

Spring 2008

CBE 430
Problem Set #5
Due Friday, February 29

Finish chapter 4, begin chapter 5 in the textbook

1. Determine the activation energy and pre-exponential factor from the following data:

<u>T (°C)</u>		<u>0</u>	<u>100</u>
k (min ⁻¹)		0.001	0.050

- a) using the Arrhenius expression;
 - b) using the form $k(T) = A'T^n e^{-E/RT}$, with $n=1$.
 - c) Calculate the relative difference between the two activation energies.
 - d) Calculate k at 1000°C using both models (results from (a) and (b)).
Compare the results.
 - e) Plot both predictions for $k(T)$ over the range 0-400°C on linear scales, and also plot $\log[k(T)]$. Comment on the results
2. Chapter 5, #2 – Stilbene isomerization
3. Chapter 5, #6 – Butene reaction network
4. Chapter 5, #8 – Pinene chemistry
5. The reaction



is being conducted at 200°C and 2500 kPa. The vapor pressure of 1,2-dibromoethane at 200°C is 506.5 kPa. Calculate the conversion of ethane at which condensation first begins. Plot the concentration and molar flow rates of each species as well as the total as a function of conversion for a stoichiometric feed. The volumetric flow rate into the reactor is 0.5 dm³/s.