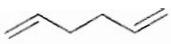
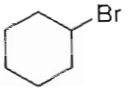
1 (6 points, 2 each) Provide IUPAC accepted names for the following compounds.



1,5-hexadiene



1-pentyne



bromocyclohexane

2. (4 points, 2 each) Classify each of the following dienes as conjugated, cumulated, or isolated.

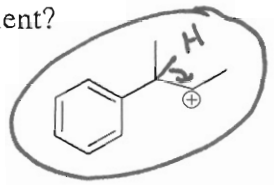


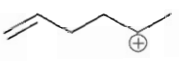
isolated

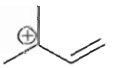


conjugated

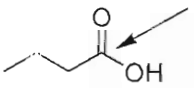
3. (2 points) Which of the following carbocations would be most likely to undergo a rearrangement?

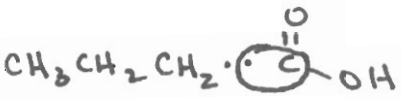






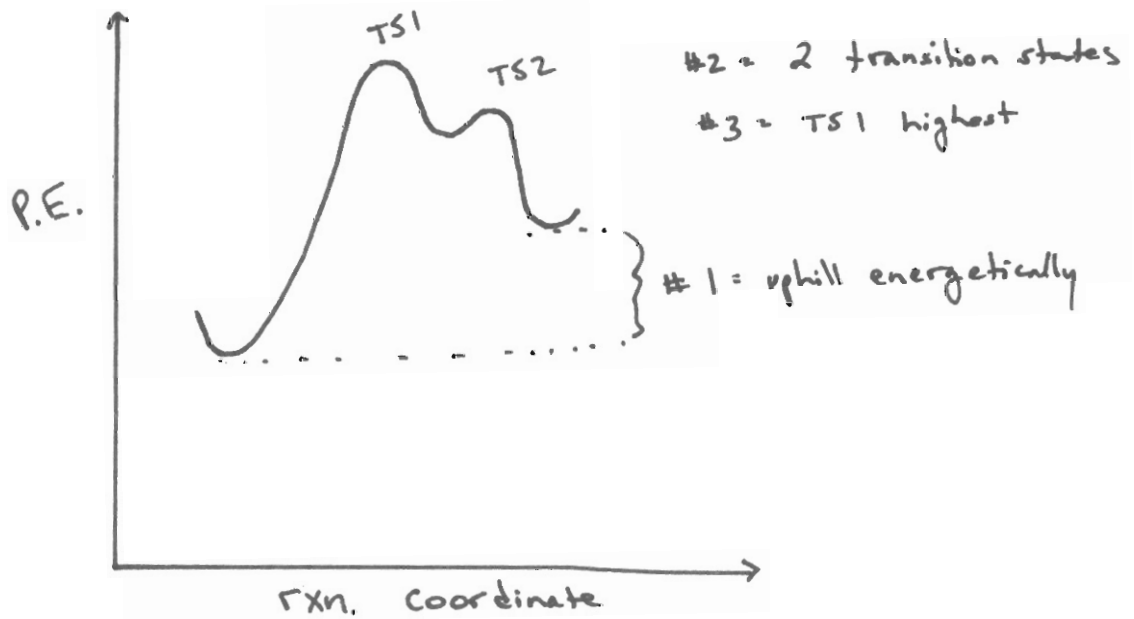
4. (2 points) What is the oxidation state (or level) of the indicated carbon?



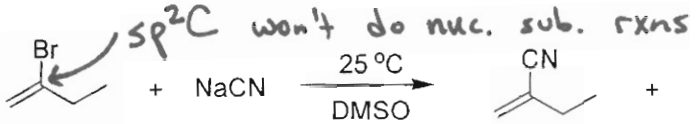


+3

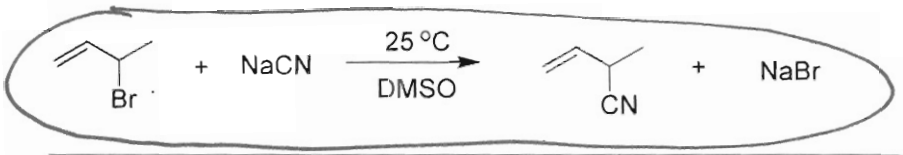
5. (6 points) Draw a generic reaction energy diagram that fits the following profile: 1) the reaction is endothermic, 2) the reaction occurs in two steps mechanistically, and 3) the first step of the mechanism is rate determining. Be sure to label both axes.

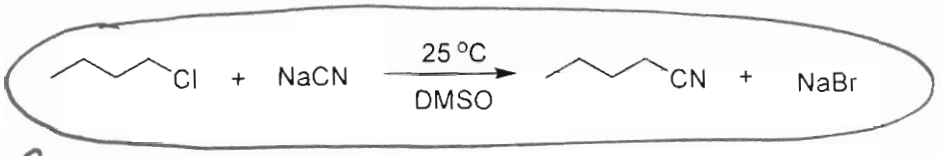


6. (10 points, 2 each) Circle the reaction in each pair that would be faster.



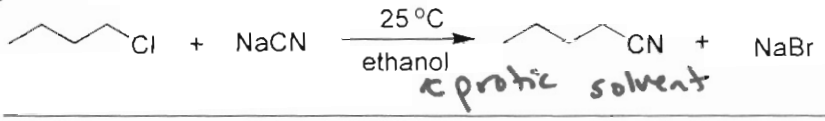
sp^2C won't do nuc. sub. rxns



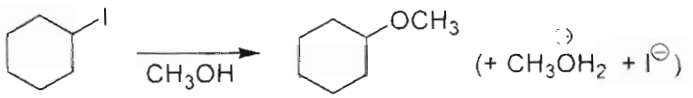


polar aprotic solvent

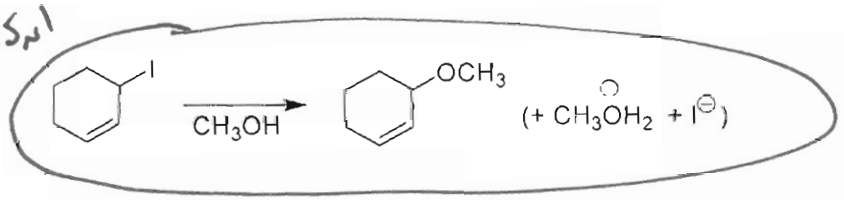
S_N2



protic solvent



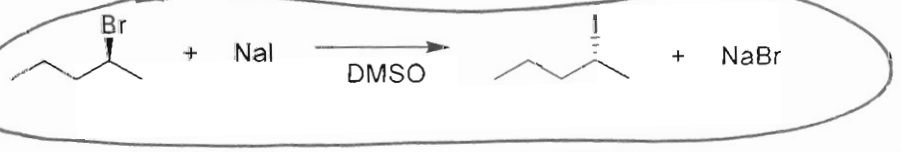
S_N1



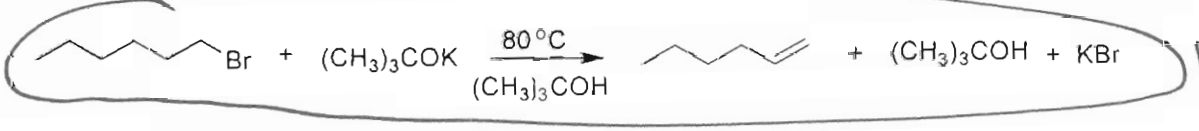
forms 2° allylic C+



S_N2

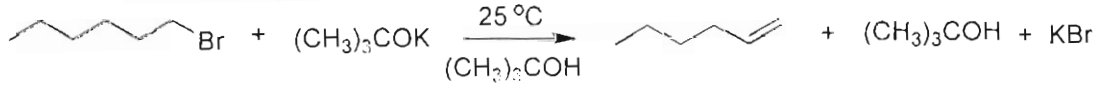


better L.G.

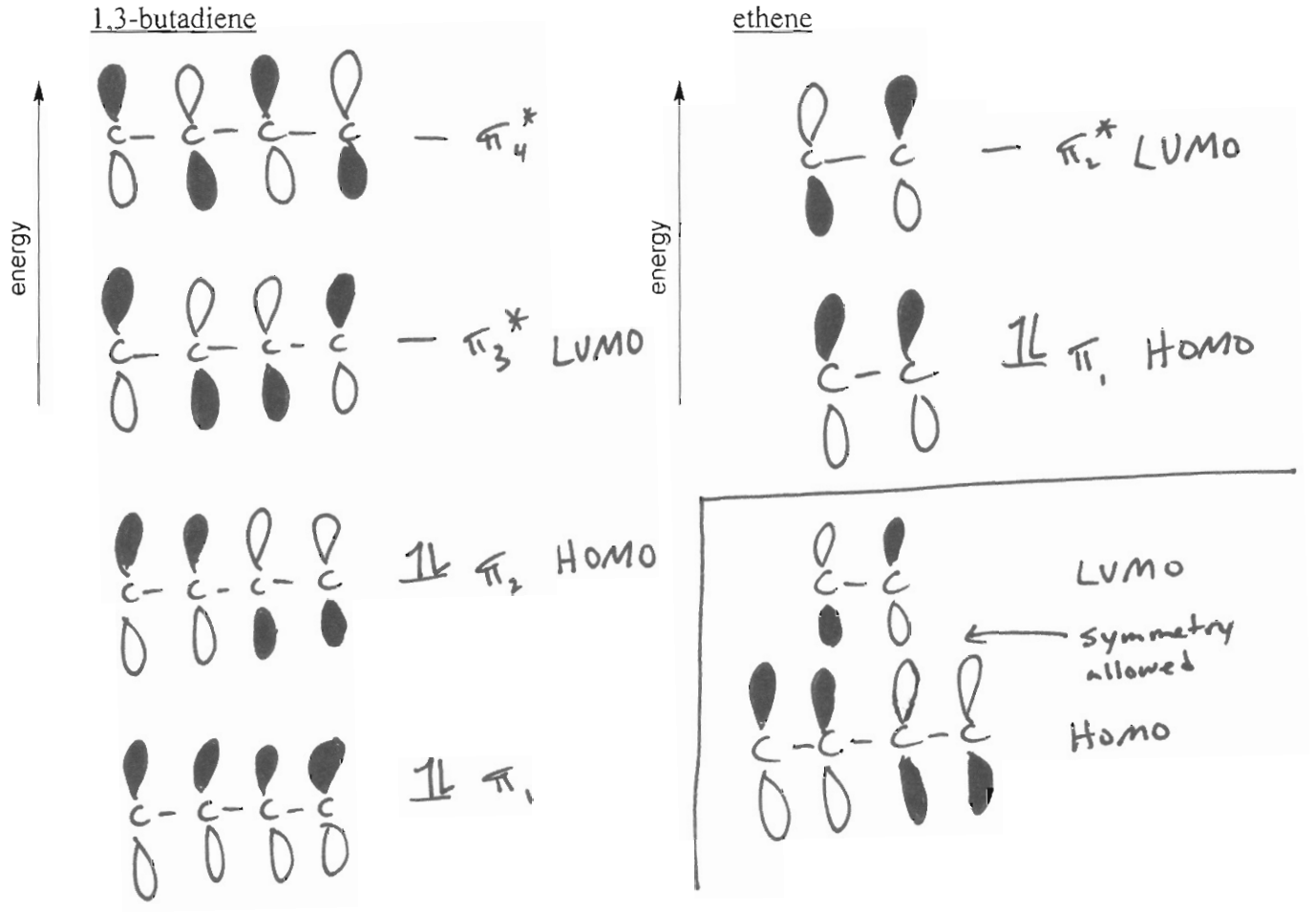


higher T

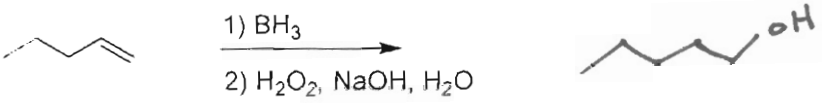
E2



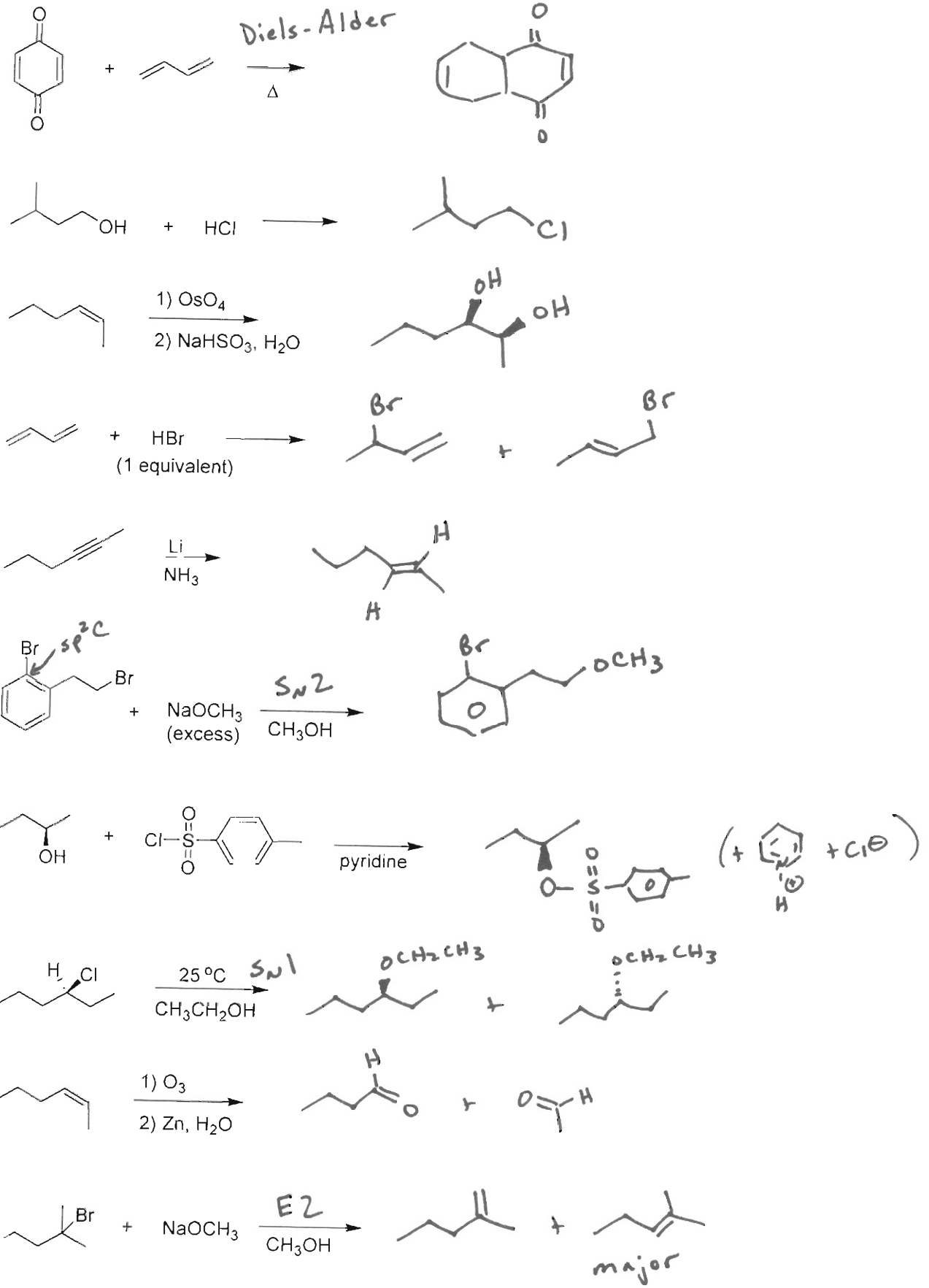
7. a. (6 points) Draw the four π-molecular orbitals of 1,3-butadiene. Show electrons in the orbitals that are filled. Label the HOMO and the LUMO.
b. (3 points) Do the same for the two π-molecular orbitals of ethene.
c. (1 point) Would a reaction involving the HOMO of butadiene and the LUMO of ethene be symmetry allowed? Yes



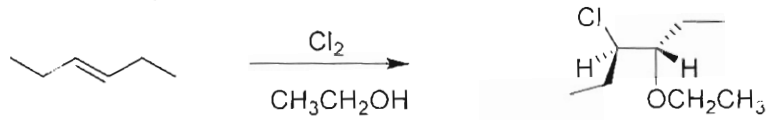
8. (36 points, 3 each) Provide structures for the major organic products of each of the following reactions. If more than one compound is expected, indicate which will be formed in greatest yield. Be careful to indicate product geometry when necessary.

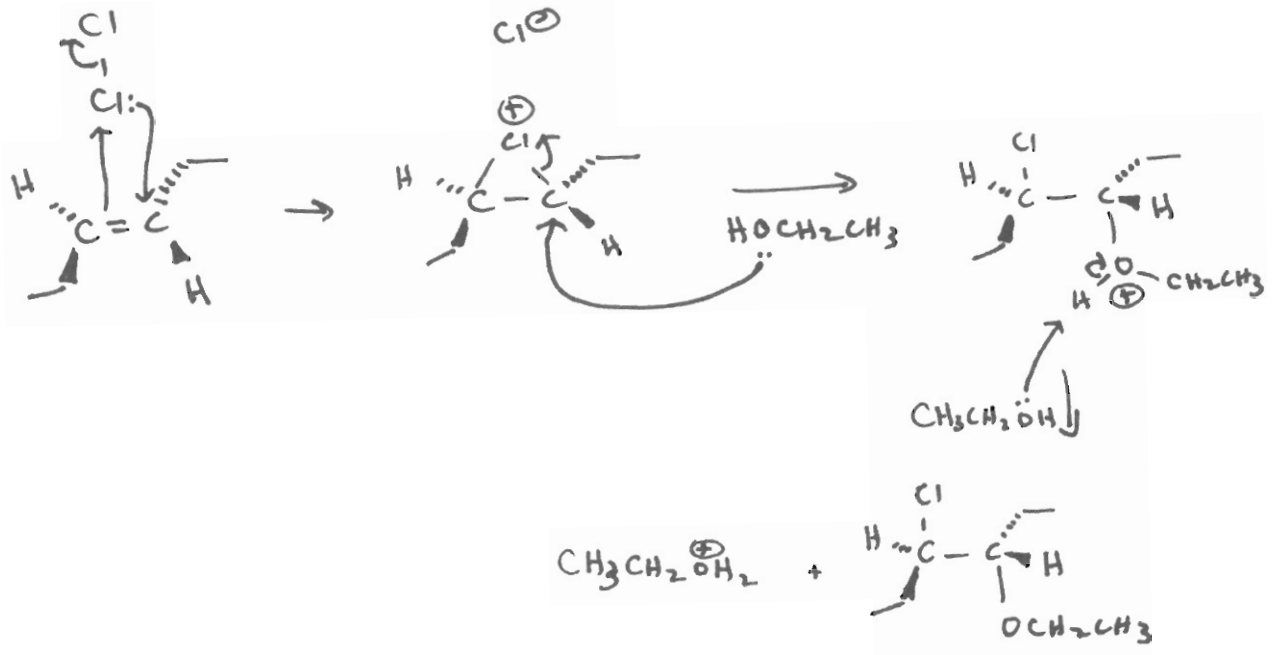




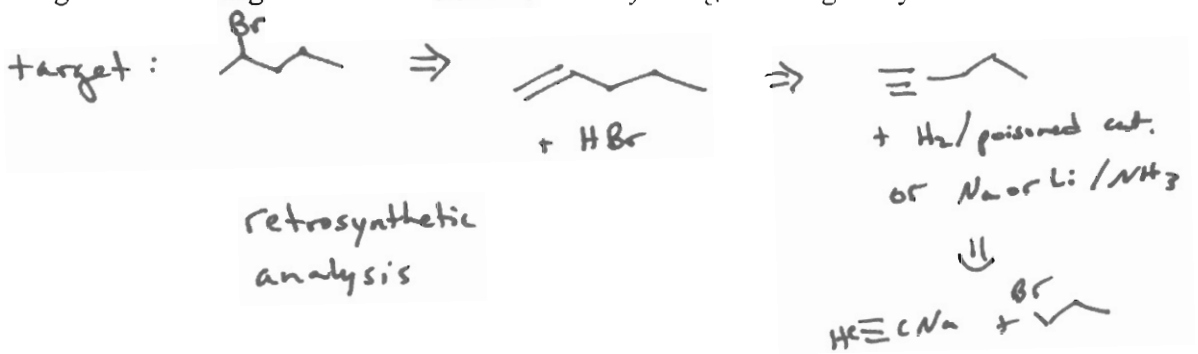

Diels-Alder
Δ
OH + HCl
Cl
1) OsO4
2) NaHSO3, H2O
OH
OH
+ HBr
(1 equivalent)
Br
Br
Li
NH3
H
H
Br
sp2C
Br
+ NaOCH3
(excess)
SN2
CH3OH
Br
OCH3
OH
Cl
pyridine
H
Cl
25 °C
CH3CH2OH
SN1
OCH2CH3
OCH2CH3
1) O3
2) Zn, H2O
H
Br
+ NaOCH3
E2
CH3OH
major

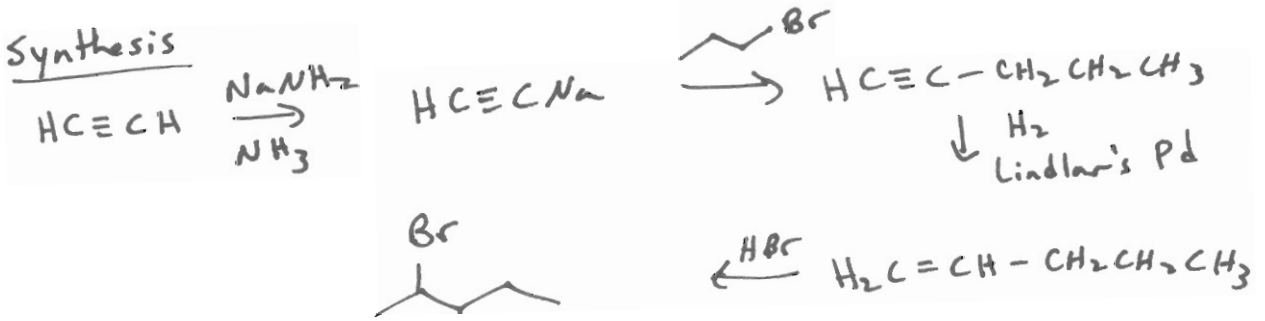
9. (8 points) Provide a complete electron-pushing mechanism for the following reaction. Include by-products as they are formed.





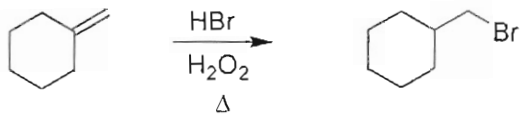
10. (8 points) Provide a synthesis of 2-bromopentane. You may begin with any organic reagents containing three carbons or less and any inorganic reagents you need.





Choose one of the following problems. Clearly indicate which one you are omitting.

11. (8 points) Provide a complete electron-pushing mechanism for the following reaction.



OR

Provide a synthesis of the following target compound. You may beginning with any organic reagents containing four carbons or less and any inorganic reagents you need.

