. But, in this chapter, you shall learn about thermal energy and temperature in a scientific manner. We shall also discuss about how thermal energy is transferred and the effects of thermal energy.

3.1 TEMPERATURE

Temperature is defined as the degree of hotness of a body. The temperature is higher for a hotter body than for a colder body. It is also be defined as the property

which determines whether a body is in equilibrium or not with the surroundings. (or average kinetic energy of the molecules). Further, temperature is the property, which determines the direction of flow of heat. It is a scalar quantity. The SI unit of temperature is kelvin (K). There are other commonly used units of temperature such as degree celsius ($^{\circ}\text{C}$) and degree fahrenheit ($^{\circ}\text{F}$).

3.1.1 Absolute scale (kelvin scale) of temperature

The temperature measured in relation to absolute zero using the kelvin scale is known as absolute scale temperature. It is also known as the **thermodynamic temperature**. Each unit of the thermodynamic scale of temperature is defined as the fraction of $1/273.16^{\text{th}}$ part of the thermodynamic temperature of the triple point of water. A temperature difference of 1°C is equal to that of 1K. Zero Kelvin is the absolute scale of temperature of the body.

