

UNIT7-DAY6-LaB1230pm

Tuesday, April 02, 2013
8:45 AM

Thinking Like a Chemist About Kinetics III

UNIT7 DAY6

CH302 Vanden Bout/LaBrake Spring 2013

What are we going to learn today?

Chemical Mechanisms

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IMPORTANT INFORMATION

LM 30, 31 and 32 due 9AM Th

Mechanisms
Arrhenius
Catalysts

CH372C

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Quiz: Clicker Question 1

In studying reaction kinetics, what is the purpose in sometimes starting with a concentration of one reactant that is much higher than the other reactant?

- A. The concentration of that reactant is virtually unchanged during the reaction
- B. The concentration of that reactant controls the rate of the reaction.
- C. The concentration of that reactant causes the kinetics to be 2nd order
- D. The rate law will have to be 2nd order

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Quiz: Clicker Question 2

Now that one reactant is essentially constant in concentration:

- A. The rate of the reaction will be dependent only on the other (low) reactant.
- B. The rate of the reaction will be constant.
- C. The rate of the reaction will be dependent only on the high concentration reactant.
- D. The rate of the reaction will depend on both reactants.

Now that one reactant is essentially constant in concentration:

- A. The rate of the reaction will be dependent only on the other (low) reactant.
- B. The rate of the reaction will be constant.
- C. The rate of the reaction will be dependent only on the high concentration reactant.
- D. The rate of the reaction will dependent on both concentrations.

rate dependence on low conc.

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What determines the rate people get off an airplane?

- A. How fast they stand up
- B. How fast they can get out the door
- C. How fast they can walk up the jet-bridge.

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Rate Determining Step

When a reaction involves many steps we can approximate the rate of the overall reaction by the rate of the slowest step
(the rate determining step)

WORK ON ACTIVITY

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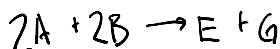
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Poll: Clicker Question 2

Write the overall reaction and the rate law expression that corresponds to the following mechanism. Be sure to eliminate intermediates from the answers.

1. $2A + B \rightleftharpoons D$ (fast, equilibrium)
2. $D + B \rightarrow E + F$ (slow)
3. $F \rightarrow G$ (fast)

- a) Rate = $k[A]^2[B]$
- b) Rate = $k[D][B]$
- c) Rate = $k[A]^2$
- d) Rate = $k[A]^2[B]^2$



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Poll: Clicker Question 3

Write the overall reaction and the rate expressions that correspond to the following mechanisms. Be sure to eliminate intermediates from the answers.

1. $A + B \rightleftharpoons C$ (fast, equilibrium)
2. $C + B \rightleftharpoons F$ (fast, equilibrium)
3. $F \rightarrow G$ (slow)

- a) Rate = $k[F]$
- b) Rate = $k[C][B]$
- c) Rate = $k[A][B]^2$
- d) Rate = $k[A]^2[B]^2$

REVIEW OF ACTIVITY

MAIN POINTS:

1. MECHANISM
UNIMOLECULAR
BIMOLECULAR
RATE OF CHANGE DEPENDS ON CONCENTRATION
2. INDIVIDUAL RATE LAWS CAN BE WRITTEN FROM ELEMENTARY STEPS
3. USE METHOD OF INITIAL RATES TO PROPOSE MECHANISM
4. OVERALL RATE LAW NEEDS TO SUPPORT PROPOSED MECHANISM

What did we learn today?

Understand the concept of mechanism using rate law data to predict whether or not a proposed mechanism is viable or not.