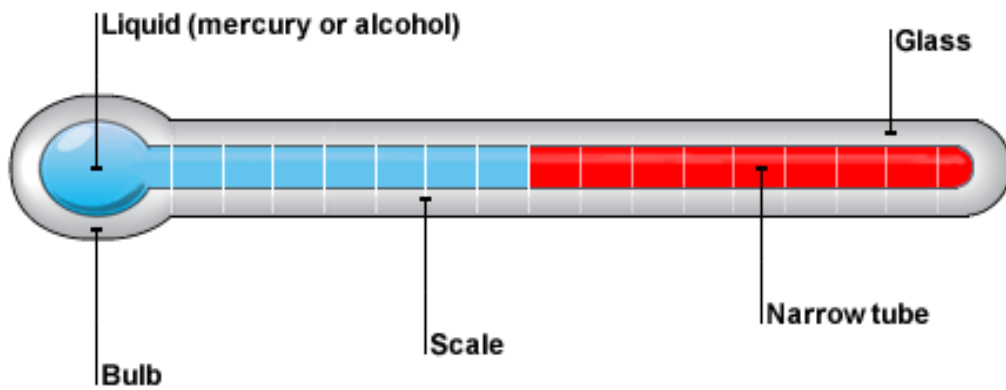
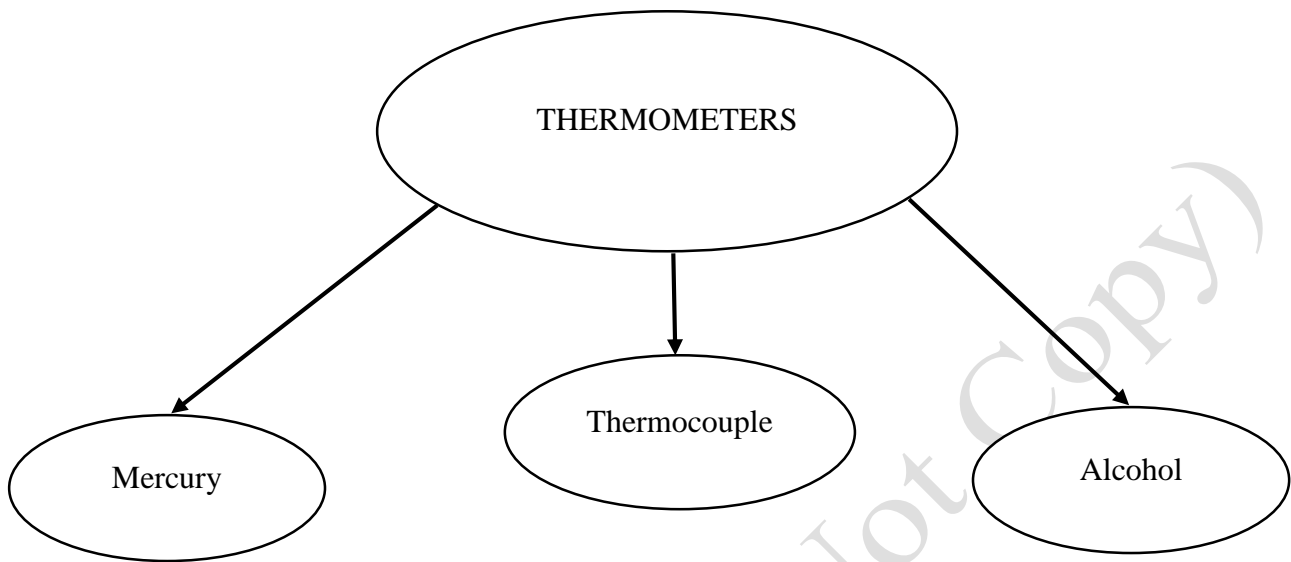


**PHYSICS
THERMOMETERS
FORM 5**



The above diagram shows a liquid-in-glass thermometer. The liquid may either be mercury or alcohol.

PHYSICS
THERMOMETERS
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Mercury Thermometers

1. Mercury is silver in colour and therefore easily seen.
2. Mercury is a metal and therefore conducts heat better.
3. If the thermometer is broken the mercury is poisonous.
4. The mercury expands readily when heated (sensitive to temperature changes)
5. At low temperatures the mercury readily freezes and therefore is not used for measuring low temperatures.
6. Since mercury has a high boiling point it can be used for measuring very high temperatures.

Alcohol Thermometers

1. Alcohol is colourless, a red dye must therefore be added to make it visible.
2. If the thermometer is broken the alcohol is harmless.
3. Alcohol has a very low freezing point and therefore can be used for measuring low temperatures.
4. The boiling point of alcohol is 78°C therefore an alcohol thermometer is not useful for measuring high temperatures.

Liquid-in-Glass Thermometers

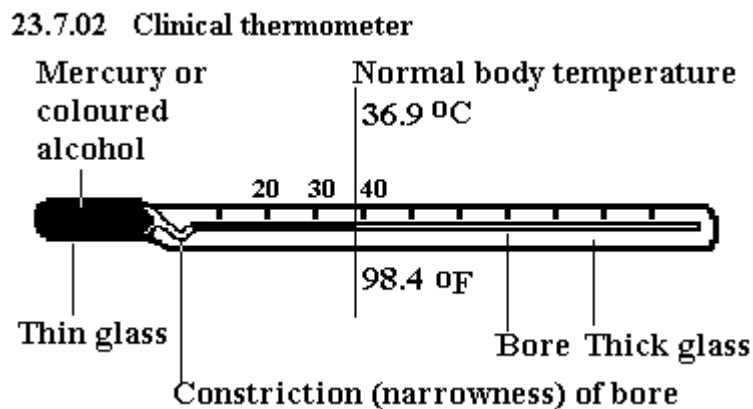
1. These type of thermometers are used on the expansion of a liquid when heated.
2. The liquid reservoir is contained in a thin walled glass bulb.
3. The walls of the glass bulb should be thin. If it is too thick, then the thermometer will not respond to changes in temperature. If the wall of the bulb is too thin, then the bulb will break readily.
4. The amount of liquid in the reservoir should be a small amount since it will be warmed up readily. A large reservoir therefore reduces the sensitivity of temperature changes.
5. The fine tube within the glass stem must be uniformed to give an even expansion of the liquid.
6. The finer the tube the more sensitive is the thermometer. Since with this fine tube any little expansion in the liquid is readily seen whereas in a large tube expansion is not readily seen.
7. The narrow tube must be initially empty (evacuated). The presence of air trapped in the tube will prevent the full expansion of the liquid when heated.

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To increase the sensitivity of the thermometer the following is required:

1. Thin walled, glass bulb
2. Narrow tube
3. Small quantity reservoir

Clinical Thermometer



A clinical thermometer is used to measure body temperature.

Usage of a Clinical Thermometer

A clinical thermometer has a very narrow constriction in the tube just above the bulb. When the mercury expands it pushes past the constriction but when it is taken out of your mouth it does not go back to the bulb and so the doctor can read your temperature.

The clinical thermometer is used to measure body temperature. It is a mercury thermometer for the following reasons:

1. It is readily visible
2. Being a metal it conducts heat better and therefore responds readily to temperature changes.

Just after the reservoir within the glass stem there is a tiny constriction. This constriction allows the thermometer to be read at a later time. The bulb of the thermometer is placed in contact with the person for one minute.

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The site of contact include:

1. Under the tongue (mouth)
2. Armpit
3. Rectum

After about one minute the thermometer is removed and read at eye level.

If the thermometer cannot be read it can be left alone and be read at another time. If the thermometer is left on the table it will cool. The mercury will contract causing the mercury column to break at the constriction site. The mercury column that remains in the glass stem contracts minimally and when read, is roughly the same temperature.

Thermocouple

R. Mondol (Do Not Copy)

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If two different metals are joined in an electric circuit and one junction is at a different temperature to the other junction, then an electric current is generated. The voltage of the electric current increases as the temperature increases.

Thus, if one junction is kept at a constant low temperature, the other junction can function as a probe to measure temperature.

Advantages of The Thermocouple

1. The wire junction can be very small and needs little heat to warm up. This means that it responds quickly to temperature changes and it can be used to measure the temperature of precise locations.
2. Since the output of this thermometer is an electric current, it means therefore that this thermometer can be connected to other machines to have continuous monitoring of temperature or warning signals can be created to indicate temperature changes.
3. Exceedingly high temperatures can be recorded by altering the type of metal used for A and B.