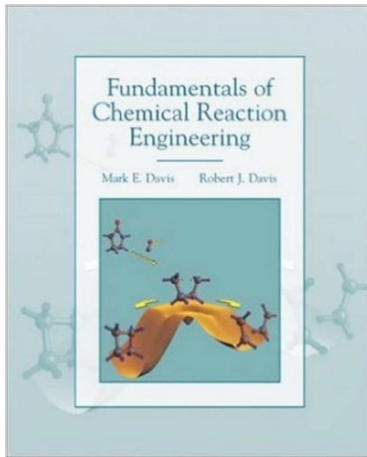


# The Book



Available on Amazon for prices  
as low as \$40 (+ shipping)

Or it's **Free!**

<http://authors.library.caltech.edu/25070/>

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# Outline of the course

**Objective:** Be able to analyze and understand a heterogeneous reaction (mechanism, kinetics etc...) from experimental data .

- 1. Basic concepts (about 4 weeks)
    - Kinetics (elementary reactions and transition state theory) Chapter 1 and 2 (partial)
    - Ideal reactors Chapter 3 (partial)
    - Non-ideal reactors Chapter 8 (most of it)
    - The Steady-State Approximation (SSA) Chapter 4 (most of it)
  
  - 2. Heterogeneous catalysis (about 4 weeks)
    - What are heterogeneous catalysts?
    - Bulk and surface structures in heterogeneous catalysts
    - Surface reactivity
    - Elementary step kinetics
    - Kinetics of Overall Reactions
 } Chapter 5
  
  - 3. Transport effects in heterogeneous catalysis (about 4-5 weeks)
    - External transport
    - Internal transport
    - Combined internal and external transport
    - Analyzing rate data
 } Chapter 6
- + 1 week of computer exercises

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## Course philosophy

We will follow the book = an excellent reference. My job is to help you understand it.

Most of the class will be taught on the blackboard. If you follow and write down what I write, you should have an organized summary of the textbook by the end of the semester.

We will do exercises right after I have taught the concept (exercises will be part of the course not after the course).

How to get an amazing grade:

- Read the book (before class)!
- Use class to reinforce/clarify/strengthen what you read.
- Ask questions.
- Do the exercises.

The grade will be based on a **final written exam during the exam period.**

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## Minimum energy pathway



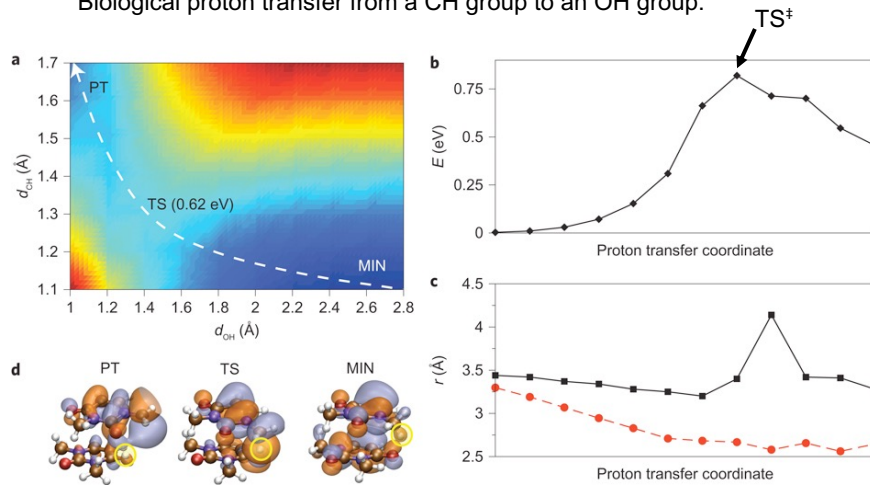
Work on the transition state led to the Nobel prize of Ahmed Zewail in 1999.

Ref.: *Science*, Cover page, November 24<sup>th</sup> 1994.

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# Minimum energy pathway

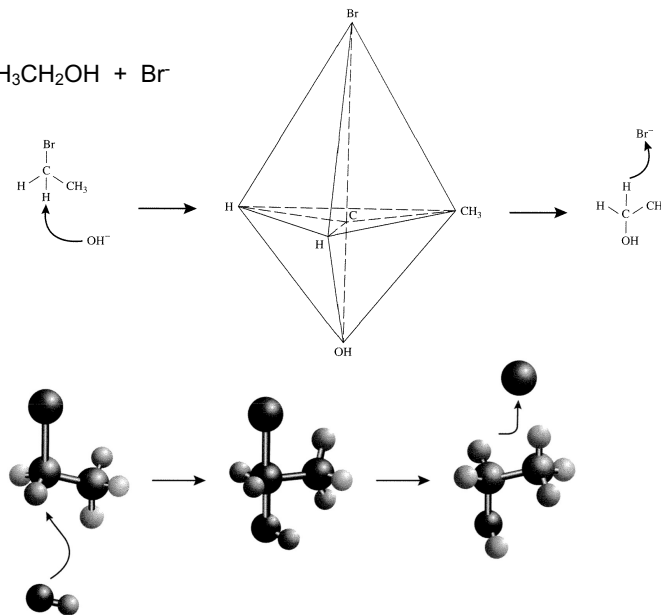
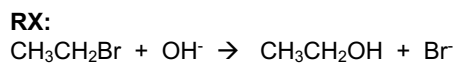
Biological proton transfer from a CH group to an OH group:



Ref.: *Nature Chemistry* 4, 323–329 (2012)

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# Transition state



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