Electrochemical Cell or Galvanic cell

It is a device in which a redox reaction is used to derive electrical energy. During the working of the cell the stored chemical energy decreases and gained as electrical energy.

The electrode at which oxidation occurs is called anode (− ve) and the electrode at which reduction occurs is called cathode (+ ve).

Example: Zn acts as anode and Cu acts as cathode in Daniel cell

Differences between electrolytic and electrochemical cells

Electrolytic cell	**Electro Chemical / Galvanic cell**
Conversion of electrical energy into chemical energy.	Chemical energy into electrical energy.
The anode is positive plate and cathode is negative plate.	The anode is negative plate and cathode is positive plate.
Electrons are supplied to the cell from the external power supply.	Electrons are drawn from the cell.
Non spontaneous reaction. Eg. Electroplating	Spontaneous reaction. eg. Corrosion
The extent of chemical reaction occurring at the electrode is governed by Faraday's law of electrolysis.	The e.m.f of the cell depends on the concentration of the electrolyte and chemical nature of the electrode. (Nernst Equation)
The amount of electricity passed during electrolysis is measured by Coulometer. e.g: Electroplating, Electrolysis	The e.m.f produced in the cell is measured by potentiometer. e.g: Corrosion, Discharging of battery

Single electrode potential **(E)**

It is the measure of tendency of a metallic electrode to lose or gain electrons, when it is in contact with a solution of its own salt.

Standard electrode potential **(E°)**

It is the measure of tendency of a metallic electrode to lose or gain electrons, when it is in contact with a solution of its own salt of 1 molar concentration at 25°C.

Measurement of single electrode potential

It is impossible to determine the absolute value of a single electrode potential. But we can measure the potential difference between two electrodes potentiometrically. For this purpose 'reference electrode' is used. SHE commonly used as reference electrode. The single / standard electrode potential can be measured by coupling the electrode with a SHE. The Electrode potential of SHE is zero

For example the potential of Copper electrode can be measured by coupled with SHE

Pt | H_2(g) | H+ || M2+ (aq) | M(s)

H+ || H_2(g)| Pt || Cu^{2+} (aq) | $CuSO_4$(s)

$$At\ anode: H_2 \rightarrow 2H^+ + 2e^-$$

$$At\ cathode: Cu^{2+} + 2e^- \rightarrow Cu_{(s)}$$

$$E_{Cell} = E_{Cathode} - E_{anode}$$

E^0_{cell} = +0.34 - 0

Indicates the single electrode potential of Cu^{2+}| Cu is +0.34V