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| --- | --- | --- | --- | --- | --- | --- |
| Name | Physical property based upon | How it operates | Range (◦C) | Usage | Advantages | Disadvantages |
| Liquid in glass* Alcohol
 | Liquid expansion | When the liquid in the bore is heated, it expands moving up the bore of the thermometer | -20 - 50 | \*Walk-in freezers\*Artic conditions | \*Cheap\*Lightweight\*Portable\* Easy to use\*High expansion - thick bore\* Low freezing point | \* Colorless- difficult to see (dyed red)\*Sticks to bore(adhesive with glass)\*Not a “remote sensing device”\* Cannot measure high temperatures |
| Liquid in glass* Mercury

(Laboratory) | Liquid expansion | When the liquid in the bore is heated, it expands moving up the bore of the thermometer | -10 - 110 | \*Laboratory | \*Cheap\*Lightweight\*Portable\* Easy to use\*Low expansion - thin bore\* High freezing point | \* Cannot measure low temperatures\*Not a “remote sensing device” |
| Liquid in glass* Mercury

 (Clinical) | Liquid expansion | When the liquid in the bore is heated, it expands moving up the bore of the thermometer | 35 - 42 | \*Medical | \*Cheap\*Lightweight\*Portable\* Easy to use\*Sensitive (reads down to 0.1◦C)\*Constriction “holds” reading | \*Not a “remote sensing device” |
| Bimetallic strip thermometer | Solid expansion | Two metals of different linear expansivity are melded together and shaped into a coil. One end is fixed and the other attached to a pointer. As it expands it curves such that the metal of greater expansivity will be on the outer arc. | -100 - 550 | \*Cooking thermometers- Oven- Meat- Candy | \*Cheap\*Lightweight\*Portable\* Easy to use\* Rugged \* Large range | \*Low accuracy\*Not a “remote sensing device” |
| Constant volume gas thermometer | Gas pressure increases with temperature | Under conditions of constant volume, gas pressure is directly proportional to temperature | -200 - 800 | \* “Gas” Laboratories\*Calibrating thermometers | \*Very high accuracy\* Large range | \*Expensive\*Bulky\*Very difficult to use\*Too responsive |
| Name | Physical property based upon | How it operates | Range (◦C) | Usage | Advantages | Disadvantages |
| Thermocouple | Thermoelectric effect | If the junctions of two different metals are held at different temperatures a current is produced that is proportional to the temperature difference at the junctions | -200 - 1500 | \* Car temperature gauge\* Industry | \* Very responsive\* Remote reading\* Large range\* Not expensive\* Rugged | \*Not easily portable |
| Thermister | The resistance of a semiconductor decreases with increasing temperature | The resistance of the semiconductor is proportional to the temperature | -200 - 1500 | Industry | \* Very responsive\* Remote reading\* Large range\* Not expensive\* Rugged | \*Not easily portable |
| Platinum resistance thermometer | The resistance of a metal increases with increasing temperature | The resistance of the metal is proportional to the temperature | -200 - 1500 | Industry | \* Very responsive\* Remote reading\* Large range\* Not expensive\* Rugged | \*Not easily portable |