

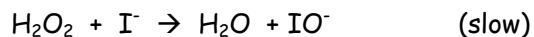
Name Beth "Key"

Chemistry 2: Reaction - Chemical Kinetics Reaction Mechanisms

1. Complete the table for each elementary reaction shown.

Elementary Reaction	Molecularity	Rate Law
$2\text{NO} \rightarrow \text{N}_2\text{O}_2$	Bimolecular	$\text{Rate} = k[\text{NO}]^2$
$\text{SO}_3 \rightarrow \text{SO}_2 + \text{O}$	Unimolecular	$\text{Rate} = k[\text{SO}_3]$
$\text{O} + \text{O}_3 \rightarrow 2\text{O}_2$	Bimolecular	$\text{Rate} = k[\text{O}][\text{O}_3]$

2. The decomposition of hydrogen peroxide is catalyzed as shown below. The catalyzed reaction is thought to proceed by a two-step mechanism:

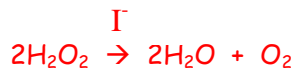


a. Predict the rate law for the overall process

$\text{Rate} = k[\text{H}_2\text{O}_2][\text{I}^-]$  according to slow elementary step. However,  $\text{I}^-$  is not consumed in the reaction and therefore changing its concentration does not impact rate. Its behavior as a catalyst will impact the value for  $k$ . This is often designated with  $k'$  so we can write the rate law as:



b. Write the chemical equation for the overall process.



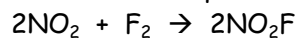
c. Identify the intermediate, if any, in the mechanism.



d. Identify the catalyst in this reaction.

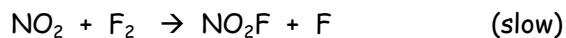


3. The balanced equation for the reaction of the gases nitrogen dioxide and fluorine is:



The experimentally determined rate law is:  $\text{Rate} = k[\text{NO}_2][\text{F}_2]$

One possible mechanism for this reaction is shown below.



a. What is the rate law for this mechanism?



b. What is the overall reaction for this mechanism?



c. Is this an acceptable mechanism?

Yes