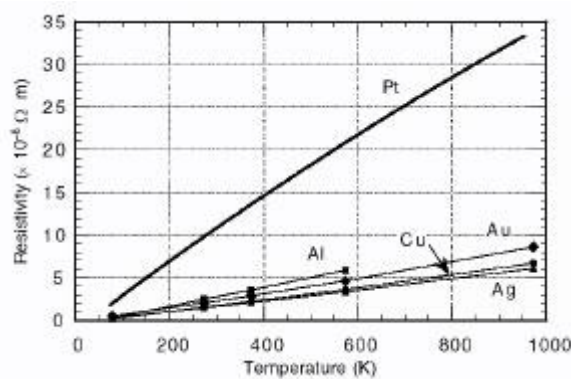


Answer on Question #66799, Physics / Molecular Physics | Thermodynamics

Explain the working of a platinum resistance thermometer with the help of a neat am labelled diagram.

Solution:

The electrical resistance of many metals (e.g. copper, silver, aluminium, platinum) increases approximately linearly with absolute temperature and this feature makes them useful as temperature sensors. The resistivity of five metallic elements plotted on a linear scale as a function of temperature (Figure). The data for platinum is the result of many closely-spaced measurements and is plotted as a continuous curve. The data for Al, Cu, Ag and Au consists of just a few points with lines drawn to connect the data points.



The most reproducible type of sensor is made from platinum because it is a stable unreactive metal which can be drawn down to fine wires but is not too soft. The resistance of a wire of the material is measured by passing a current (AC or DC) through it and measuring the voltage with a suitable bridge or voltmeter, and the reading is converted to temperature using a calibration equation. The length and diameter of the platinum wire used in a thermometer are often chosen so that the resistance of the device at around 0°C is 100 ohms.

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