

- What is the purpose of a reaction mechanism?
- What are the requirements in order for a reaction to occur?
- Why does increasing the following quantities increase the rate of reaction:
 - concentration
 - temperature
- What is the importance of activation energy?
- Explain the transition theory in your own words.
- For the following reaction of $\text{Mo}(\text{CO})_6$, $\text{Mo}(\text{CO})_6 + \text{P}(\text{CH}_3)_3 \rightarrow \text{Mo}(\text{CO})_5\text{P}(\text{CH}_3)_3 + \text{CO}$, the proposed mechanism is:

$$\text{Mo}(\text{CO})_6 \rightarrow \text{Mo}(\text{CO})_5 + \text{CO}$$

$$\text{Mo}(\text{CO})_5 + \text{P}(\text{CH}_3)_3 \rightarrow \text{Mo}(\text{CO})_5\text{P}(\text{CH}_3)_3$$
 - Is the proposed mechanism consistent with the equation for the overall reaction?
 - Identify any intermediates.
- In the following single elementary step, predict the rate law:

$$\text{H}_2 + \text{Br}_2 \rightarrow 2 \text{HBr}$$
- The reaction $2 \text{NO} + \text{Cl}_2 \rightarrow 2 \text{NOCl}$ obeys the rate law, $\text{rate} = k [\text{NO}]^2 [\text{Cl}_2]$. The following mechanism has been proposed for this reaction:

$$\text{NO} + \text{Cl}_2 \rightarrow \text{NOCl}_2$$

$$\text{NOCl}_2 + \text{NO} \rightarrow 2 \text{NOCl}$$
 - What would the rate law be if the first step were rate determining?
 - Based on the observed rate law, what can we conclude about the relative rates of the two steps?

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