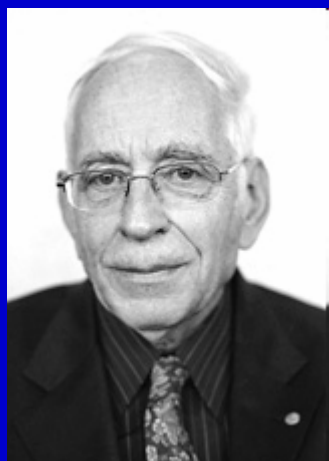


# Macromolecular Chemistry

## Transition metal catalysis of polymerization



Yves Chauvin  
Institut Français du Pétrole  
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Robert Grubbs  
California Institute of Technology  
(Caltech) Pasadena, CA, USA



Richard Schrock  
Massachusetts Institute  
of Technology (MIT)  
Cambridge, MA, USA

# Homework

## Assignment 11

Due May 4<sup>th</sup> before 5PM

DO: Submit a corrected copy of your midterm exam

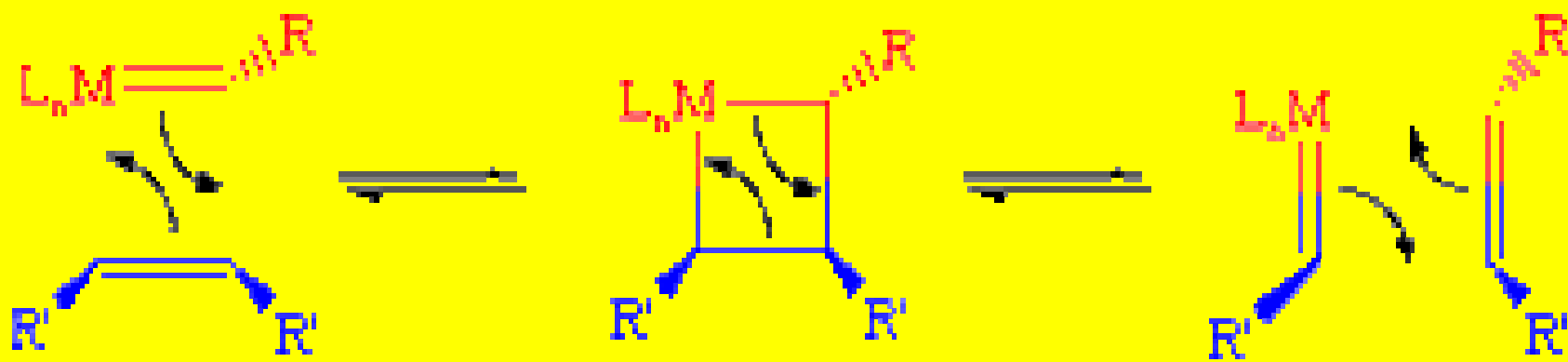
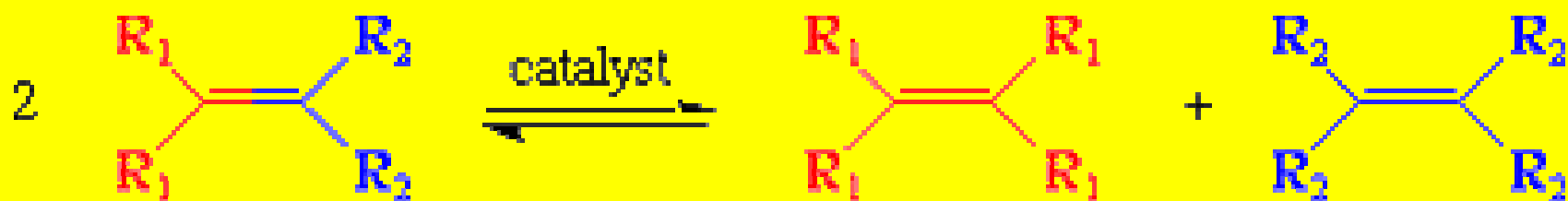
# Metathesis

From Dictionary.com

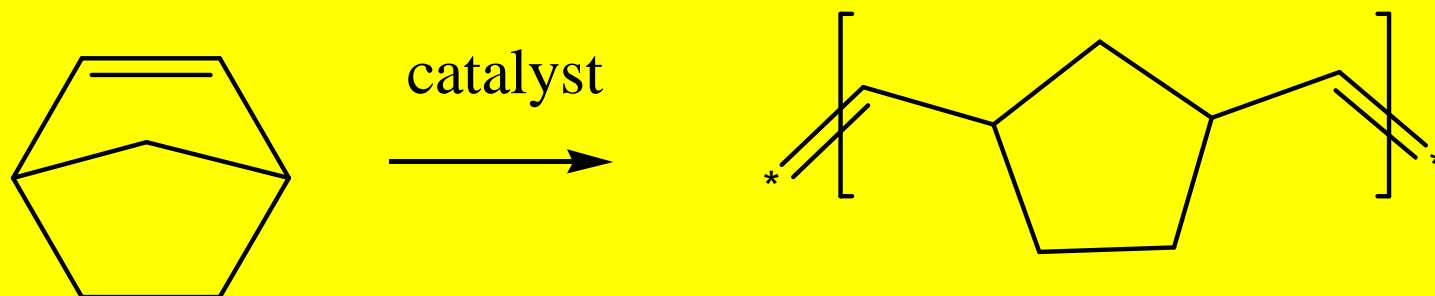
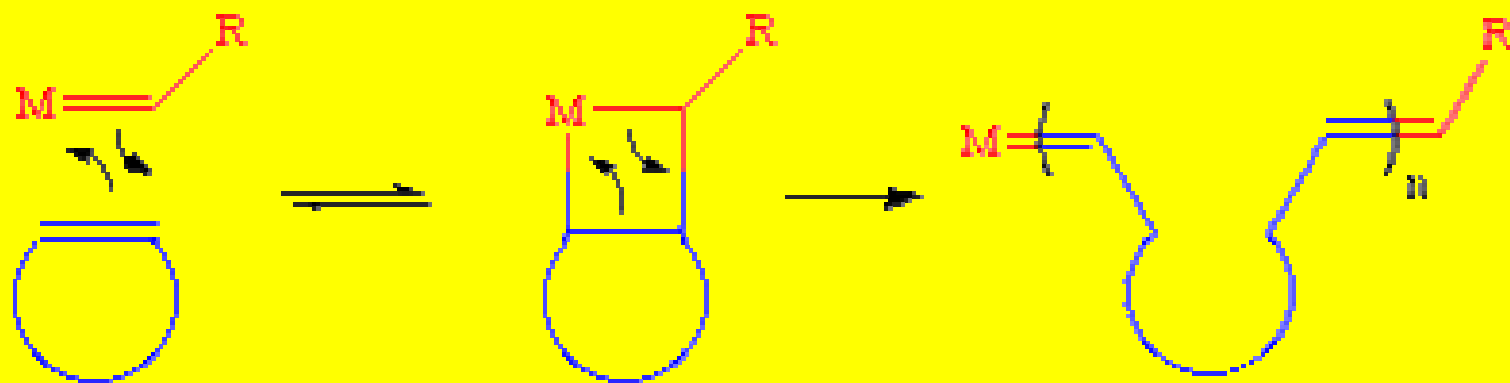
1. the transposition of letters, syllables, or sounds in a word, as in the pronunciation **aks** or *ask*.
2. In chemistry, reaction whose result is the interchange of two parts of two substances to form two new substances, as



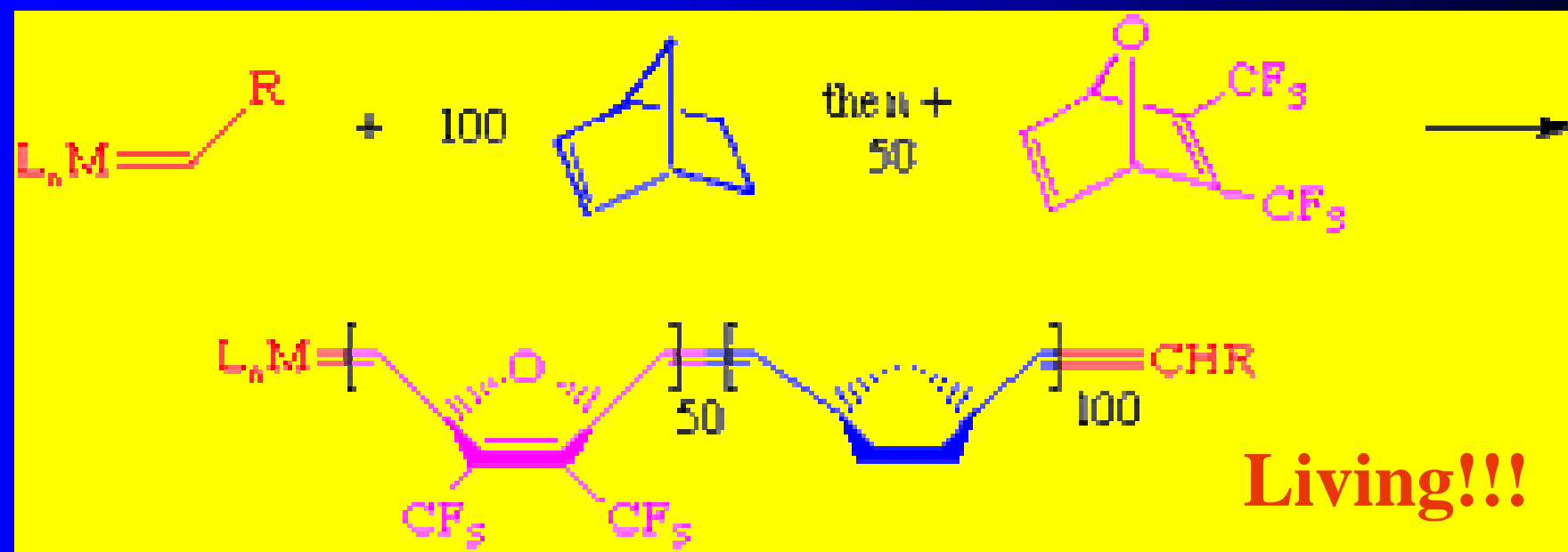
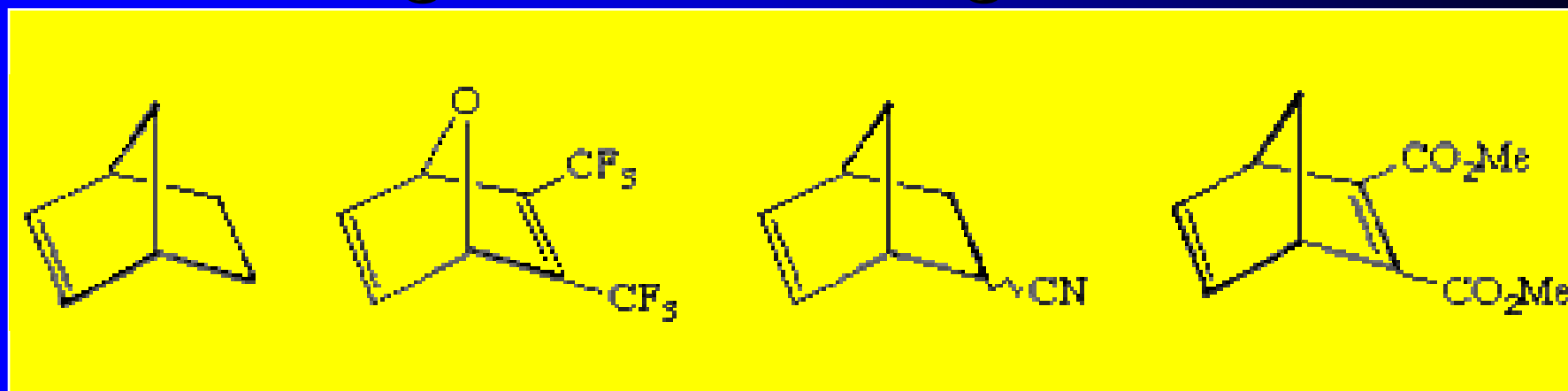
# Olefin Metathesis



# Ring opening metathesis polymerization ROMP

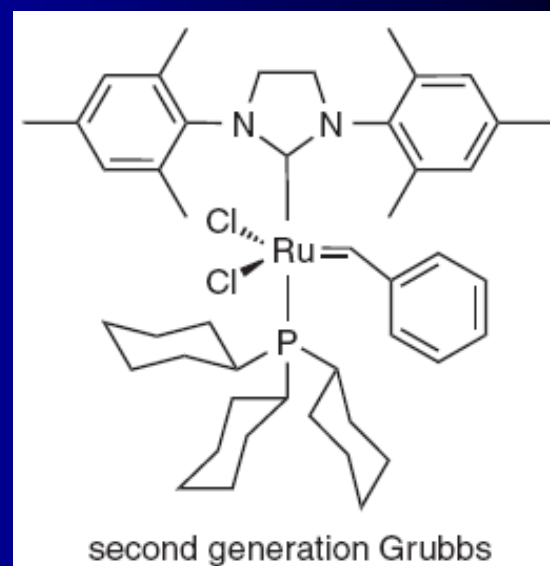
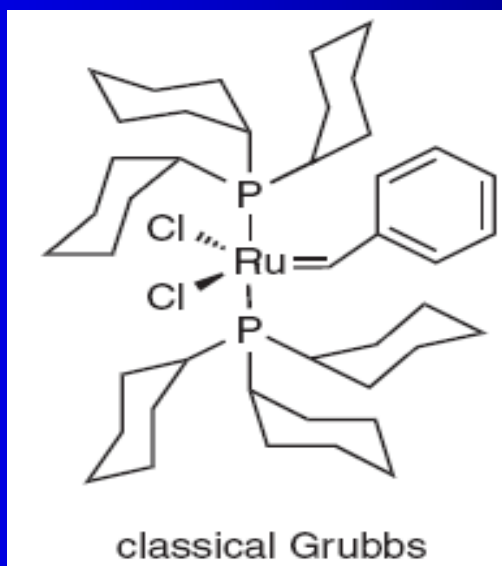
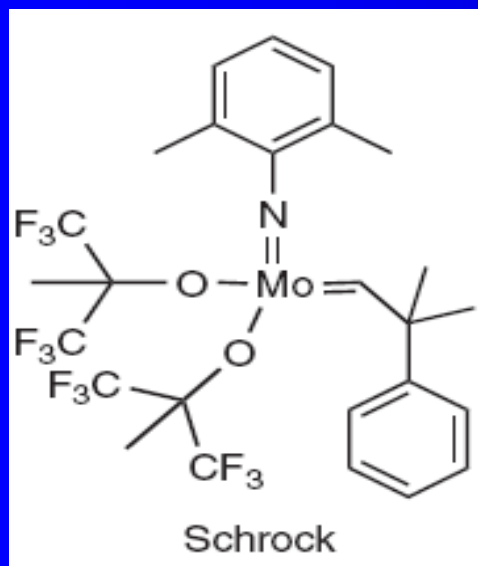


# Ring strain driving force



# Olefin Metathesis Catalysts

- Schrock and Grubbs
  - Air sensitive
  - Initially were molybdenum and ruthenium based, respectively
  - Shared 2005 Nobel Prize with Chauvin



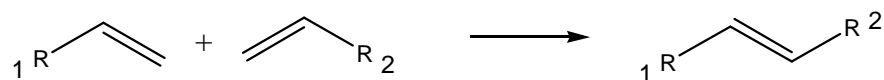
Images from Pappenfus, T. M. Synthesis and Catalytic Activity of Ruthenium-Indenylidene Complexes for Olefin Metathesis, *J. Chem. Ed.* **2007**, 84 (12), 1998-2000.

*Chemistry 318N*

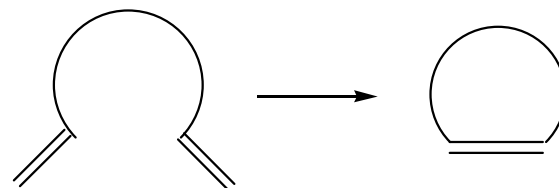


# Span of Olefin Metathesis

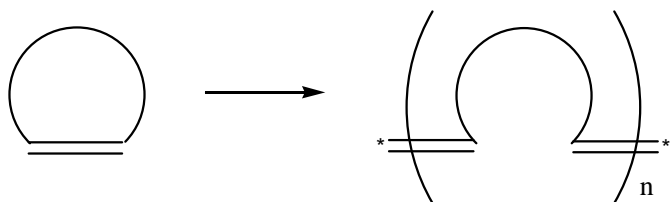
## Types of Metathesis



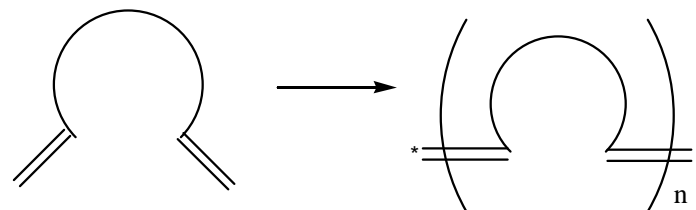
cross metathesis (CM)



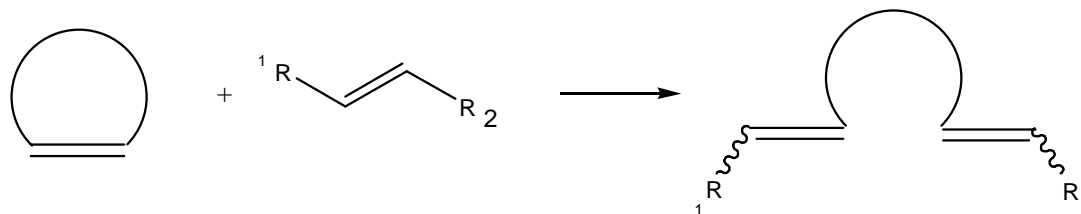
ring closing metathesis (RCM)



ring opening metathesis  
polymerization (ROMP)



acyclic diene metathesis (ADMET)



ring opening cross metathesis (ROCM)



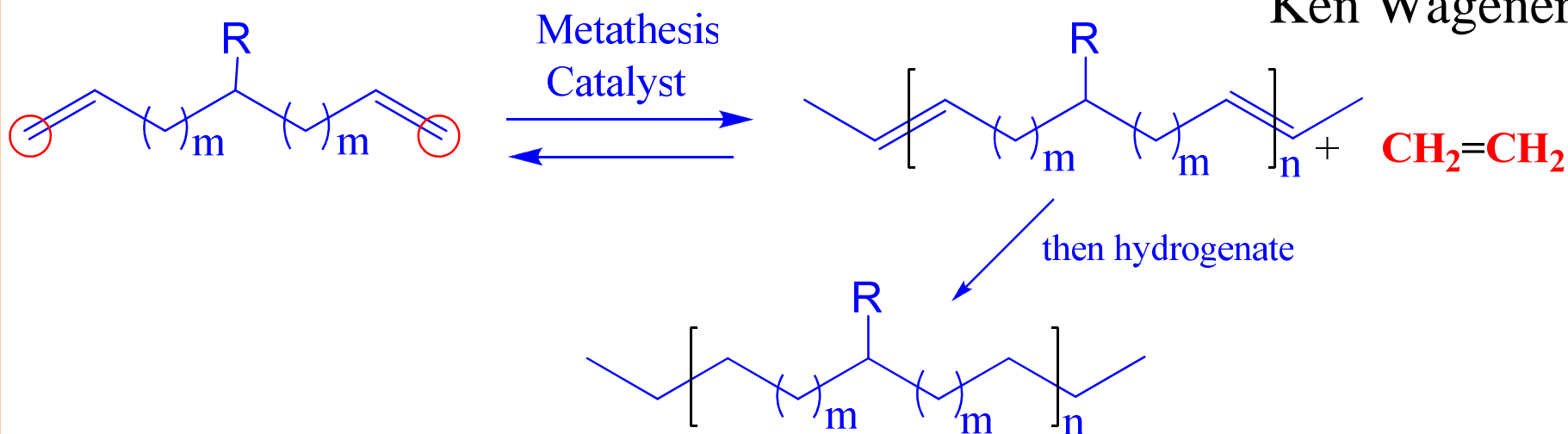


# ADMET is step growth polymerization chemistry



Ken Wagener

## Symmetrical Diene

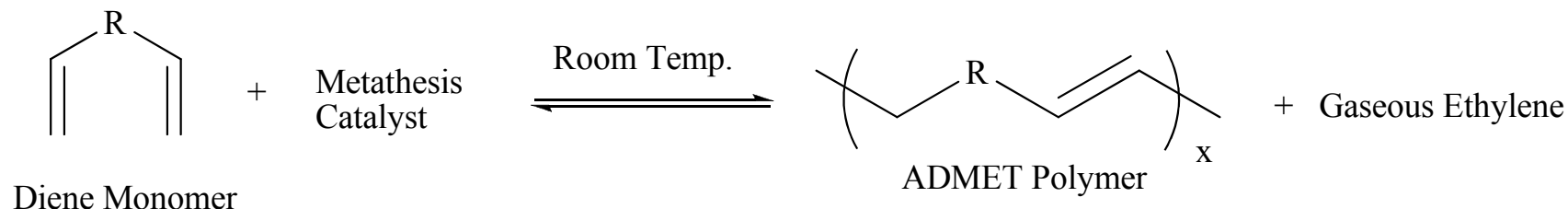


## Symmetrical Repeat Unit

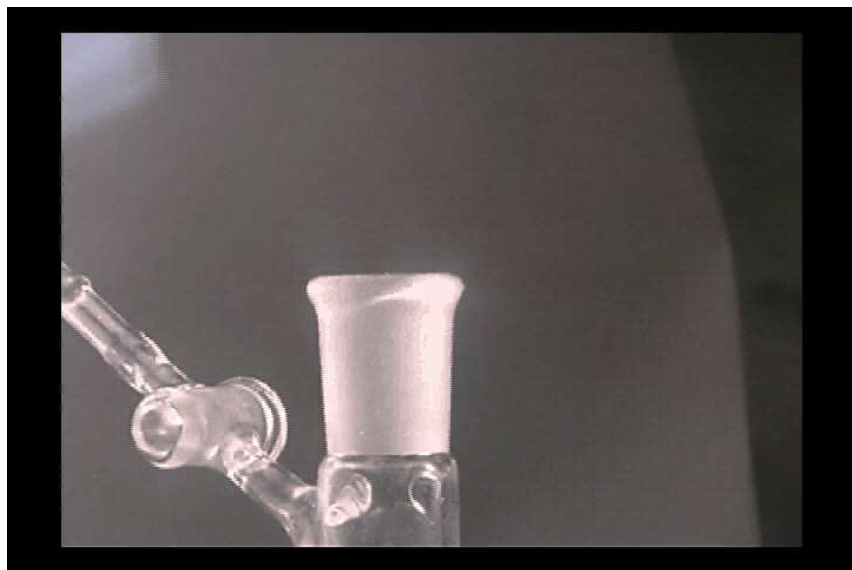
- High strength polymers can be made by ADMET



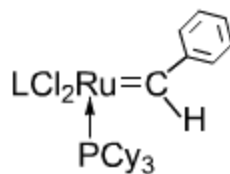
# Professor Ken Wagener, University of Florida



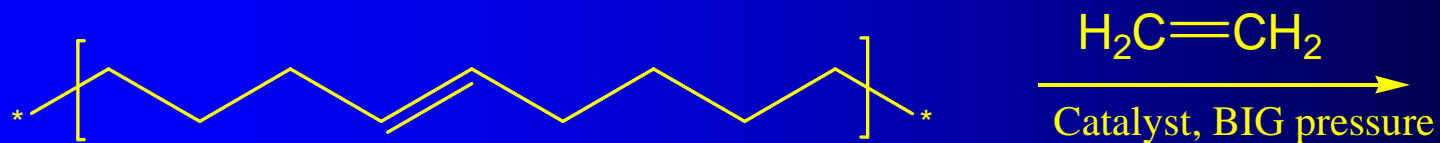
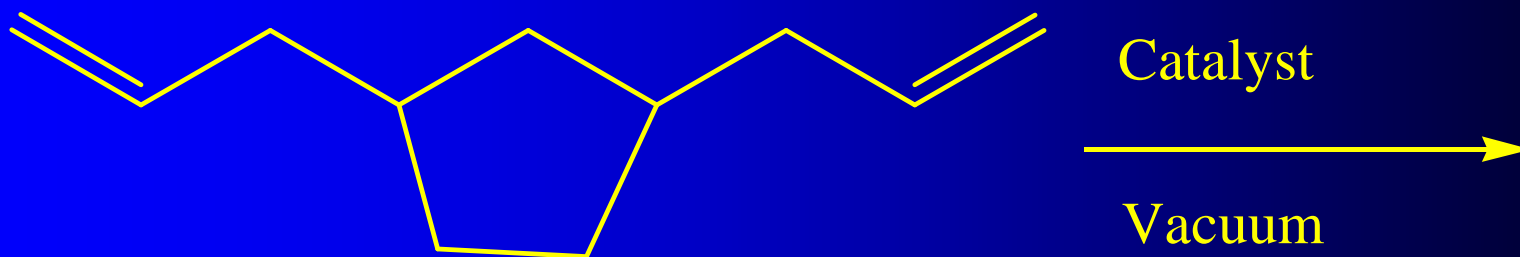
## The ADMET Reaction



## Animation of ADMET Mechanism



# Lets Practice ADMET



# Tuesday Lecture

## Polymer separation membranes



Prof. . Benny Freeman

