

IV-E1004B Electrical Conductivity Of Metal Rod

Principle and Working:

- The heat conduction occurs due to the temperature difference between different locations of a body. In this setup a one-dimensional temperature gradient along a copper and aluminum rod is investigated. The quantity of heat dQ transported with time dt is a function of the cross-sectional area A and the temperature gradient dT/dx perpendicular to the surface is defined as:

$$dQ/dt = A (dT/dx)$$

- At room temperature T the conduction electrons in metal have a much greater mean free path than the phonons. For this reason heat conduction in metal is primarily due to the electrons. The relationship between the thermal conductivity λ and the electrical conductivity is established by the Wiedmann-Franz law:

$$\lambda / \sigma = LT$$

- Where L is Lorenz number.

Experiment:

- To determine the heat capacity of the calorimeter.
- To study the thermal conductivity of copper and aluminum in a constant temperature gradient.
- To determine the electrical conductivity of aluminum and copper by plotting a current-voltage characteristic curve.

Apparatus Supply:

- Conductivity rod Cu
- Conductivity rod Al
- Power supply 20Amp
- Micro Voltmeter
- Connecting lead 4Nos
- Working Manual
- BNC to Banana Plug 1Nos.

