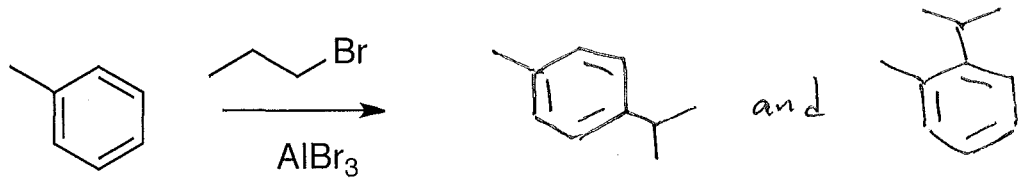
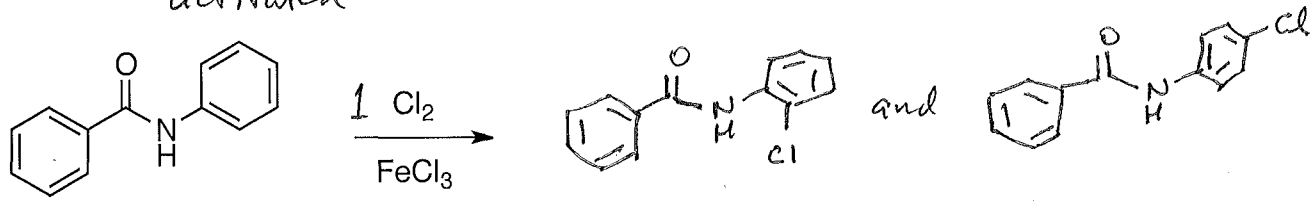
163. Fill in any of the missing starting material(s), reagent(s), and/or dominant product(s) for each single reaction. Please specifically denote all stereochemistry.

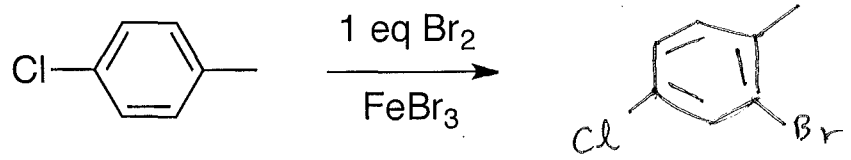


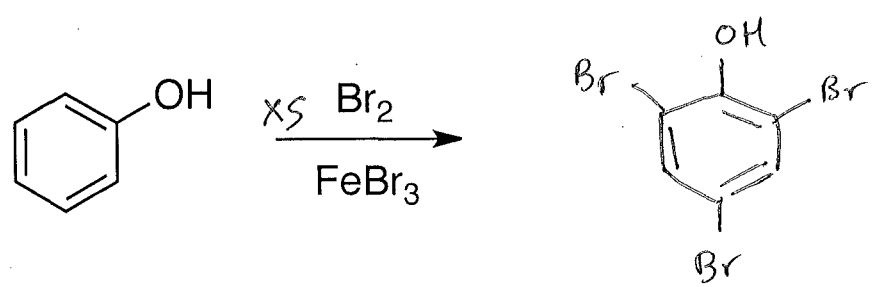
make the thermodynamic product

activated

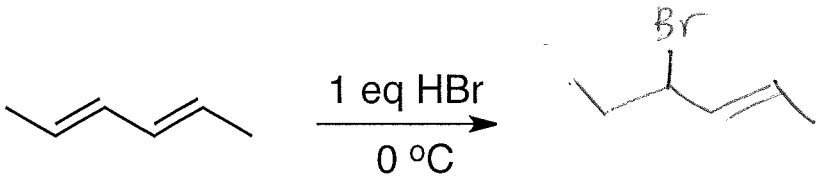


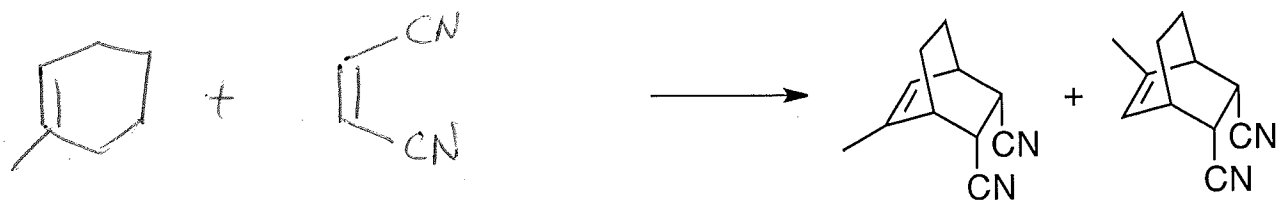
deactivated

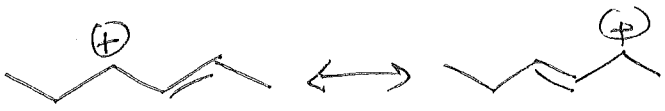




Question 3 continued.





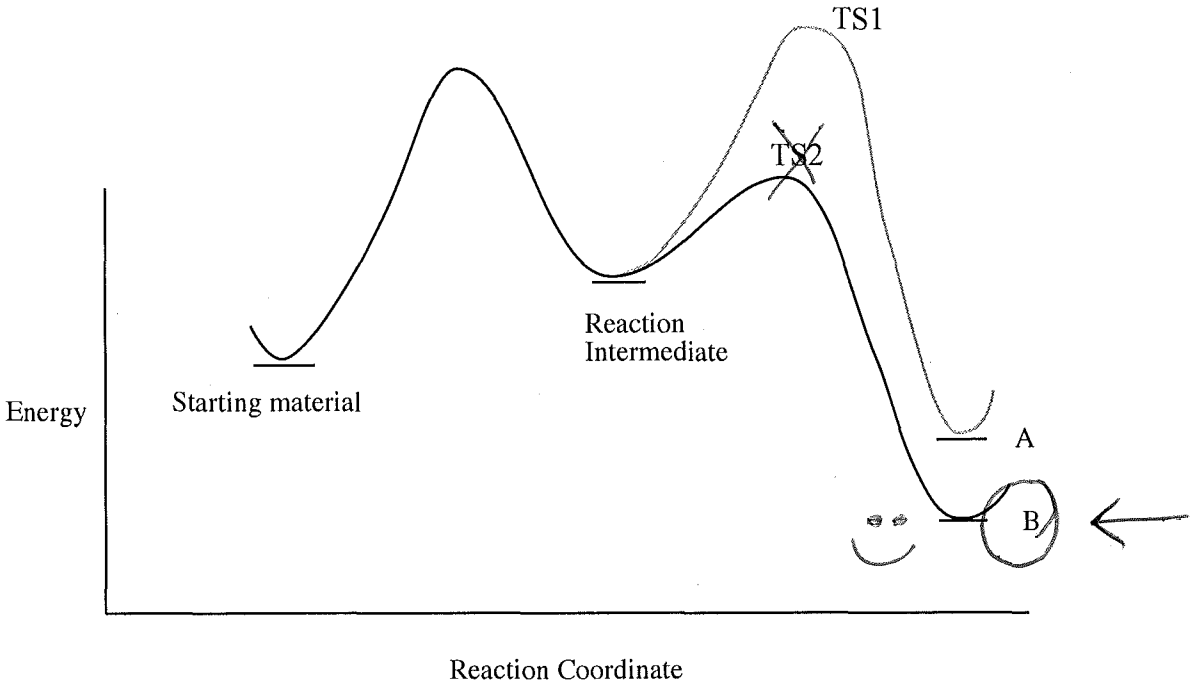


similar 2° allyl

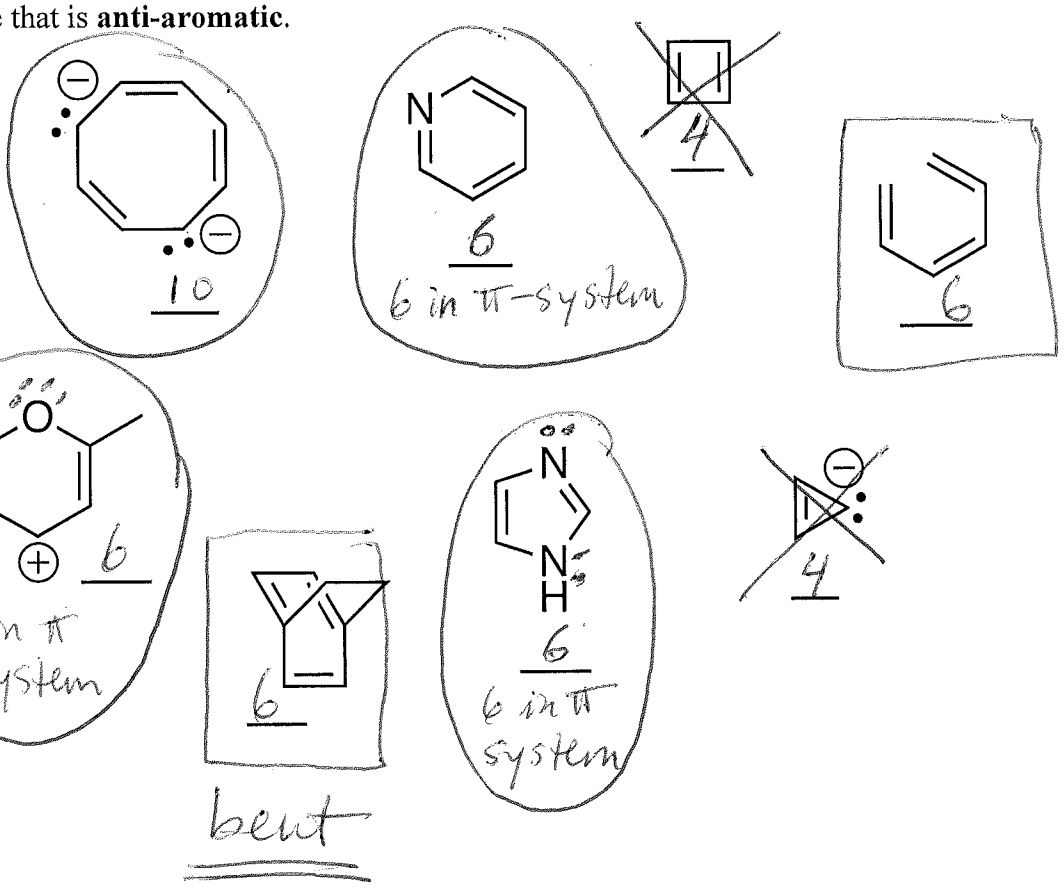
will give disubst alkene in either case.

Favor 1,2-addn based on proximity, all else being equal/very similar

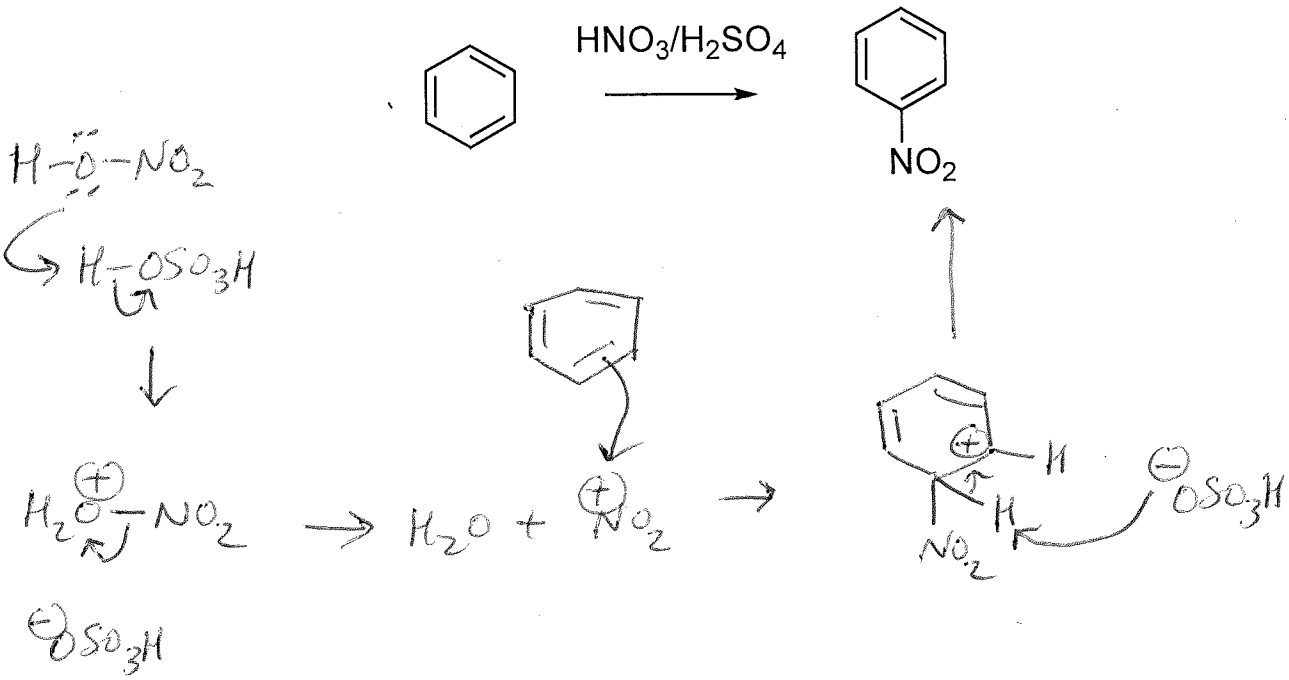
84. ***PAY ATTENTION TO ALL DIRECTIONS!!!***
Below is an Energy vs Reaction Coordinate diagram for a reaction with two possible products, **A** and **B**. Circle the product that is favored if the reaction is run at high temperature. Draw an X through the transition state that is kinetically favored. Draw an arrow pointing to the product that is favored at low temperature. Draw a smiley face next to the product that is thermodynamically favored. :)

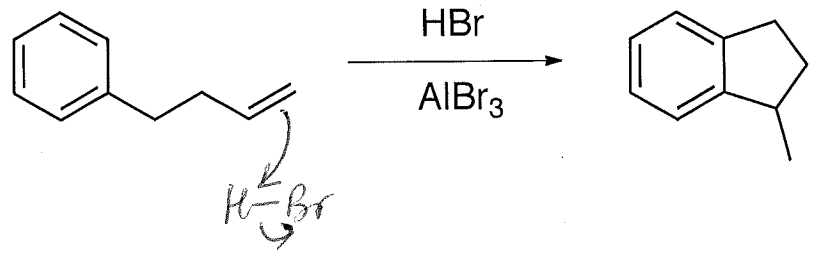


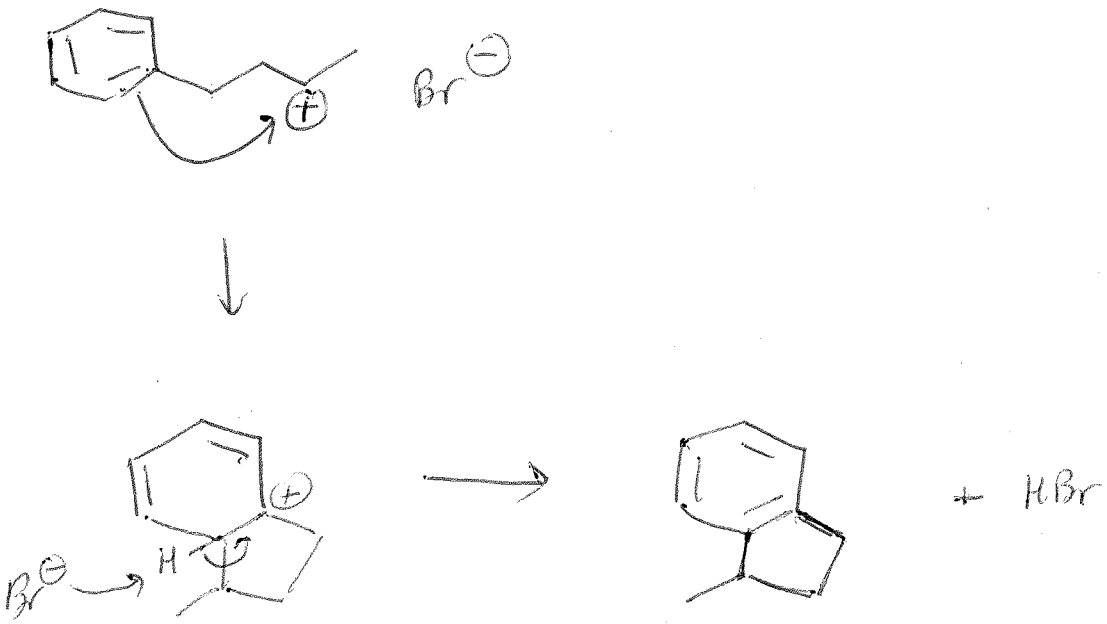
165. Under each molecule, write the # of π electrons in each molecule. Circle each molecule that is **aromatic**, put a box around each molecule that is **not aromatic**, and put an X through each molecule that is **anti-aromatic**.



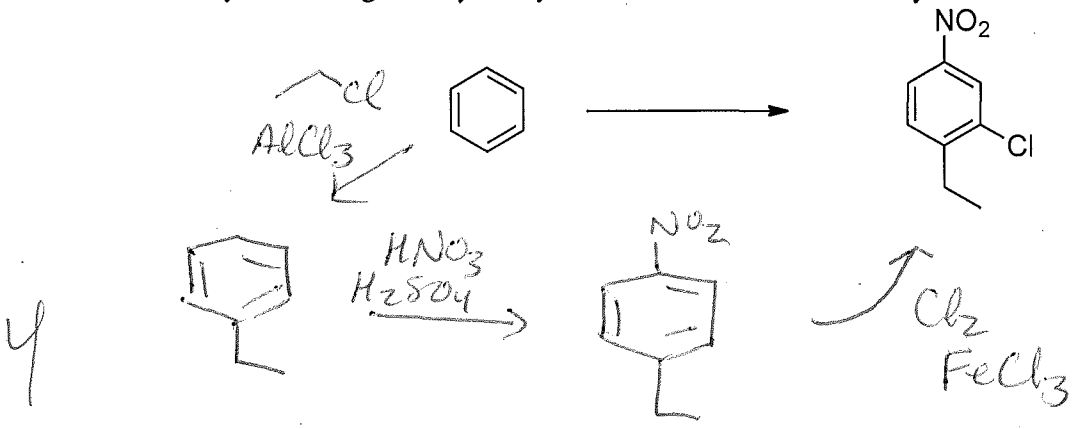
166. Please draw a stepwise electron pushing mechanism for the reactions shown below.



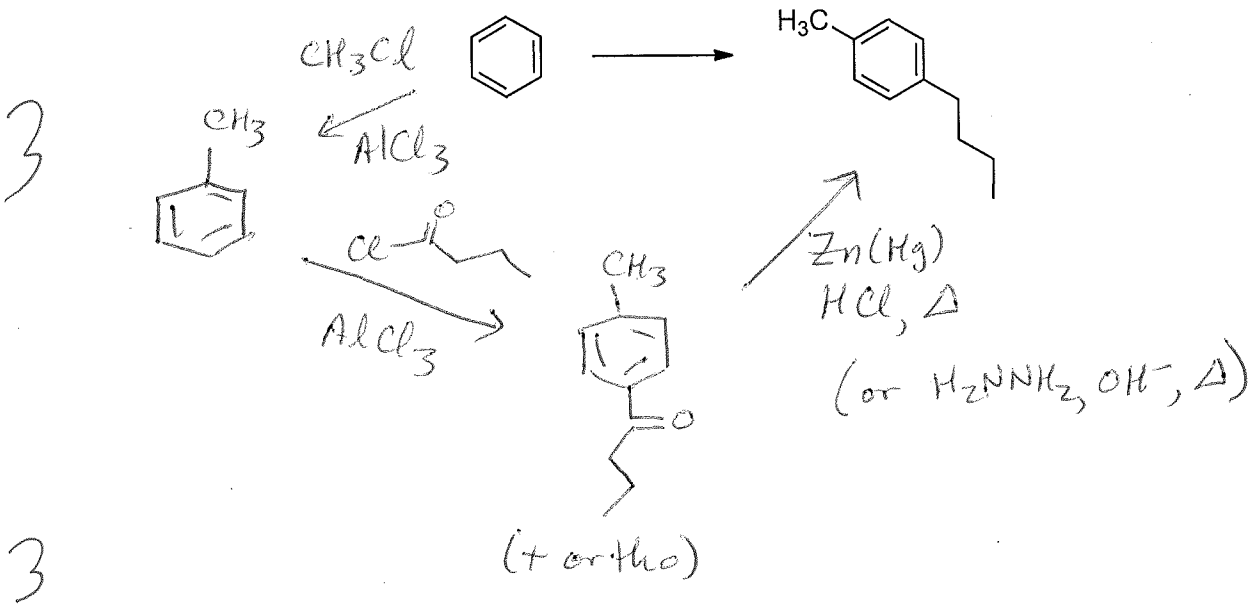




107. Synthesis! Please write a series of reactions that will produce the product from benzene. You may use any other reagent in your synthesis. You must draw every molecule along the way.

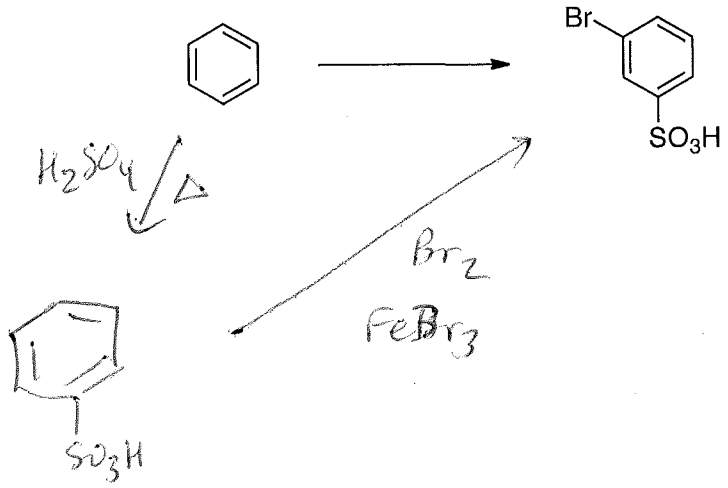


4



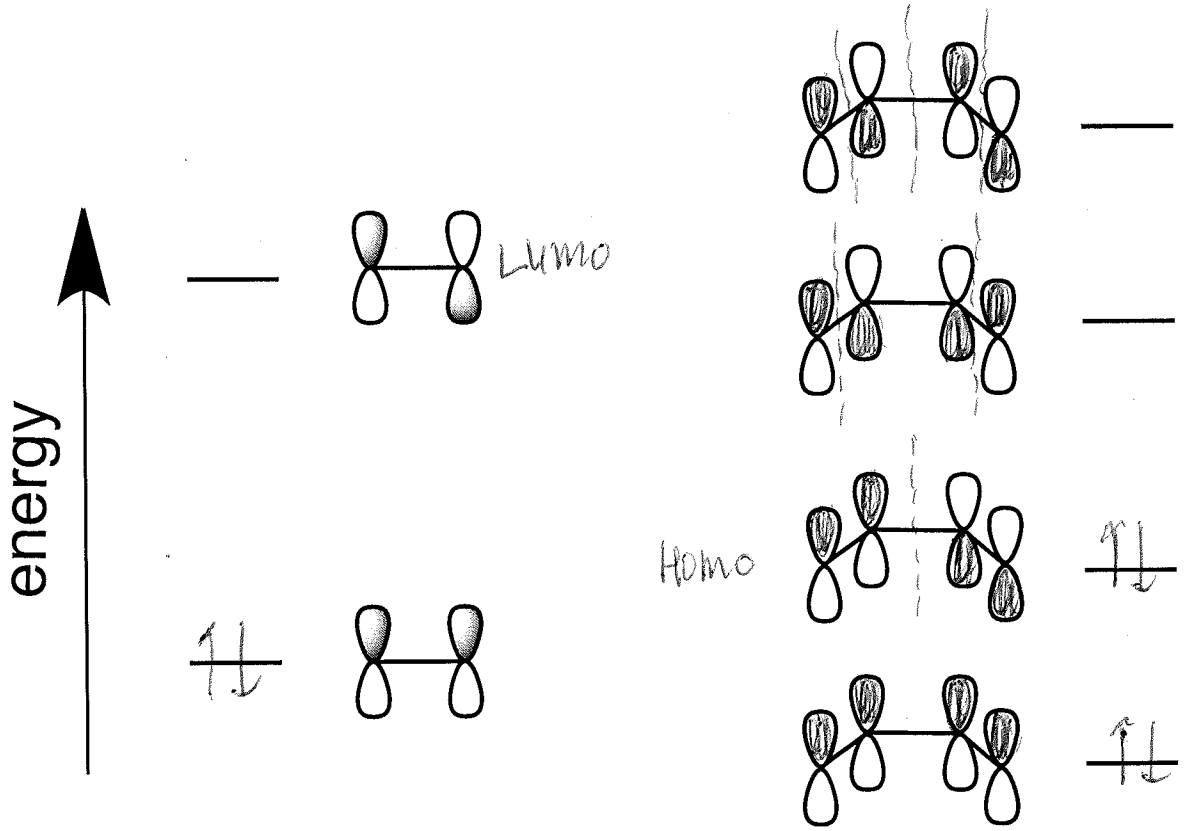
3

3



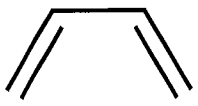
88. These are the π-molecular orbital diagrams for ethene and 1,3-butadiene. The MO diagram for ethene has been completed, but ***the diagram for 1,3-butadiene is not complete***.

(a) Shade the lobes of the 1,3-butadiene molecular orbitals correctly.
(b) Use dashed lines to show where nodes are present in the molecular orbitals.
(c) Fill in the electrons in each diagram.
(d) Identify the LUMO of ethene and the HOMO of 1,3-butadiene.

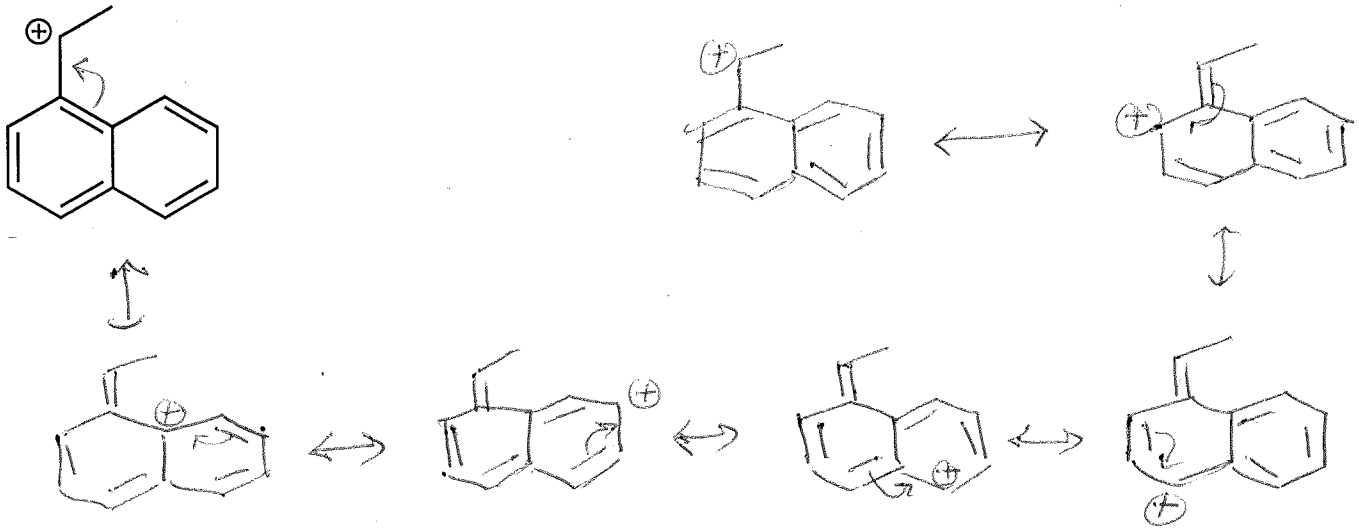


ethene 1,3-butadiene

$H_2C=CH_2$



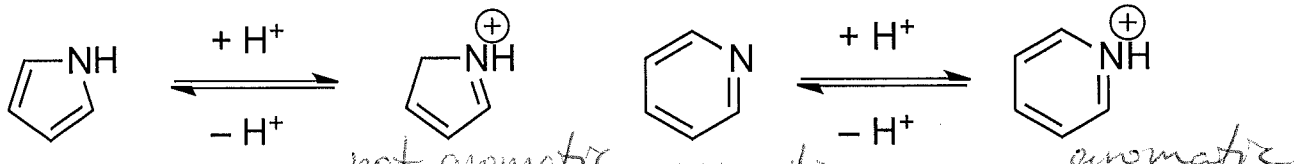
129. Please draw all of the resonance structures for the following molecule. Used curved arrows to show how you move elections to each new structure.



8

Of the two molecules below, one is a much better base. If you make the conjugate acid for each, one has a pK_a of about 5 (less acidic), and the other of about –4 (more acidic) ! Assign the correct pK_a to each conjugate acid, and briefly state why this is so.

4



aromatic not aromatic aromatic aromatic

pK_a –4 pK_a 5

compare the acids: one is not aromatic. That one is relatively less stable; it is the stronger. (Both bases are aromatic and assumed to be similar in stability)