

Temperature Measurements # 2

* objectives

1) to be familiar with many different methods of measuring temperature highlighting

- accuracy ϵ how close the reading is to the true value
- calibration

$\leftarrow$ Error Sensitivity $\rightarrow$ how sensitive the instrument is (is)

(combined accuracy and precision)
2) introduction to international temperature scale and investigate Platinum resistance temperature measurement methods

* Theory

Temperature: is an indication of intensity of molecular activity.

Temperature of a body: is a measure of the thermal potential of the body.

* Measuring Temperature Equipment

1) Thermometer $\rightarrow$ Mercury: used for high and wide ranges [because of high density]

$\rightarrow$ Alcoholic: used for small T and narrow ranges [accurate readings]
low $\rightarrow$

2) Gauge $\rightarrow$ Vapor Pressure
measures the vapour pressure through a spring and then temperature readings are calibrated

→ Bi-metallic : Same principle as the vapour pressure gauge.
[Instead of springs there are metallic tubes]

3) Thermocouple : There are many types the most used one is the K-type

Working principle of Thermocouples:
Two different types of alloys are welded together at the junction [connecting point] at different temperature this point has different conductivity [changes in the current] these changes are calibrated to temperature readings.

Different Types of Thermocouples → Different alloy metals

→ Different Ranges for T-readings

[Selection of the type based on the application]
[and what is the T-range]

4) Thermistor: Also known as thermostat
not exactly a measuring device, it is a device that controls temperature to a set point by changing ~~its~~ the conductivity of the metal that contains.

* Sensitivity: How sensitive the device is when measuring temperature with time [the changes]
does it change fast? or slowly? (per unit time)

* Accuracy: How accurate the device is for a specific temperature with respect to the true value

Boiling P : 100°C is my device reading too at B.P?
[at instant moment]

Centigrade scale $\rightarrow$ based on the point at which ice melts and pure water boils at atmospheric pressure

H₂O triple point [All three phases] $\rightarrow 0.01^\circ\text{C}$