

The background features a large, stylized blue and grey buffalo mascot logo. The buffalo is facing forward with its mouth open, showing its teeth. Below the buffalo's head, the word "BUFFALO" is written in a large, bold, white, italicized font with a grey outline.

A First Course on Kinetics and Reaction Engineering

Class 42 on Units 39 and 40

Where We're Been

- Part I - Chemical Reactions
 - ▶ 1. Stoichiometry and Reaction Progress
 - ▶ 2. Reaction Thermochemistry
 - ▶ 3. Reaction Equilibrium Part II - Chemical Reaction Kinetics
- Part II - Chemical Reaction Kinetics
 - ▶ A. Rate Expressions
 - 4. Reaction Rates and Temperature Effects
 - 5. Empirical and Theoretical Rate Expressions
 - 6. Reaction Mechanisms
 - 7. The Steady State Approximation
 - 8. Rate Determining Step
 - 9. Homogeneous and Enzymatic Catalysis
 - 10. Heterogeneous Catalysis
 - ▶ B. Kinetics Experiments
 - 11. Laboratory Reactors
 - 12. Performing Kinetics Experiments
 - ▶ C. Analysis of Kinetics Data
 - 13. CSTR Data Analysis
 - 14. Differential Data Analysis
 - 15. Integral Data Analysis
 - 16. Numerical Data Analysis



Where We're Been

- Part III - Chemical Reaction Engineering
 - ▶ A. Ideal Reactors
 - 17. Reactor Models and Reaction Types
 - ▶ B. Perfectly Mixed Batch Reactors
 - 18. Reaction Engineering of Batch Reactors
 - 19. Analysis of Batch Reactors
 - 20. Optimization of Batch Reactor Processes
 - ▶ C. Continuous Flow Stirred Tank Reactors
 - 21. Reaction Engineering of CSTRs
 - 22. Analysis of Steady State CSTRs
 - 23. Analysis of Transient CSTRs
 - 24. Multiple Steady States in CSTRs
 - ▶ D. Plug Flow Reactors
 - 25. Reaction Engineering of PFRs
 - 26. Analysis of Steady State PFRs
 - 27. Analysis of Transient PFRs
 - ▶ E. Matching Reactors to Reactions
 - 28. Choosing a Reactor Type
 - 29. Multiple Reactor Networks
 - 30. Thermal Back-Mixing in a PFR
 - 31. Back-Mixing in a PFR via Recycle
 - 32. Ideal Semi-Batch Reactors



Where We're Been

- Part IV - Non-Ideal Reactions and Reactors
 - ▶ A. Alternatives to the Ideal Reactor Models
 - 33. Axial Dispersion Model
 - 34. 2-D and 3-D Tubular Reactor Models
 - 35. Zoned Reactor Models
 - 36. Segregated Flow Models
 - 37. Overview of Multi-Phase Reactors
 - ▶ B. Coupled Chemical and Physical Kinetics
 - 38. Heterogeneous Catalytic Reactions
 - 39. Gas - Liquid Reactions
 - 40. Gas - Solid Reactions



Final Exam

- Any topic covered in the readings, class activities or homework could be on the exam
- There will be 10 short answer questions @ 2.5% each and 3 problems @ 25% each
 - ▶ Material from Part IV (Units 33 to 40) could appear in the short answer questions, but it will not appear in the problems
- The final exam is from 8 to 11 AM on Friday 12/18/15 in 97 Alumni



Questions?



Today's Activity

- Take out a piece of paper and write one paragraph about the most interesting thing you learned in CE 329

CEB



Where We're Going

- Part I - Chemical Reactions
- Part II - Chemical Reaction Kinetics
- Part III - Chemical Reaction Engineering
- Part IV - Non-Ideal Reactions and Reactors
 - ▶ A. Alternatives to the Ideal Reactor Models
 - ▶ B. Coupled Chemical and Physical Kinetics
 - 38. Heterogeneous Catalytic Reactions
 - 39. Gas-Liquid Reactions
 - 40. Gas-Solid Reactions

