

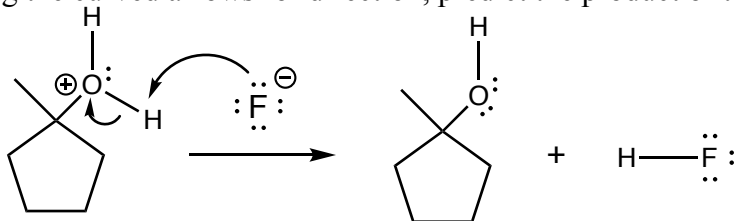
Problem Set Chapter 6

Organic Chemistry for
Life Sciences: CHM 223
Section A

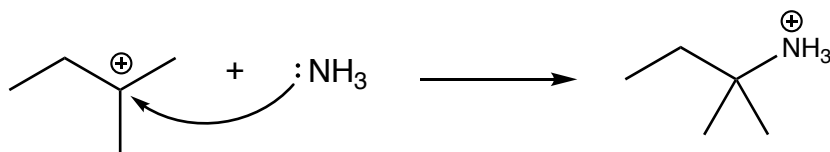
Name _____

DUE: Wednesday November 1 @ 8am

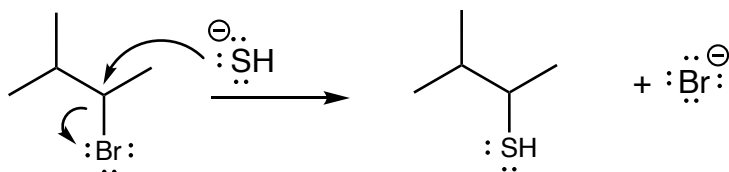
1. Using the curved arrows for direction, predict the product of the following reaction step:



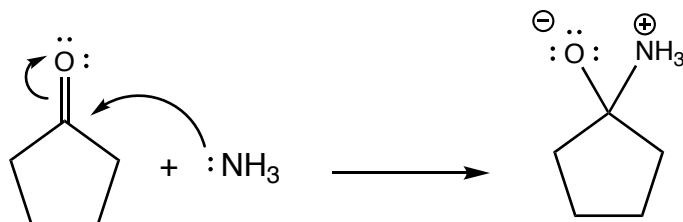
2. Using the curved arrows for direction, predict the product of the following reaction step:



3. Provide proper curved arrows to describe the reaction step below (HINT: first add all missing lone pairs of electrons!)



4. Provide proper curved arrows to describe the reaction step below (HINT: first add all missing lone pairs of electrons!)



5. Predict the structure of the transition state for the reaction described in problem 1 using all proper conventions. Indicate which bonds are forming and which are breaking and include appropriate partial charges as necessary.

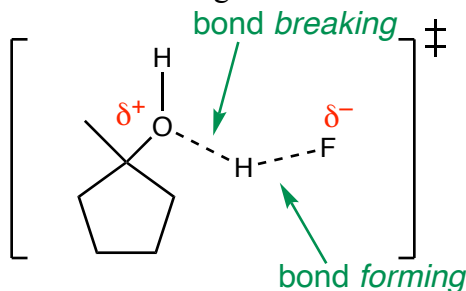
A transition state needs to reflect all bonds formed and/or broken in a reaction step:

bonds breaking:

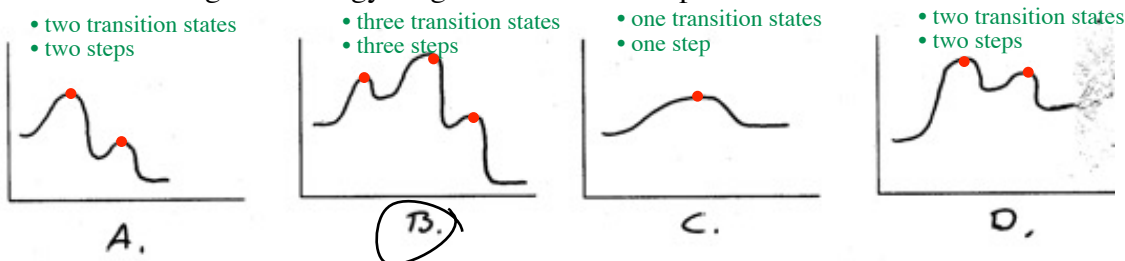
O-H

bonds forming:

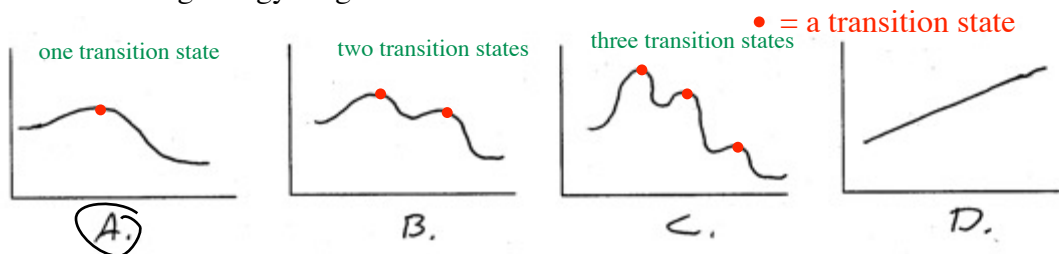
H-F



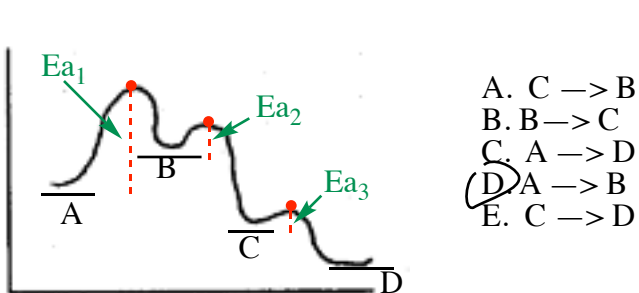
6. Which of the following is an energy diagram for a three step reaction? • = a transition state



7. Which of the following energy diagrams is of a reaction with one transition state?



8. Which step is the rate determining step in the reaction below?

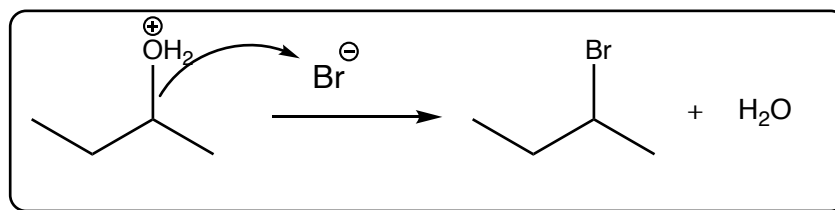


- the activation energy (E_a) for each step is the energy difference between where the step begins to the transition state for that step
- there are three steps in the reaction provided (A → B, B → C, and C → D) and therefore, 3 transition states
- the biggest activation energy corresponds to the activation energy for the first step, E_{a1}
- the reaction step with the largest activation energy will be the rate determining step
- NOTE: answer A is completely irrelevant because it is NOT a reaction step for the forward reaction as provided; answer E is not a reaction "step", but the entire reaction!

9. Jimmy draws curved arrows for the reaction below as shown (while murmuring under his breath that he'd like to see the arrow heading towards Breton's fat nose). Is Jimmy correct or is there a better way in which to describe the reaction? Provide correct curved arrows if you think Jimmy is incorrect.



Jimmy



Jimmy's Answer



alternative curved arrow drawing?

- If Jimmy had focused more on class rather than on harming Breton, he may have realized the utility of including lone pairs into his structures
- A decrease of lone pairs on an atom suggests bond formation from that atom, an increase of lone pairs on an atom suggests bond breakage
- Sorry Jimmy! Wrong again!