Activity and activity coefficients I

Consideration of the complexing of ions that goes on in a solution suggests that, of all the individuals of an ion M^{z+} or Y^{z-}, some are involved in complexes and thus unavailable to participate in chemical reactions. Thus only some proportion of the individuals of an ion M^{z+} or Y^{z-} are "active". Thus, rather than using *concentration* to predict the ion's behavior in a reaction, we use the *activity* to better estimate the individuals actually available for reaction.

With the above considerations in mind, we need some way of quantifying what proportion of the individuals of an ion *i* will be active in a given solution. This proportionality is the activity coefficient γ, so that

$$a_i = (\gamma_i)(m_i)$$

For example, in the schematic sketch at right, there are twelve individuals of the blue ion M. Of those twelve, four are in complexes, and only eight are in the hydrated or aquo-ion condition that we will assume lets them be available for reaction. Thus the activity coefficient γ_M for the blue ion M would be 0.67 in this simple case.

The problem with reality is that we can't see ions the way that they are shown at right, and thus we can't directly determine γ. Instead, we have to have a model to predict γ. Part II of this series will move us toward that model.