

List of discussion topics

Definitions, nomenclature, and bookkeeping

- Elementary steps, stoichiometric numbers, reversibility, extent of reaction, turnover frequency, steady state approximation etc.

Analysis of elementary steps

- Collision theory, transition state theory (TST)
- Application of TST to thermodynamically non-ideal systems
- Application of TST in interpreting kinetic isotope effects and apparent activation energies

Analysis of reaction sequences (introductory)

- Principle of microscopic reversibility
- General mathematical relations for closed reaction sequences
- Temkin's theory of non-uniform surfaces for two-step sequences

Analysis of reaction sequences (intermediate)

- De Donder relations for the thermodynamic formulation of reaction rates
- Kinetic coupling within and between catalytic cycles
- Interpreting rate determination using reversibilities of elementary steps
- Interpreting rate determination using degrees of rate control

Analysis of reaction sequences (advanced)

- Theory of maximum rates
- Unification of De Donder relations and degrees of rate control through TST
- Analogies between reaction paths and electrical circuits

Analysis of complex reaction networks

- Delplot analysis of network ranks
- Lumping of species in monomolecular reaction systems
- Wei-Prater method for analyzing the structure of a reaction network