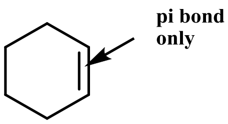
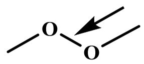
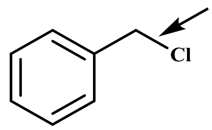
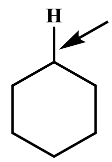
Mechanisms are, essentially, roadmaps which explain each sequential movement of electrons in a chemical reaction. This map helps us to understand how and why certain mechanisms work, and others do not.

1. Bonds can break in both a homolytic and heterolytic fashion.
   a. For the indicated bonds below, show curved arrows to indicate homolytic cleavage

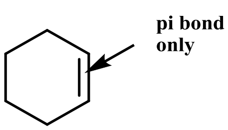


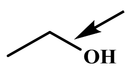


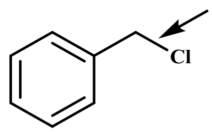


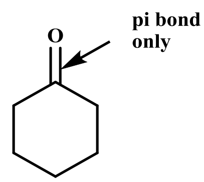


   b. For heterolytic bond breaking, there are two directions the bond can break. Draw both options and circle which is more likely. Explain your choices.

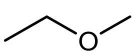


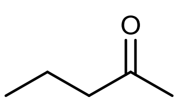


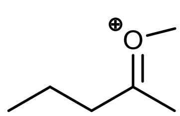


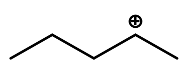
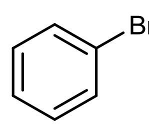


2. Electrophiles (Lewis Acids) are likely to react in a mechanism by gaining electrons. You need to be able to find the most reactive site (if more than one is available) so that you know how to proceed in a reaction mechanism. Rank the electrophiles in each series from most reactive (1) to least reactive (5):

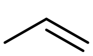
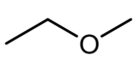


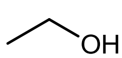


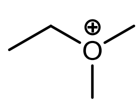


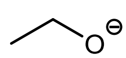



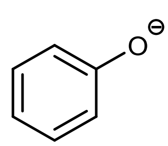
3. Nucleophiles (Lewis Bases) are likely to react in a mechanism by donating electrons. You need to be able to find the most reactive site (if more than one is available) so that you know how to proceed in a reaction mechanism. Rank the nucleophiles in each series from most reactive (1) to least reactive (5):

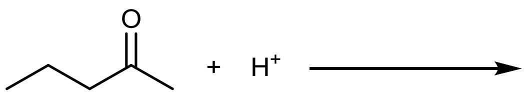


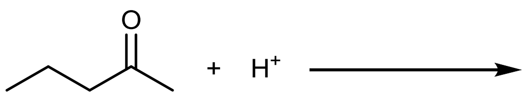




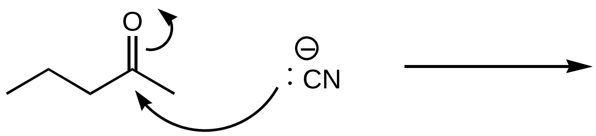


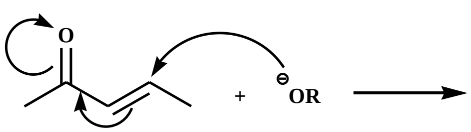
4. For the following reaction between a Lewis acid and base, you can draw the curved arrows in one of two ways, starting from a lone pair or the pi bond. Draw both methods, why does it not matter how you draw it (why are they both correct)?

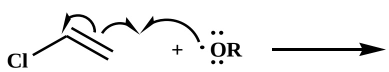


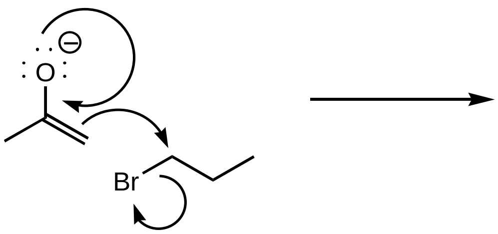


5. Predict the products from the following curved arrows:

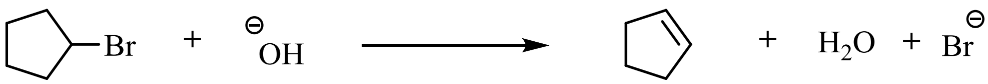






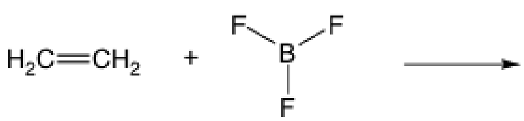


6. For the following transformations, fill in mechanistic arrows needed to show how the products were created from the starting materials.



7. Predict the product(s) for the given Lewis acid-Lewis base reactions. Use curved arrows to show the movement of electron pairs in the reaction.

a.



b.