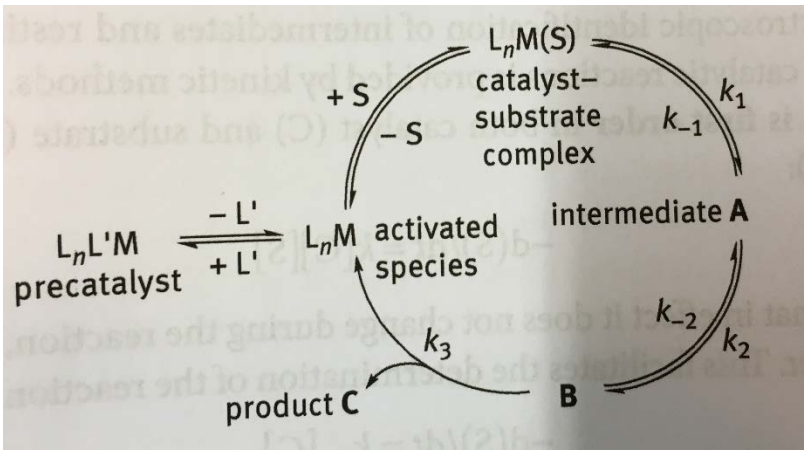
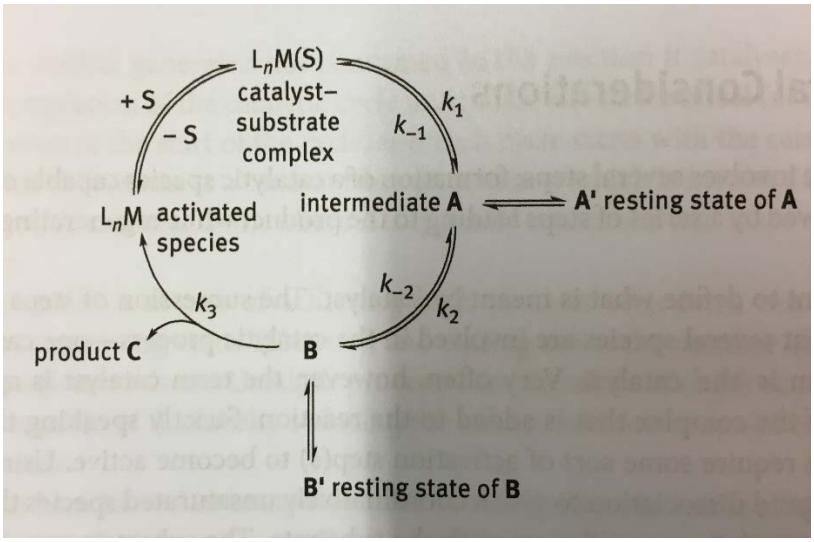
Typical catalytic cycle:



1. Catalyst – we often denote a metal complex added to a reaction mixture as a catalysts. However, this complex must be first activated to form the active catalytic species, i.e. it is in fact a precatalyst. (Discussion of precatalysts in Suzuki coupling or in hydroformylation rxn)
2. Rate determining step – the step with the smallest k.
3. C can be a kinetic product and it can then further isomerize to form a thermodynamically favored product D. (What will affect the C/D ratio?)

Resting states – species A' and B' that are in the equilibrium with the active intermediates in the catalytic cycle:



Rate of a catalytic reaction:

$$\left(-\frac{d[S]}{dt}\right) = k_{obs}[S][Cat]$$

- Reaction orders (what does it mean, if the order is not 1?)

Discussion of examples:

A typical organometallic reaction – Kumada coupling

A typical organocatalytic reaction – prolinol catalyzed Diels-Alder reaction