

SUMMARY REPORT

TEACHING OF UNDERGRADUATE
KINETICS

A mini-session presented at the
Annual Meeting

American Institute of Chemical Engineers
Washington, D. C.
December 4, 1974

Dr. Edwin O. Eisen, Chairman

INTRODUCTION

The attached questionnaire was sent in May 1974 to the chairman of each chemical engineering department in the United States and Canada together with a cover letter asking that the

appropriate faculty member complete and return the questionnaire. A follow-up letter was sent in early September to those schools

universities contacted, ninety questionnaires were returned. This compares with seventy-one responses to the 1972 mini-session (Mass and Energy Balances) and fifty-nine replies to the 1973 mini-session (Thermodynamics).

QUESTIONNAIRE ON THE TEACHING OF
REACTION KINETICS

Instructor: _____

University: _____

Distinctive features of the course as I give it are:

Some explanations of concepts which I have found particularly effective are...

with the minimum possible

the opportunity to present these at the session.)

Some particular challenges in teaching Reaction Kinetics are:

QUESTIONNAIRE ON THE TEACHING OF
REACTION KINETICS

1. IDENTIFICATION

Instructor: _____

University: _____

2. COURSE TITLE(S) (undergraduate courses)

1. _____

2. _____

3. TIME AVAILABLE

Course 1

Course 2

Hrs lecture/week

Hrs problem lab/week

Hrs experimental lab/week

4. TEXT(S) AND RESOURCES (AUTHOR, TITLE)

Course 1

Circle chapters usually covered 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Course 2

Circle chapters usually covered 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

5. STUDENTS

Course 1

Course 2

A. Year of Students
e.g. seniors

B. Class Size

Number of courses _____

TEXTS

responding listed the chapters usually covered in their courses.

COURSE TIME DEVOTED TO THREE SPECIFIC
TOPICS RELATED TO REACTION KINETICS

A. Reaction Equilibria

The equilibrium conversion of chemical reactions is a bridge between thermodynamics and kinetics. The equilibrium

is valuable in characterizing the kinetic behavior

of reversible reactions. Of the schools responding, 67% cover reaction equilibria in the chemical engineering thermodynamics course, 13% cover this in the kinetics course, and

LABORATORY EXPERIMENTS

Rensselaer Polytechnic Institute (Dr. Gregory P. Wotzak)
"Hydrolysis of Acetic Anhydride"

Queens University (Dr. B. W. Wojciechowski)
"Hydrolysis of Acetic Anhydride in Batch, CSTR and Flow Reactors"

University of Calgary (Dr. Norton G. McDuffie)
"Hydrolysis of Methyl Acetate"
"Catalyst Surface Determination (BET)"
"Fluidized and Packed Bed Behavior"

University of Washington (Dr. L. N. Johanson)
"Basic Principles in Stirred Tank Reactors"

University of Maine (Dr. Gerald L. Simard)
"Emulsion Polymerization"
"De-alkylation of Cumene"
"Saponification of Ethyl Acetate"

Chemical Engineering (Dr. Deran Hanesian)

"Tubular Reactor"
"Backmix Reactor"
"Fermentation Reactor"
"Non-isothermal Batch Reactor"
"Heterogeneous Catalysis"

15
University of British Columbia (Dr. K. L. Purder)
"Liquid Phase Homogeneous Catalysis (Including Enzymes)"
~~"Reaction Heterogeneous Reactions"~~

Colorado School of Mines (Dr. R. W. Baldwin)
Eight different experiments

University of California, Berkeley (Dr. A. T. Bell)
Several different experiments

SEMESTERS/QUARTERS

86-1 [redacted] according 20% operate on the quarter

system and 79% operate on the semester system. The average length of the semester and quarter, taken as a combined unit, is twelve weeks.

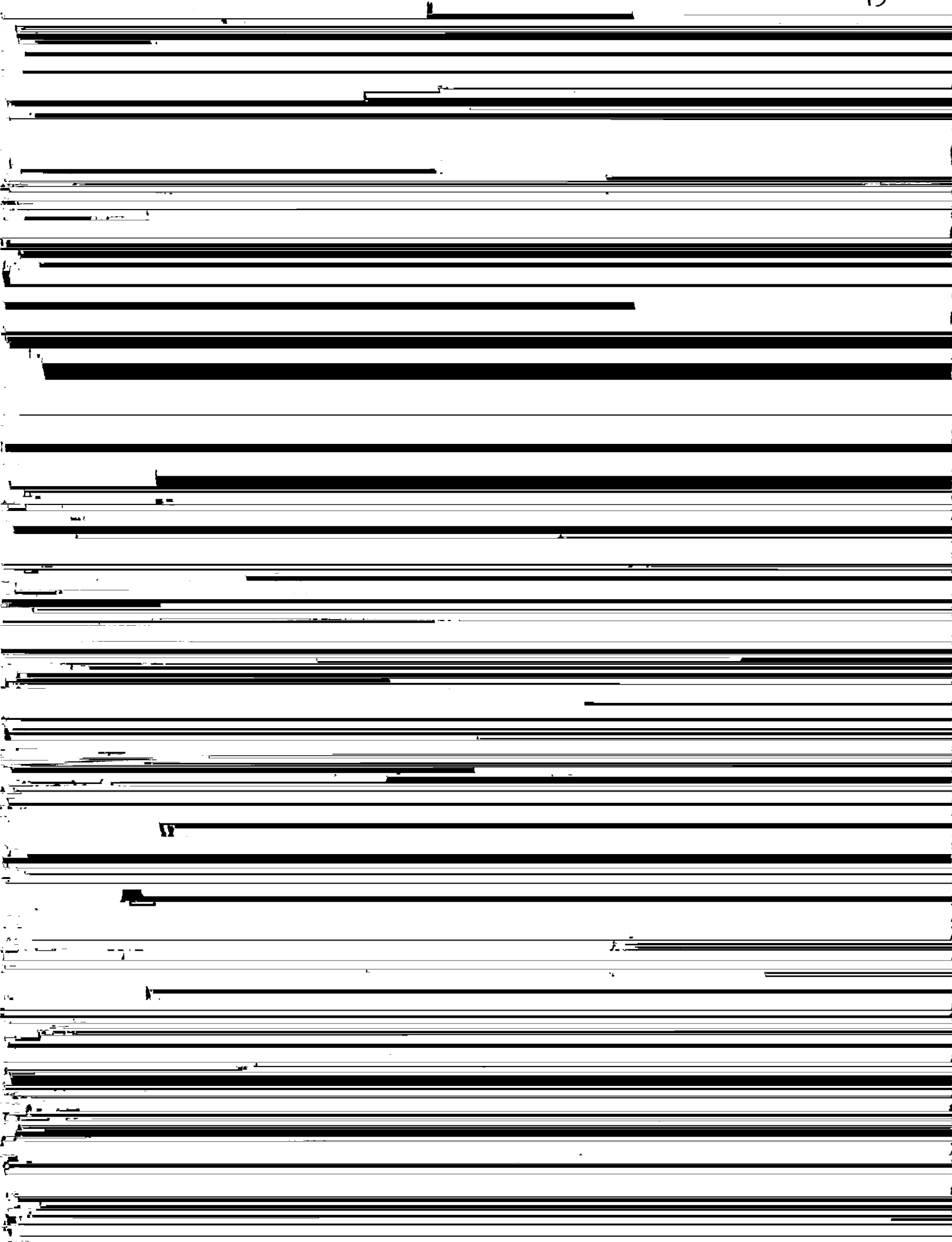
REPLIES TO QUESTIONNAIRES

[redacted] are summarized on the following

pages. The following form is used.

NAME OF UNIVERSITY

[redacted] (When one or more numbers



MASSACHUSETTS STATE UNIVERSITY

WORCESTER POLYTECHNIC INSTITUTE



MEXICAN TECHNOLOGICAL UNIVERSITY

2. Smith
FEATURES

Sr

Three weeks devoted to uncatalyzed fluid-solid reactions, using personal notes.

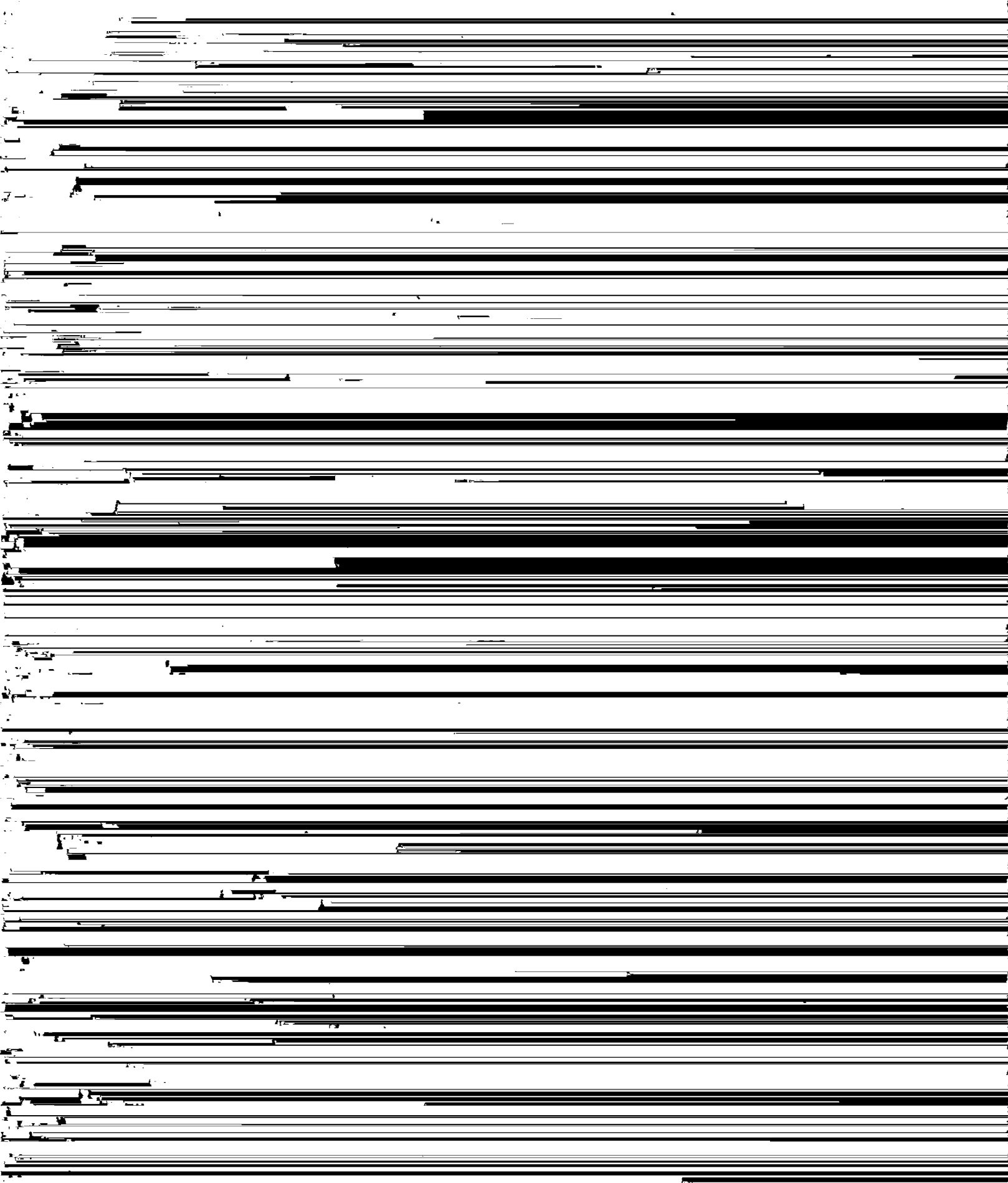
CHALLENGES

Objective treatment of use of chemical

FEATURES

Use of demonstration lab where students are assigned concepts to demonstrate using normally available laboratory equipment, students design, construct and demonstrate apparatus used to measure or elucidate kinetic phenomena. Examples: effect of pressure and temperature, evaluate a reverse reaction rate; compare batch and

CLARKSON COLLEGE OF TECHNOLOGY



1. Sr
EXPLANATIONS/CONCEPTS
Presentation of a large number of

1. Sr
EXPLANATIONS

UNIVERSITY

OKLAHOMA STATE UNIVERSITY

Jr

Sr

Levenspiel

1. Levenspiel

FEATURES

Emphasis on applications. Many, many
illustrations 70% discussion and

design rather than mechanism.

UNIVERSITY OF WISCONSIN

LAVAL UNIVERSITY