Temperature

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Two objects of different masses made of the same material at the same temperature would have different amounts of heat. When a substance melts or boils, heat is input but there is no temperature energy. Temperature does not measure the amount of thermal energy in a body. Thermal energy is always transferred from an area of higher temperature to an area of lower temperature. Thermal equilibrium is a condition when two or more objects are in contact and have the same temperature so that there is no net flow of energy between them. Regions of equal temperature are in thermal equilibrium. Zeroth law of thermodynamics states that if object A is in thermal equilibrium with object B and B is in thermal equilibrium with object C then object A and object C must be in thermal equilibrium.

Temperature scales

A physical property that varies with temperature may be used for the measurement of temperature—

1) Change in volume of a liquid,
2) Change in volume of a gas at constant pressure,
3) Change in pressure of a gas at constant volume,
4) Change in electrical resistance of a metallic conductor or semiconductor like thermistor,
5) Change in voltage produced by a thermo-couple.

Physical properties should have the following qualities—

1) Change in property with temperature should be large enough to be measured accurately,
2) Value of temperature recorded should be reproducible (mass and density should be the same when measured second time),
3) Property being used must be suitable over temperature range measured,
4) Should be able to calibrate easily and property should change uniformly with temperature.

Fixed point is fixed temperature when substances change state from solid to liquid or liquid to gas. Temperature has two fixed points- the melting point of pure ice and the boiling point of pure water divides the range between thermistor 100 equal intervals when pressure changes. Thermo-dynamic (kelvin) scale- theoretical scale is the properties of any particular substance that are independent. Based on the idea that average kinetic energy of particle of a substance increases with temperature and the average kinetic energy are same for all substance at a particular temperature$k = ℃ + 273.15$. Absolute zero is the temperature at which a system has a minimum interval of energy but not zero and impossible to remove more energy at 0 kelvin. Triple point of pure water is the temperature at which water exists as vapor, liquid and solid at 273.16 kelvin. The thermometric property is ice and steam points and the property has the value at an unknown temperature.

- θ=[100(property value – ice)]/(steam – ice)