

Stepwise and Overall formation constant

In 1941 J. Bjerrum suggested that the formation of a complex in solution proceeds with stepwise addition of the ligands to the metal ion.

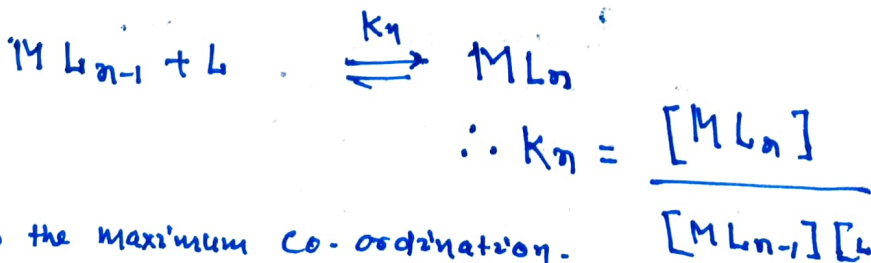
Let us consider the formation of a complex ML_n . (stepwise formation of ML_n complex)

where M is the metal ion and

L is a monodentate ligand,

n is the maximum co-ordination number.

Now suppose that the formation of the complex ML_n takes place by the following n consecutive steps and equilibrium constants.



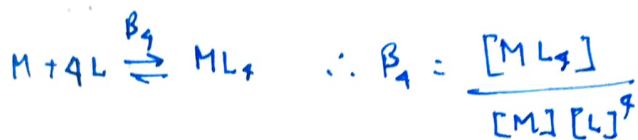
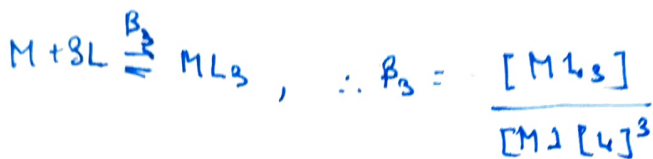
where n is the maximum co-ordination number of a metal ion for the ligand L .

The equilibrium constants K_1, K_2, \dots, K_n are called stepwise formation constant.

or
Step wise stability constant.

Overall formation of complex ML_n

Now the formation of the Complex ML_n may be expressed by the following steps and Equilibrium constants are as



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The Equilibrium Constants, $\beta_1, \beta_2, \beta_3, \beta_4, \dots, \beta_n$ are called Overall or Cumulative formation Constant.
or, Overall or Cumulative Stability Constant.