

Experiment 10

Oxidation-Reduction (Redox) Reactions

Pre-Lab Assignment

Before coming to lab:

- Read the lab thoroughly.
- Answer the pre-lab questions that appear at the end of this lab exercise.

Purpose

A set of oxidation-reduction (redox) reactions will be performed to determine the relative strengths as reducing and oxidizing agents of metals and other ions. An activation series will be devised and used to predict whether a reaction will occur spontaneously or not.

Background

Oxidation-reduction (redox) reactions are a classification of chemical changes that involve the transfer of electrons. An example of a redox reaction is shown in Eqn. 1, when magnesium metal reacts with chlorine gas.



At first glance, the electron exchange is not apparent as electrons are not included in the overall balanced equation. However, electrons are shown when the reaction is split into halves: an oxidized half-reaction and a reduced half-reaction, as in Eqn. 2 and Eqn. 3 respectively.



Notice that in the half-reactions, the electrons are required to balance the charges. Since Mg is becoming more positive, one magnesium atom loses two electrons to become a cation and is said to be **oxidized**. Chlorine is becoming more negative, so one molecule of $\text{Cl}_2(\text{g})$ gains two electrons to become two chloride anions and is said to be **reduced**. Both oxidation and reduction happen simultaneously in a single redox reaction. Overall, Mg is transferring two electrons to chlorine (Fig. 1).

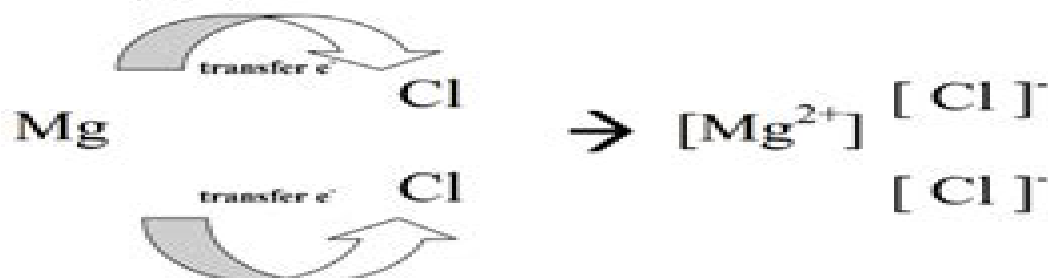


Fig. 1: Redox reaction between Mg(s) and Cl₂(g) to produce MgCl₂(aq)

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