

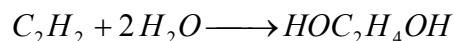
University of Kentucky
Chemical & Materials Engineering Department
CME 550: Chemical Reactor Design
Homework 3

Due at *beginning* of class on Friday, September 16, 2003
Partial credit will be given in ½-point increments.

- 1) [1 pt] Below are initial rate data for a gas-phase partial catalytic oxidation of ethylene (A). What is the order of the reaction with respect to A?

C_{A0} (mol/L)	$-r_{A0}$ (mol/L/min)
0.01	0.342
0.055	0.829
0.15	1.40
0.277	1.86

- 2) [2 pt] An equimolar mixture of acetylene and water vapor is fed into a batch reactor at 1 atm and a certain temperature. The mixture reacts to make ethylene glycol. You may assume that the mixture acts like an ideal gas.



- a. When the reaction is carried out in a constant-volume reactor, the pressure drops during the reaction until it reaches 0.527 atm. What is the conversion of acetylene at this pressure?
 - b. If the reaction were instead carried out in a constant-pressure reactor (at 1 atm) but reached the same conversion, calculate the initial and final concentrations of acetylene and water vapor.
- 3) [1 pt] OL problem 3.5
- 4) [1 pt] OL problem 3.9
- 5) [2 pt] OL problem 3.14
- 6) [3 pt] OL problem 3.21