

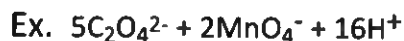
Name:

Woy - Lesson 7

Date:

Chemistry 12 – Reaction Mechanisms

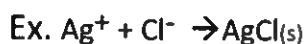
Almost every chemical reaction has to occur in a series of steps.



We would need 23 particles to react at once for this to work. The chances of this happening are next to zero.

A series of steps for a reaction to occur is called a reaction mechanism.

There are some reactions that can occur in one step.



Reaction Mechanisms

- In a reaction mechanism each step depends on the others before it.
- The mechanism CANNOT be determined by looking at the overall reaction
- A LOT of research is done to find out reaction mechanisms
- You will NEVER be asked to come up with a mechanism from scratch
- Each step in a mechanism is called an elementary process

Example:



Mechanism – 3 step process



Rate Determining Step

- Always the slowest step in the mechanism
- The overall reaction can never be faster than the rate determining step
- The only way to speed up the overall reaction is to speed up the rate determining step.

Consider the reaction



How could we speed up this reaction?

- Speeding up a fast step will have no effect on the overall rate

↳ can't use products that are not there

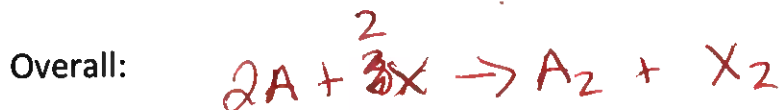
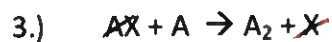
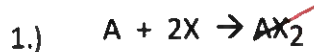
How to determine the overall reaction given the mechanism



Cross out what is produced in one step & used in another.

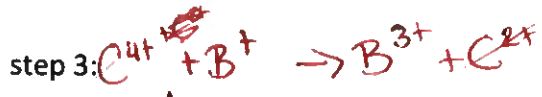
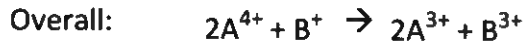


Example:



What if you are asked to find a missing step?

the following reaction occurs in a **3 step mechanism**:

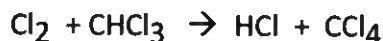


find step 3.

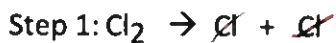
Example:



Consider the following reaction for the formation of HCl in the presence of light.



The following is the proposed reaction mechanism:



Determine **Step 2** of the reaction mechanism.



Reaction Intermediates

- A species which is produced on one step and used up in a later step
For the mechanism:

- 1) $HBr + O_2 \rightarrow HOBr$
- 2) $HBr + HOBr \rightarrow 2H_2O$
- 3) $2HBr + 2HOBr \rightarrow 2H_2O + 2Br_2$

reaction intermediates are HOBr & HOBr

- An intermediate doesn't accumulate (it always gets used once formed)
- Intermediates may last a while and can be stable compared to an activated complex which are VERY unstable and SHORT-LIVED (AC doesn't usually obey bonding rules)

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read 26-27

