

LX. Reaction mechanisms

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1. **Reaction mechanism**: a theory about what takes place at each stage of the reaction

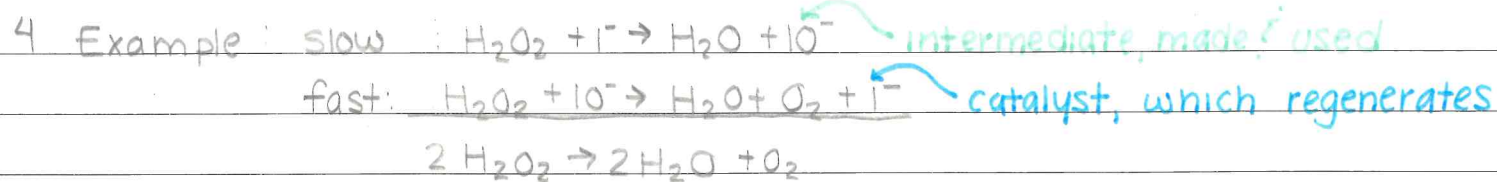
a. Reactions may occur all at once or through several discrete steps

b. Elementary step: each of these steps

2. **molecularity**: how many molecules are involved in that step of the reaction

a. Termolecular are SLOW, need 3 molecules in right orientation

3. For elementary reactions, you can use molecularity to find rate law

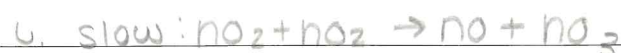


a Rate determining step: reaction cannot proceed faster than slow step

5. Plausible mechanism

- a. Rate-determining step must be consistent with observed rate law
- b. Stoichiometry must be found when all reactions are added up
- c. All reactions must be balanced
- d. Intermediates are made and used up
- e. Catalysts are regenerated at the end

6 If the first step is RDS, the coefficients on the reactants side are the same order as the rate law



8 Presence of a Catalyst

a. Catalysts affect rate without being in the overall reaction

u. Increase the rate of the forward and backward reaction

uu. They don't change the position of the equilibrium

b. $k_{\text{cat}} = Ae^{-E_a/RT}$, $k_{\text{uncat}} = Ae^{-E_0/RT} \rightarrow$ look at ratio