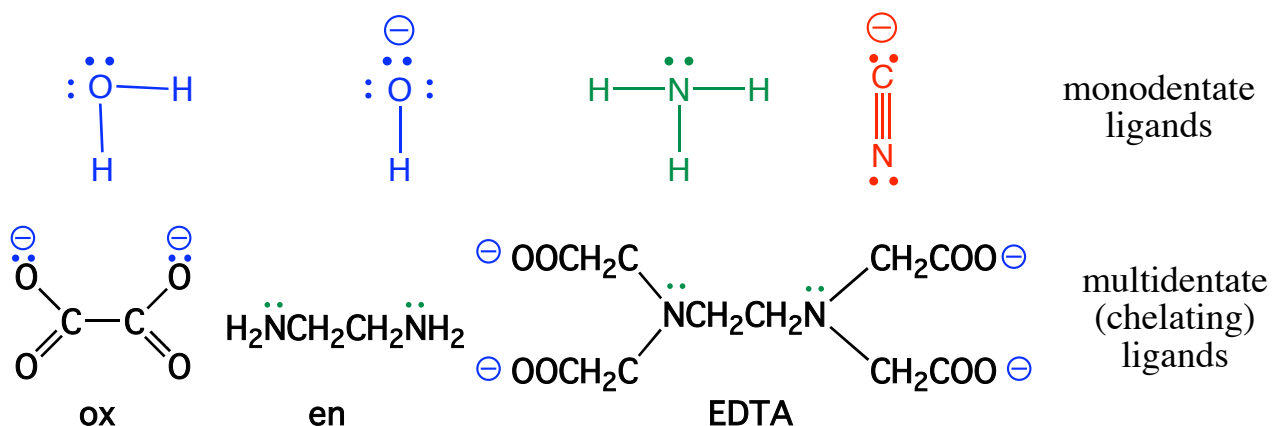


## COMPLEX ION FORMATION

A complex ion is formed from the association of a metal ion with ligands that donate an unbonded electron pair.



Equilibrium constants are usually expressed for the formation of the complex ion.

					log(K <sub>f</sub> )
Ag <sup>+1</sup>	+	2 NH <sub>3</sub>	⇌	Ag(NH <sub>3</sub> ) <sub>2</sub> <sup>+1</sup>	7.2
Cu <sup>+2</sup>	+	4 NH <sub>3</sub>	⇌	Cu(NH <sub>3</sub> ) <sub>4</sub> <sup>+2</sup>	13.7
Ni <sup>+2</sup>	+	6 NH <sub>3</sub>	⇌	Ni(NH <sub>3</sub> ) <sub>6</sub> <sup>+2</sup>	8.7
Zn <sup>+2</sup>	+	4 OH <sup>⊖</sup>	⇌	Zn(OH) <sub>4</sub> <sup>-2</sup>	15.4
Al <sup>+3</sup>	+	4 OH <sup>⊖</sup>	⇌	Al(OH) <sub>4</sub> <sup>-1</sup>	33
Ag <sup>+</sup>	+	4 CN <sup>⊖</sup>	⇌	Ag(CN) <sub>4</sub> <sup>-3</sup>	18.7
Ni <sup>+2</sup>	+	4 CN <sup>⊖</sup>	⇌	Ni(CN) <sub>4</sub> <sup>-2</sup>	31
Fe <sup>+3</sup>	+	6 CN <sup>⊖</sup>	⇌	Fe(CN) <sub>6</sub> <sup>-3</sup>	42

Notice that since the values of K<sub>f</sub> are very large, formation of complex ions will significantly decrease the concentrations of free metal ion.