

9.2.1: Redox Mechanisms

The oxidation state of a metal ion can be changed by **reduction/oxidation** (redox) reactions in which electrons are transferred between a metal center and another species. The other species could be another metal ion or some other redox partner. In the case of metal complexes, the electron transfer often occurs at the metal center, changing the oxidation state of the metal ion(s) involved. This section will focus on the redox reactions involving change in metal ion oxidation state.

There are two general mechanisms by which electrons can be transferred to or from a metal center. The definition of these two mechanisms depends on whether the redox partner is bound within the metal ion's inner sphere (bound directly to the metal ion), or whether it is just nearby the metal complex (in the metal ion's outer sphere). If the redox partner is bound to the metal ion itself, it is called an **inner-sphere electron transfer**. Electrons can also be transferred between two species that are close in proximity, but not bound to one another. When electrons are transferred to or from a metal through close proximity, but not through direct bonds to the metal center, it is an **outer-sphere electron transfer**.

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