

# Equilibrium Electrochemistry

Galvanic Cell: an electrochemical cell in which the cell reaction is spontaneous.

Electrolytic Cell: an electrochemical cell in which the cell reaction is not spontaneous (requires an external energy source).

Electrode: an electronic conductor (usually a metal).

Electrolyte: an ionic (conducting) solution.

Electrode Compartment: an electrode and its electrolyte

Oxidation: the gaining of electrons.

Reduction: the losing of electrons.

Redox: a chemical reaction in which one species is oxidised and another is reduced (*i.e.* there is charge transfer from one species to another during the reaction).

Reducing agent (reductant): a chemical species that brings about reduction of another species.

Oxidising agent (oxidant): a chemical species that brings about oxidation of another species.

Cathode: the electrode at which reduction is spontaneous.

Anode: the electrode at which oxidation is spontaneous.

## Thermodynamic relationships

$$E = E^\ominus + RT/\nu F \ln Q \quad \Rightarrow \quad K = \exp(\nu F E^\ominus / RT)$$

$$\Delta_r G = -\nu F E$$

$$\Delta_r S = \nu F (dE/dT)$$

$$\Delta_r G = \Delta_r H - T\Delta_r S \Rightarrow \Delta_r H = -\nu F E + T(\nu F (dE/dT)) \Rightarrow \Delta_r H = -\nu F (E - T dE/dT)$$