Activity on Measurements of Temperature

Temperature

Temperature is the measurement of the hotness and coldness of a body. It is measured with the help of a device called thermometer. The three units in which temperature is measured are Celsius, Fahrenheit, and Kelvin. **The SI unit used to measure the temperature in Kelvin (K).**There are three main scales commonly used to measure the temperature:

- The Fahrenheit scale, whose symbol is (°F).
- The Celsius scale, whose symbol is (°C).
- The Kelvin scale, whose symbol is (K).

Each of these scales has different reference points and uses a different set of divisions based on them. The Celsius scale is generally used for most temperature measuring purposes.

According to the Kelvin scale, the freezing and the boiling point of water are 273.15K and 373.15K respectively. According to the Fahrenheit scale, the freezing and the boiling point of water are 32°F and 212°F respectively. According to the Celsius scale, the freezing and the boiling point of water are 0°C and 100°C respectively.

Types of thermometer
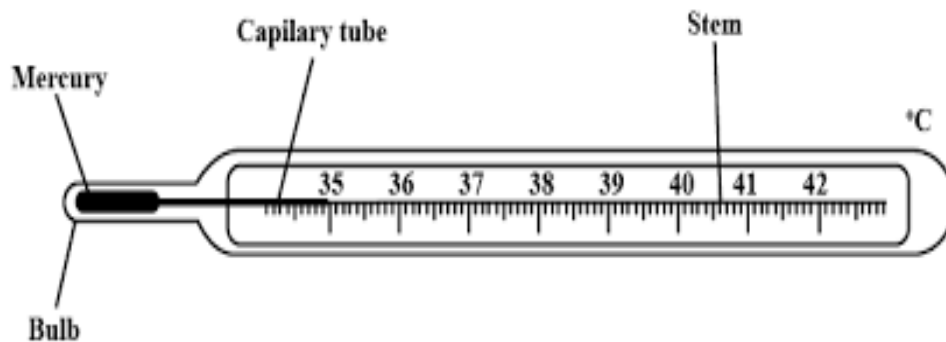
1. Clinical Thermometer

These thermometers are used in homes, clinics, and hospitals. These thermometers contain kink which prevents mercury to go back when it is taken out of patient's mouth so that temperature can be noted down easily. There are two temperature scales on either side of mercury thread, one is celsius scale and other is Fahrenheit scale.
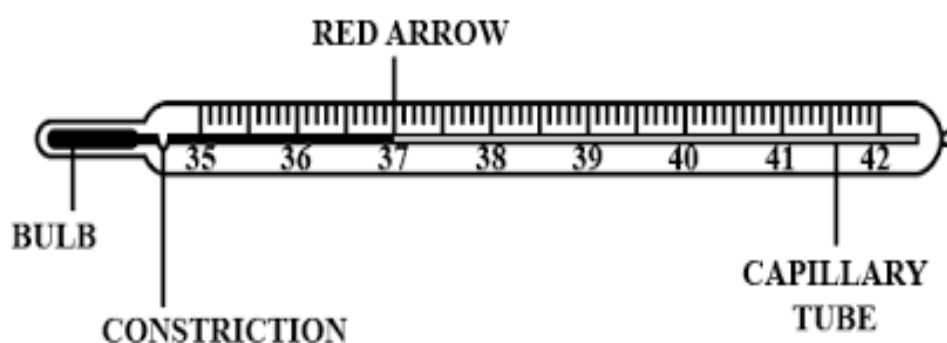
It can give temperature range from a minimum of 35°C or 94°F to the maximum of 42°C or 108°F. Fahrenheit scale is more sensitive than Celsius scale. Thus, the temperature is measured in Fahrenheit(°F).

Laboratory Thermometer

Laboratory thermometers can be used to notice the temperature in school labs or other labs for scientific research purposes. These are also used in industries to measure the temperature of solutions or instruments.

The stem, as well as bulb of laboratory thermometer, is longer when compared to the clinical thermometer. There is no kink in laboratory thermometer. It has only celsius scale. It can measure temperature from -10°C to 110°C.

Celsius and Fahrenheit Scale

Normal body temperature   in celsius - 37°C and in Fahrenheit – 98.6°F
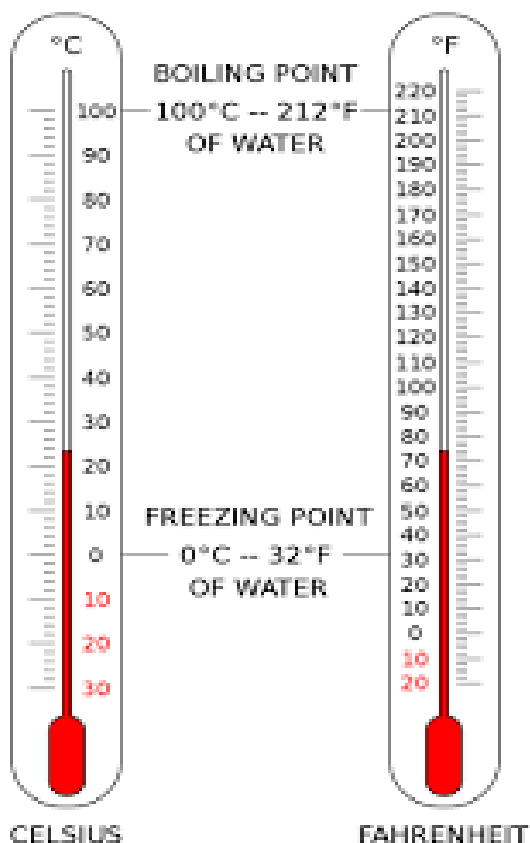
Temperature Conversion Formula Table

Unit	To Celsius	To Fahrenheit	To Kelvin
Celsius (C)	C (°)	C(9⁄5) + 32	C + 273.15
Fahrenheit	(F − 32) × 5⁄9	F	(F − 32) × 5⁄9 + 273.15
Kelvin	K − 273.15	(K − 273.15) * 9/5 + 32	K

Temperature Conversion Formulas between Celsius and Kelvin

Conversion of temperature between Celsius and Kelvin is done using the following formulas:

- The temperature conversion formula from Celsius to Kelvin is:
  $K = C + 273.15$
- The temperature conversion formula from Kelvin to Celcius is:
  $C = K − 273.15$

Example: Convert 16°C into Kelvin.

Solution:

C = 16°C (Given). Using the Celsius to Kelvin conversion formula,

$K = C + 273.15$

$= 16 + 273.15$

$= 289.15 \text{ K}$

Therefore, 16°C is equivalent to 289.15 K.

Temperature Conversion Formulas Between Fahrenheit and Celsius

Conversion of temperature between Fahrenheit and Celsius is done using the following formulas:

- The temperature conversion formula from Fahrenheit to Celsius is:
  $C = (F − 32) × 5/9$
- The temperature conversion formula from Celsius to Fahrenheit is:
  $F = C(9/5) + 32$

Example: What is 115°F on the Celsius scale?

Solution:

$F = 115°F$.

Using Fahrenheit to Celsius conversion formula,

$C = (F − 32) × 5/9$

$= (115 − 32) × (5/9)$

$= 46.11°F$

Therefore, 115°F is 46.11°C on the centigrade scale.

Temperature Conversion Formulas Between Fahrenheit and Kelvin

Conversion of temperature between Fahrenheit and Kelvin is done using the following formulas:

- The temperature conversion formula from Fahrenheit to Kelvin is:
  $K = (F − 32) × 5/9 + 273.15$
- The temperature conversion formula from Kelvin to Fahrenheit is:
  $F = (K − 273.15) × 9/5 + 32$

Example: Convert 100 degrees Fahrenheit to Kelvin.

Solution:

Temperature in Fahrenheit, F = 100 F(Given). Using Fahrenheit to Kelvin Formula,

$K = (F − 32) × 5/9 + 273.15$

$= (100 − 32) × 5/9 + 273.15$

$= 310.93 K$

Therefore, 100 degree Fahrenheit = 310.93 K

Practice Problems

1. What is 115°F on the Celsius scale?
2. Convert 16°C into Kelvin.
3. Convert 100 degrees Fahrenheit to Kelvin.
4. Convert 225 K to Celsius.
5. Find out names of other instruments to measure temperatures in different areas.