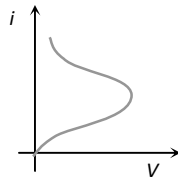


## Various Electrical Conducting Material for Specific Use.

- (1) Filament of electric bulb: Is made up of tungsten which has high resistivity, high melting point.
- (2) Element of heating devices (such as heater, geyser or press) : Is made up of nichrome which has high resistivity and high melting point.
- (3) Resistances of resistance boxes (standard resistances): Are made up of manganin, or constantan as these materials have moderate resistivity which is practically independent of temperature so that the specified value of resistance does not alter with minor changes in temperature.
- (4) Fuse-wire: Is made up of tin-lead alloy (63% tin + 37% lead). It should have low melting point and high resistivity. It is used in series as a safety device in an electric circuit and is designed so as to melt and thereby open the circuit if the current exceeds a predetermined value due to some fault. The function of a fuse is independent of its length.  
Safe current of fuse wire relates with its radius as  $i \propto r^{3/2}$ .
- (5) Thermistors: A thermistor is a heat sensitive resistor usually prepared from oxides of various metals such as nickel, copper, cobalt, iron etc. These compounds are also semi-conductor. For thermistors  $\alpha$  is very high which may be positive or negative. The resistance of thermistors changes very rapidly with change of temperature.



Thermistors are used to detect small temperature change and to measure very low temperature.

### Concepts



In the absence of radiation loss, the time in which a fuse will melt does not depend on its length but varies with radius as  $t \propto r^4$ .

If length ( $l$ ) and mass ( $m$ ) of a conducting wire is given then  $R \propto \frac{l^2}{m}$ .

Macroscopic form of Ohm's law is  $R = \frac{V}{i}$ , while its microscopic form is  $J = \sigma E$ .