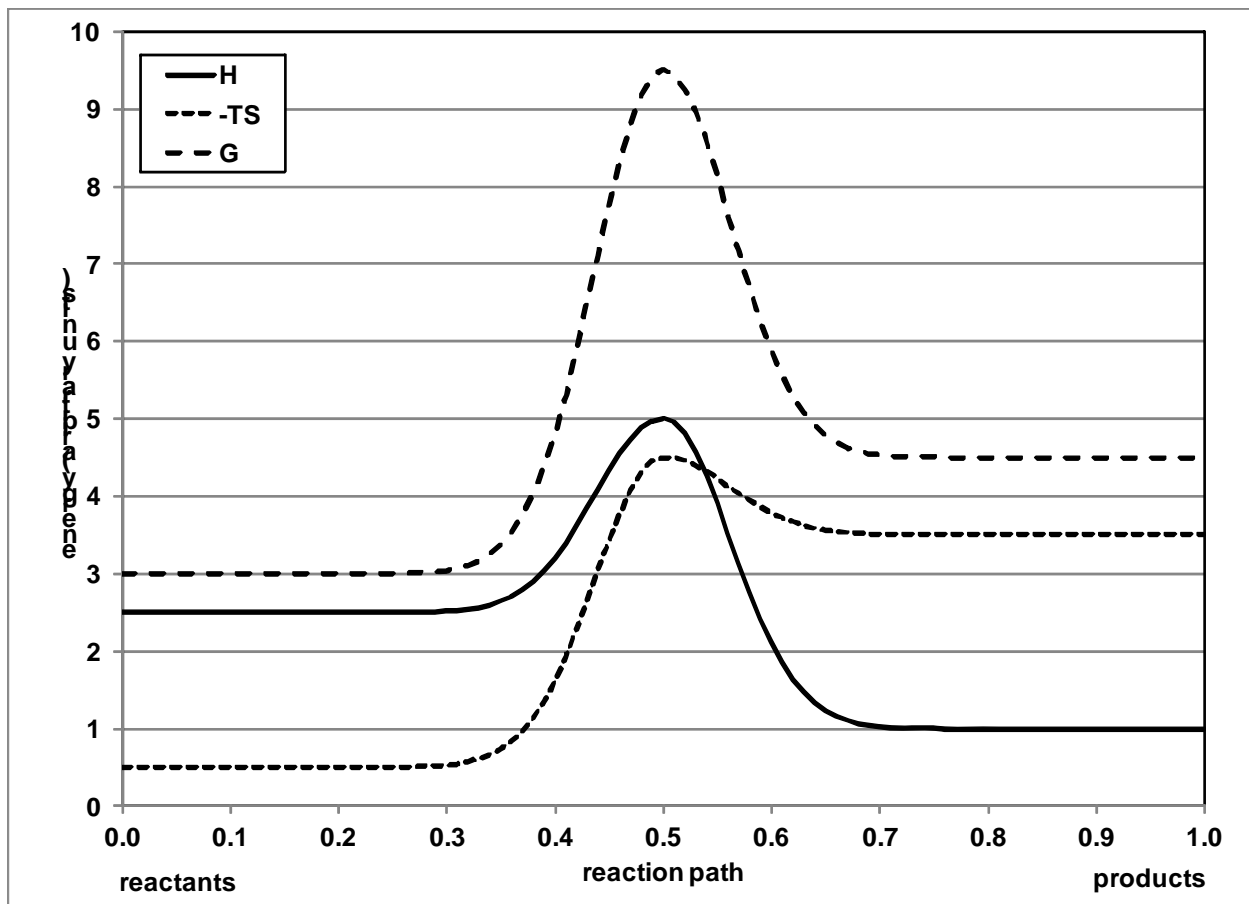


**CBE 450 Chemical Reactor Fundamentals**  
**Midterm Exam 1**  
**September 21, 2009**  
**Department of Chemical and Biomolecular Engineering**  
**University of Tennessee, Knoxville**

1. Write the five steps of Fogler's algorithm for solving reactor problems.
2. Consider an elementary dimerization reaction of A to B ( $2A \rightarrow B$ ) in a batch reactor. Perform the five steps of Fogler's algorithm. Label each step. Introduce variables as necessary.
3. For problem 2, derive an expression for conversion as a function of time in the reactor.
4. Consider the thermodynamic properties at a given temperature shown in the following graph as a function of position along the reaction path for an isomerization reaction  $A \rightarrow B$ .



- (a) Is this reaction exothermic or endothermic? Why?
- (b) At thermodynamic equilibrium, will there be greater moles of reactant or product in the mixture? Why?
- (c) Will the equilibrium ratio of reactant to product increase or decrease as the temperature increases? Why?