

Concepts of electrochemistry

Electrochemistry

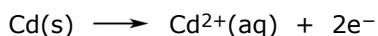
Electrochemistry is a branch of physical chemistry that studies the relationship between electrochemical potential difference and chemical changes between compounds involving the exchange of electrons.

In an electrochemical reaction there is ALWAYS two reactions running together.

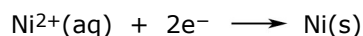
These two half-reactions are called an oxidation-reduction reaction (also "redox" reaction).

Example:

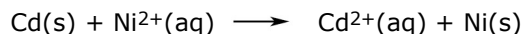
Oxidation : lost of electron(s)



Reduction : gain of electron(s)



The combination of these two reactions gives the complete redox reaction:



The driving force of a spontaneous electrochemical reaction is the difference of energy (electrochemical potential) of the electrons between two half-reactions.

- A half-reaction alone cannot run by itself.
- The reactants and products can exist in any physical state (s), (l), (g), (aq).
- The number of electron exchanged depends of the nature of the reactants and products.
- Each half-reaction may have a different number of electrons, however, the total number of electrons exchanged in the overall process is balanced. There are no free electron in a complete redox reaction.
- Masses and charges are always balanced.

Since electrons are exchanged, ions may also be present in a redox reaction.

An ion is an atom or group of atoms that carries a charge.

positive charge ion is called: CATION (e.g. Na^+ , Mg^{2+} , Al^{3+} , NH_4^+)

negative charge ion is called: ANION (e.g. Cl^- , ClO_2^- , SO_4^{2-} , PO_4^{3-})

A chemical that takes electron(s) is called an oxidizing agent

A chemical that lost electron(s) is called an reducing agent