AP Chemistry Daily Videos 5.7 Introduction to Reaction Mechanisms

Video #1

- 1. Describe in your own words what a reaction mechanism is.
- 2. What are elementary steps?
- 3. If a product is formed in one step and then consumed in another step it is called an
- 4. How do you know if a substance is acting as a catalyst or an intermediate in a reaction mechanism?

	Catalysts (Yes/No)	Intermediates (Yes/No)
Present at the beginning and end of a reaction?		
Shows up in a rate law?		
Consumed in the reaction?		
Temporary product?		

5. Identify the catalysts and the intermediates in the following reaction mechanisms:

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 \begin{split} & 2 \text{H}_2 \text{O}_2 \, \rightarrow \, 2 \text{H}_2 \text{O} \, + \text{O}_2 \\ & \text{PROPOSED MECHANISM:} \\ & \text{Elementary Step 1: } \text{H}_2 \text{O}_2 \, + \text{I}^- \, \rightarrow \, \text{H}_2 \text{O} \, + \text{IO}^- \qquad \qquad \textit{slow} \\ & \text{Elementary Step 2: } \text{IO}^- \, + \, \text{H}_2 \text{O}_2 \, \rightarrow \, \text{H}_2 \text{O} \, + \, \text{O}_2 \, + \text{I}^- \qquad \qquad \textit{fast} \end{split}
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Overall balanced equation: 0_3(g)+O(g) 	o 2O_2(g) Elementary Step One: 0_3(g)+Cl(g) 	o ClO(g)+O_2(g) Elementary Step Two: ClO(g)+O(g) 	o Cl(g)+O_2(g)
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Video #2

- 1. What are two criteria we consider when judging if a reaction mechanism is plausible?
- 2. Pause the video at 1:55 and notice each elementary step has a rate law, activation energy, and rate constant.
- 3. Write down how you add elementary steps together to generate the overall reaction.

4. Pause the video at 4:30 and attempt the problem, then evaluate how you did and identify any errors.

YOU DO IT! Stop the video and determine the overall balanced equation, identify catalyst(s), and identify intermediate(s) in the mechanism shown.

STEP 1:
$$k_1$$

 $CH_3COCH_3 + H_3O^+ \rightleftharpoons CH_3COHCH_3^+ + H_2O$
 k_{-1}

STEP 2:
$$CH_3COHCH_3^+ + H_2O \xrightarrow{k_2} CH_3COHCH_2 + H_3O^+$$

STEP 3:
$$CH_3COHCH_2 + Br_2 \xrightarrow{k_3} CH_3COCH_2Br + HBr$$