

Chem. 131(231)A; prob set 3

1. Consider the reaction of 2-methylpropene (isobutylene) with HCl.

- Two products can form.
What are they?
 - One of the products dominates.
Which one?
Why?
 - Formulate a mechanism illustrating the formation of each of the products.
 - Draw a potential energy diagram to illustrate the overall sequence.
Which step is rate determining?
Will the transition state for that step occur 'early' or 'late'?
 - Draw a picture of the transition state leading to the major product.
 - Which product should be formed faster?
What is the basis for your response?
- {**Notice** the utility of the Bell-Evans-Polanyi and Hammond postulates in formulating your responses.}

2. Determine ΔH for the reaction of ethylene with H-Br to form bromoethane.

3. Predict the reaction that you'd expect to display the greater temperature dependence. Provide a rationale.

A + B reacts to afford C + D

or

A undergoes fragmentation to produce C + D + E

4. Illustrate the Claisen condensation of ethyl acetate using sodium ethoxide as the base. Why would one be ill-advised to use sodium methoxide, instead?

5. Formulate a mechanism to illustrate that a heteroatom-stabilized carbocation is an intermediate in:

[a] the acid catalyzed formation of a ketal

[b] acid catalyzed deketalization

[c] the formation of an imine (Schiff base)

Draw a molecular orbital array to illustrate how the heteroatom is able to stabilize the cation. Notice how your response incorporates both stereochemistry and electronic effects/influences. This is an example, therefore, of a **stereoelectronic** effect.