

A First Course on Kinetics and Reaction Engineering

Unit 25. Lesson Plan

The information content of Unit 25 is relatively small. If you feel your students would benefit from spending a little more class time on a prior topic, one of the learning activities for this unit can be replaced with an activity involving that prior topic.

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 25 (5 to 10 minutes)
 - Slides 3 through 5: go over the key concepts on the slides
- Ask whether the students have any questions from their pre-class preparation and answer them
 - Slide 6
- Learning Activity 25.1 (~20 minutes)
 - Slide 7: Form class into groups of four, show them the problem statement, assign isothermal exothermic to 1/4 of the groups, adiabatic exothermic to 1/4 of the groups, etc.
 - Slide 8: Tell each group to generate a plot of conversion versus space time and to make note of the features listed on this slide, give them ~10 minutes to work. Circulate among them and answer questions as asked. When most groups have an answer, reform the groups so new groups have one person who worked on each case and tell them to now compare their responses and combine the curves onto a single set of axes. Circulate among them and answer questions as asked. Call on groups to sketch curves on blackboard, discuss as class and reach consensus
 - Slides 9 and 10: Use these slides to review key points of the analysis
- Learning Activity 25.2 (~20 minutes)
 - Slide 11: Use this slide to explain the activity to the class
 - Slides 12 and 13: Explain that in this first "experiment" it doesn't matter what kind of step change occurred, then go through the questions calling on students or asking for volunteers and discussing each one. Slide 13 can be used to summarize and to point out that irrespective of the step change, the transient will last for one residence time
 - Slides 14 and 15: Explain that in this "experiment," the composition (but not the flow rate) of the fluid entering the reactor undergoes a step change, then proceed as for the previous two slides.
 - Slides 16 and 17: Call on students or ask for volunteers and discuss their responses; use slide 17 to summarize

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- Slides 18 and 19: Explain that in this “experiment,” the flow rate of the fluid entering the reactor undergoes a step change increase, then proceed as for slides 14 and 15
- Slides 20 and 21: Call on students or ask for volunteers and discuss their responses; use slide 21 to summarize
- Slide 22: Put the material covered in this class into the overall context of the course.

After Class

- Provide the complete slides to the students.