# CONDUCTOMETRY

It is an electrochemical method of analysis concerned with electrical conductance through an electrolyte solution.

(Or)

It is defined has as determination or measurement of the electrical conductance of an electrolyte solution by means of a conductometer.

## Electric conductivity of an electrolyte solution depends on:

Type of ions (cations,anions, singly or doubly charged)

Concentration of ions

Temperature

Mobility of ions

## PRINCIPLE:

Based on the conductance of electrical current through electrolyte solutions similar to metallic conductors.

The electric conductance in accordance with ohms law which states that the strength of current (i) passing through conductor is directly proportional to potential difference & inversely to resistance.

$$i = V/R$$

## Instrumentation

The instruments used for measurement of conductance are known as conductometers

It consists of:

1. Current source
   - ✓ Alternating current source
2. Conductivity cells
   - ✓ Wide mouthed cells
   - ✓ Cell for reactions producing precipitates
   - ✓ Dip type cells
3. Electrodes

**CURRENT SOURCE:-**

1. Mechanical high frequency AC generator.
2. Vreeland oscillator.
3. Vaccum tube oscillator.

**Conductivity cells:-**

Made of pyrex or quartz and are fitted with two platinum electrodes.

Should be placed in vessel containing water to maintain constant temperature

**Types:**

Wide mouthed cell

Cell for reactions producing precipitation

Dip type cells

### *Electrodes*

Platinum sheets, each of 1 $cm^2$ are fixed at distance of 1 cm

The surface is coated with platinum black to avoid polarization effects and increase effective surface area.

Platinisation of electrodes is done by coating solution of 3% chloroplatinic acid and lead acetate on it to get uniform coating

Electrodes usage depends on conductivity and concentration

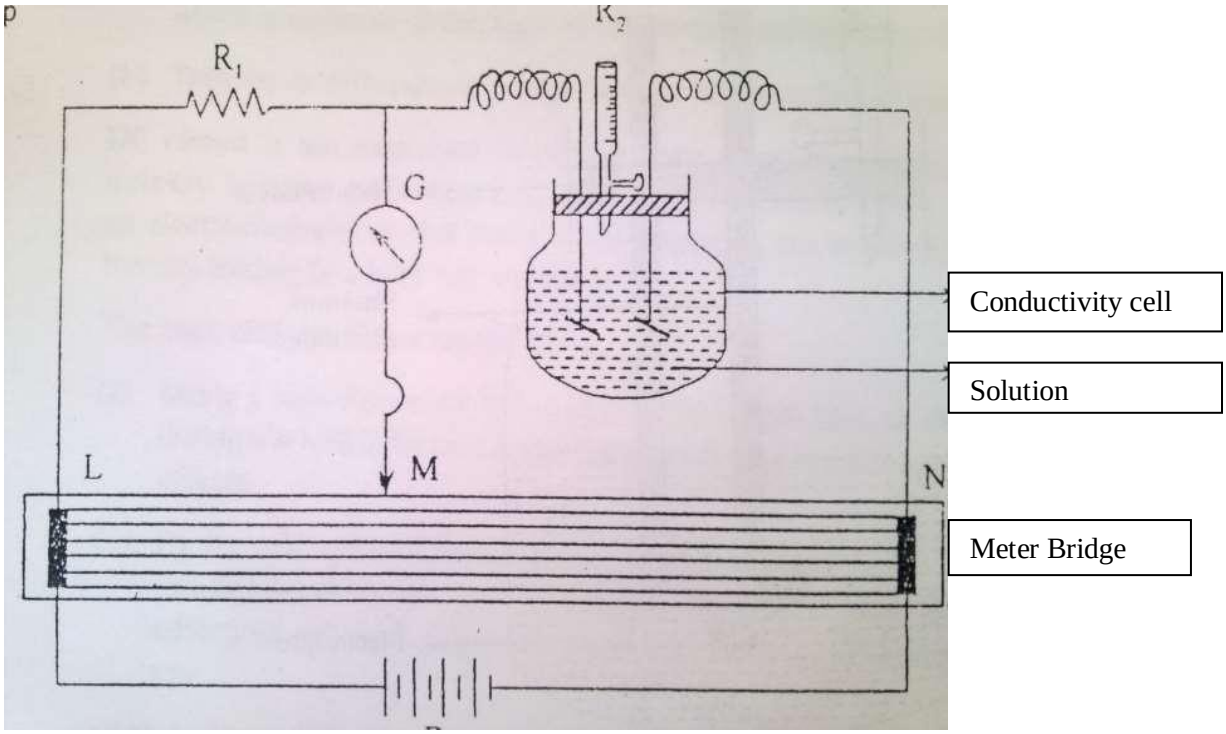
If concentration is low then electrodes should be largelyand closely packed

**Measurement of Conductivity**

It consists of meter bridge LN attached to standard resistance R1 & unknown resistance R2 cell is connected to standard resistance to one side, meter bridge LN at other. The sliding contact with galvanometer (G) can be moved on the wire of meter bridge by means of jockey (M) so that resistance of unknown is balanced with that of standard. When galvanometer shows null deflection, the resistance of unknown is measured by following equation:

$$ML / NL = R2 / R1$$

$$R2 = ML / NL \times R1$$




Hence conductivity of unknown solution:

$$1/R2 = NL / ML \times R1$$

The measured conductivity (1/R1) is not always equal to the specific conductivity of solution, because the physical configuration of platinum electrode i.e, length and area of electrodes varies from one another. Hence conductivity of solution is obtained by calculating a factor called "cell constant".