

A First Course on Kinetics and Reaction Engineering

Unit 10. Lesson Plan

Before Class

- Provide the redacted slides to the students and tell them to bring them to class

During Class

- Introduce today's topic and where it fits in the course (Slides 1 and 2)
- Review of Unit 10 (5 to 10 minutes)
 - Slide 3
- Ask whether the students have any questions from their pre-class preparation and answer them
 - Slide 4
- Learning Activity (~20 minutes) - This activity allows them to practice the procedure for generating a rate expression.
 - Slide 5: Put the slide up
 - form the students into groups and assign each group a section of blackboard.
 - explain that the activity will take the form of a relay race and go over the instructions on the bottom of the slide
 - when three groups have finished, stop the event and as a class, check the solutions using Slide 6.
- Learning Activity (20 minutes) - this activity also gives them an opportunity to practice the procedure for generating a rate expression as well as applying the simplifications associated with a most abundant surface intermediate
 - Slide 7
 - Put the problem statement up and have them work in groups at their seats to solve the problem
 - circulate among them, checking their progress, giving hints and answering questions as they work
 - when most have completed or stopped working, walk them through the part of the solution shown on Slide 8
 - Ask them how the assumption that O^* is the most abundant will simplify the rate expression. That is, have them tell you which terms in the rate expression will be eliminated
 - Slide 9 - ask if anyone would like to see why and how those terms are eliminated and then use the slide to show that one term in the denominator predominates.
 - The final rate expression shows reactant-inhibition; point this out
 - optionally ask if anyone can offer a physical reason for why this happens (increasing the O_2 partial pressure causes more O to adsorb and thereby reduces the number of sites available for CO to adsorb; if the coverage of O increases, the other coverages decrease)

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- Learning activity (optional) - have them write three minute papers per the instructions on Slide 10.
 - After 3 minutes, have a few of them read their papers and have the class comment on any steps they left out.
 - Point out that the “how to” from Unit 7 provides a non-narrative response to this assignment
- Slide 11: show them what’s next and how it relates to what’s already been covered

After Class

- Provide the complete slides to the students.
- Provide the written solutions to the activities to the students.