Lab2: Heat and Cold in medicine

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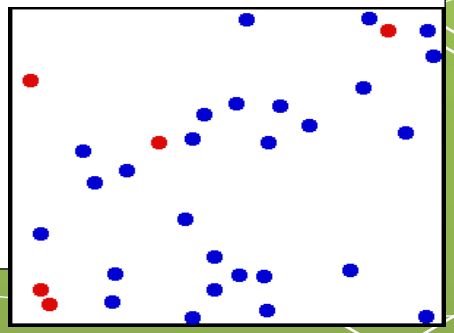
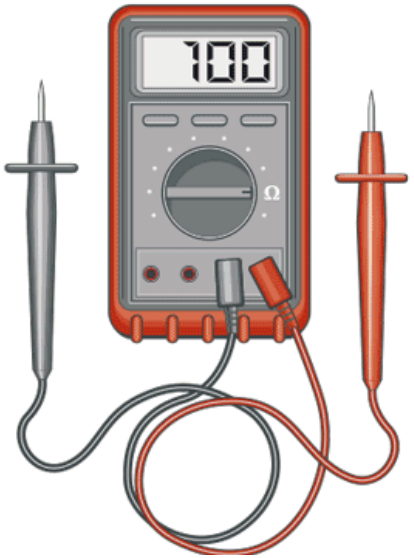
1- Physical basis of heat and temperature

- Matter is composed of molecules that are in continuous motion.
- Molecules have kinetic energy and this kinetic energy is related to the temperature.
- The average kinetic energy of the molecules of ideal gas is directly proportional to its temperature; liquids and solids show similar temperature dependence.



1- Physical basis of heat and temperature

- Heating and cooling phenomena (i.e., increase and decrease of temperature) occur when two bodies at Different temperatures are put in contact with each other (under the temperature difference).



2-Thermometry: temperature scales and thermometers

- Temperature: is a quantitative description of hotness and coldness of an object. It is the intensity of heat of the object.
- Heat: is the quantity of kinetic energy transferred as "heat flow" from a hotter body to a colder one due to the temperature difference existing between them.

Temperature scales:

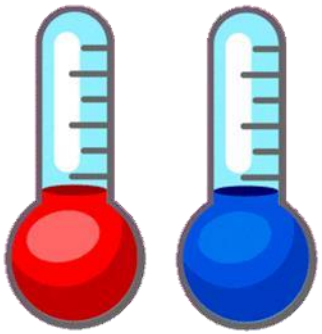
Water boiling point	**373 °K**	**100 °C**	**212 °F**	**°C = 5/9 (°F-32)**
Body temperature	310 °K	37 °C	98.6 °F	°F = 9/5 °C+32
Ice melting Point	273 °K	0 °C	32 °F	°K = °C+273

Temperature measurement devices

- Thermometer: is a device used to measure the temperature of a body.
- For the medical and biological purposes, the four important types of thermometers are:

Four important types of thermometers are:

Liquid-in-glass thermometers

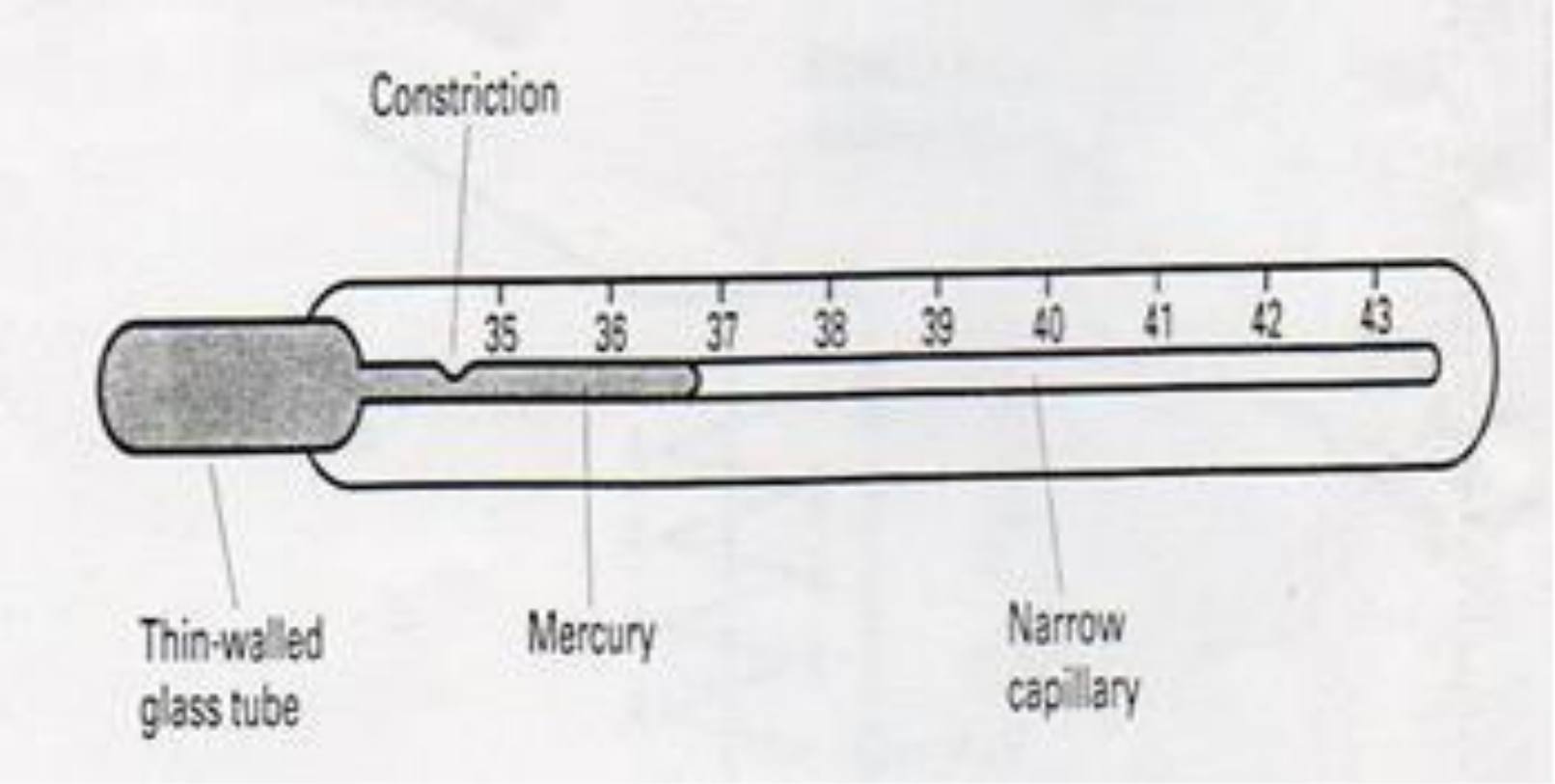


Thermistors

Thermocouple s

Thermopiles

(1)The liquid-in-glass thermometers:



(1)The liquid-in-glass thermometers:

- It is Very narrow capillary so that large changes in the length of the mercury column occur for only small changes in temperature.
- The **constriction** prevents the mercury thread from returning to the **bulb** when the thermometer is removed from the patient therefore continues to display the correct reading even after cooling.

(1)The liquid-in-glass thermometers:

- The mercury is returned to the bulb bygiving the thermometer a sharp jerk.
- The glass in front of the **scale** is thickened so that it acts as a **lens** and makes the scale easier to read.

Clinical thermometers

- Clinical thermometers are commonly used to estimate body temperature by being placed in the mouth or under the armpit.

Thermometer experiment:

- Shake your thermometer till the mercury get to the bottom
- Place the thermometer in contact to the surface you want to measure for five minutes
- Remove the thermometer from the surface and read the scale.

Thank you