PROBLEM SET 3

1. Write structural formulas for the products that form when 1-butene reacts with each of the following reagents:

a. HI

b. H_2, Pt

c. HBr

d. Br_2 in CCl_4

e. Br_2 in H_2O

f. O_3, then Me_2S

g. OsO_4, then $NaHSO_3/H_2O$

h. $KMnO_4$, HO^-, heat, then H_3O^+

i. $Hg(OAc)_2$ in THF and H_2O, then $NaBH_4$, HO^-

j. BH_3:THF, then H_2O_2, HO^-

2. Give the structure of the products that you would expect from the reaction of 1-hexyne with:

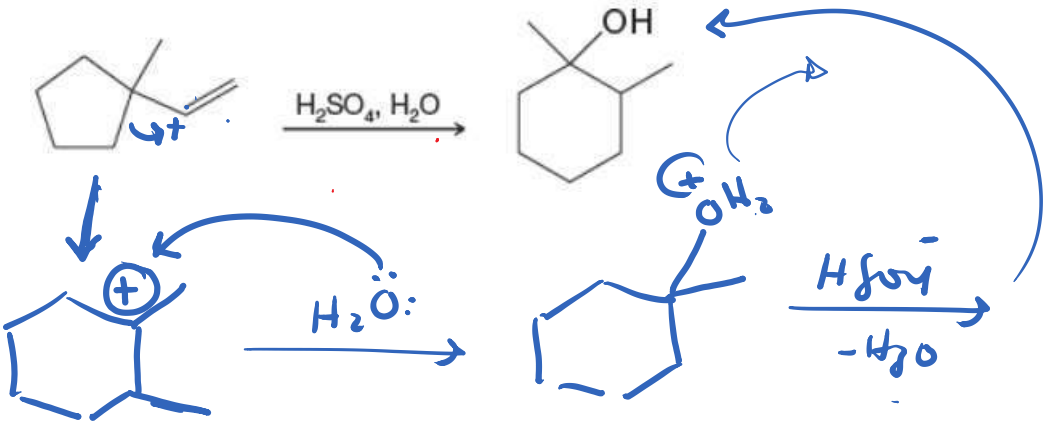
a. One molar equivalent of Br_2

b. One molar equivalent of HBr

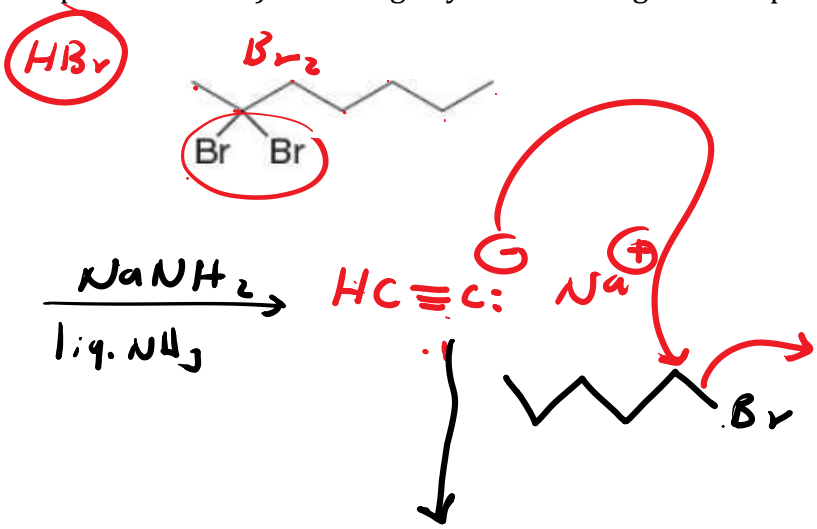
c. Two molar equivalents of HBr

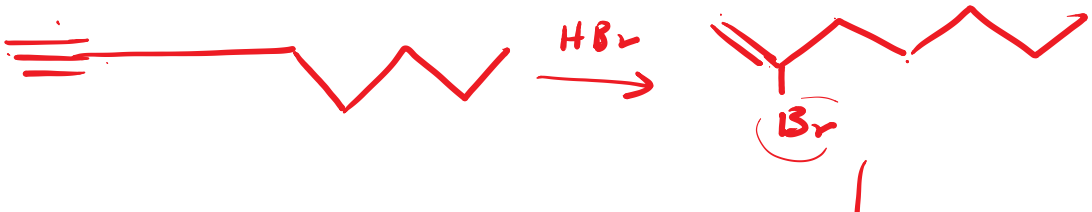
d. H_2 (in excess)/Pt

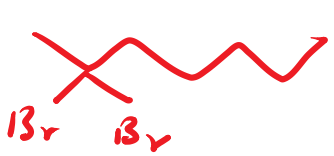
3. Write a mechanism for the following reaction.



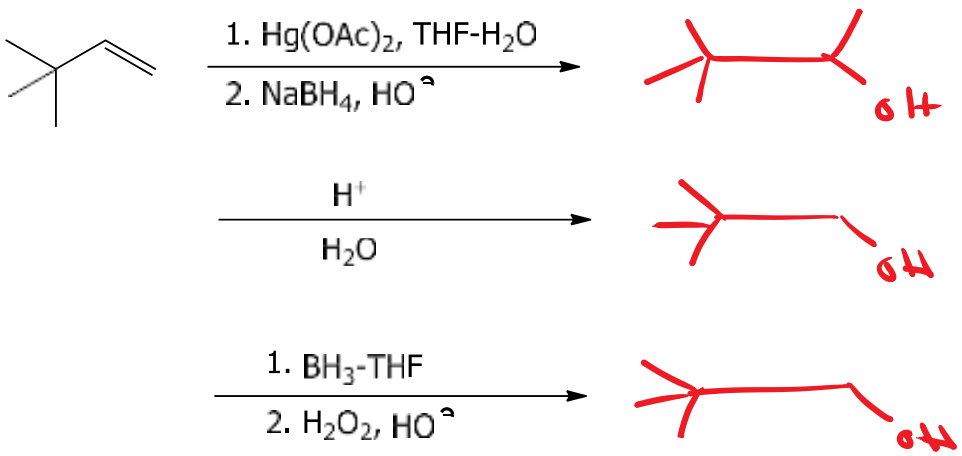
4. Synthesize the following compound starting with ethyne and 1-bromopentane as your only organic reagents (except for solvents) and using any needed inorganic compounds.







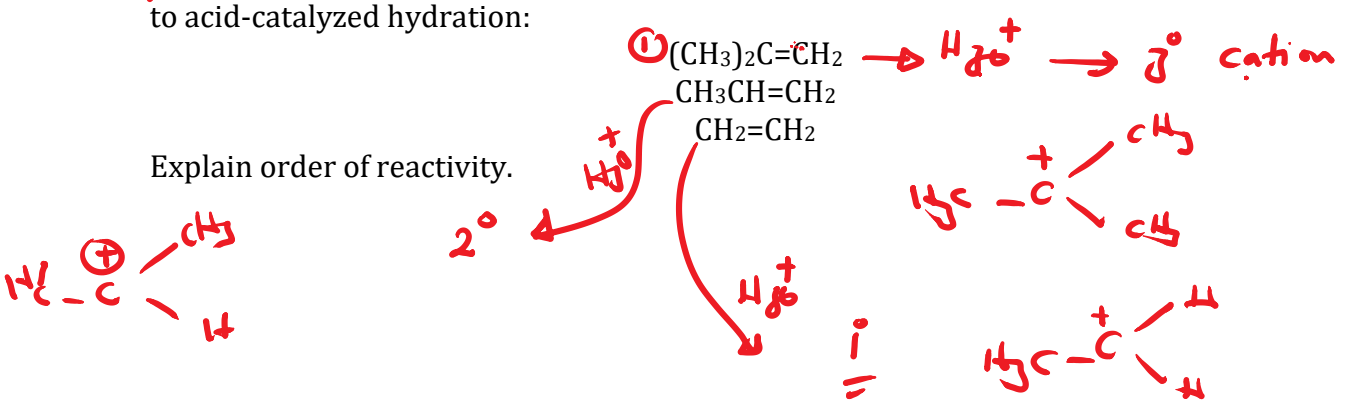
5. Starting with the same alkene, write the major products of the following reactions:



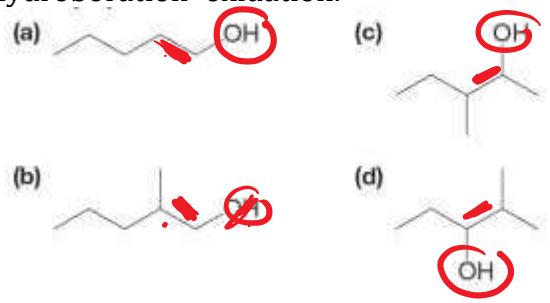
~~X~~ The following order of reactivity is observed when the following alkenes are subjected to acid-catalyzed hydration:

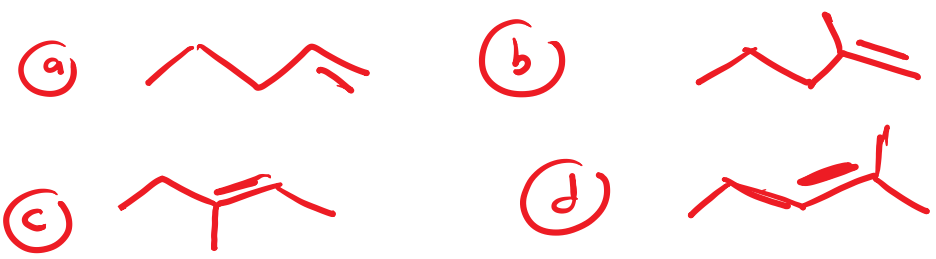
$(CH_3)_2C=CH_2$
$CH_3CH=CH_2$
$CH_2=CH_2$

Explain order of reactivity.

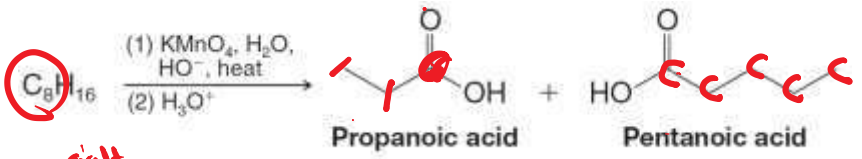


7. Specify the appropriate alkene for synthesis of each of the following alcohols by hydroboration–oxidation.





8. An unknown alkene with the formula C_8H_{16} was found, on oxidation with hot basic permanganate, to yield a three carbon carboxylic acid (propanoic acid) and a five-carbon carboxylic acid (pentanoic acid). What was the structure of this alkene?

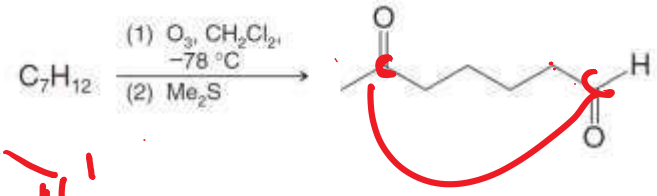


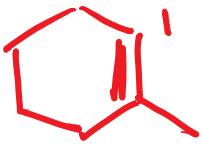
cis or trans -3-octene

oxidative cleavage

9. Give the structure of an unknown alkene with the formula C_7H_{12} that undergoes ozonolysis to yield, after acidification, only the following product:

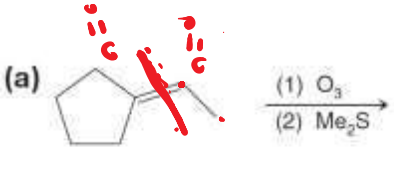
cycloalkene

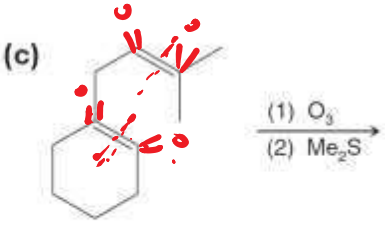


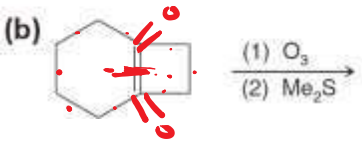


1-methylcyclohexene

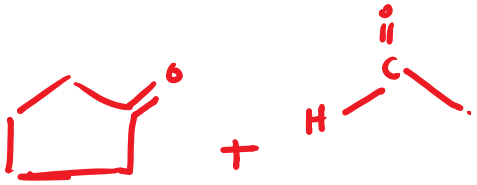
10. Predict the products of the following ozonolysis reactions.



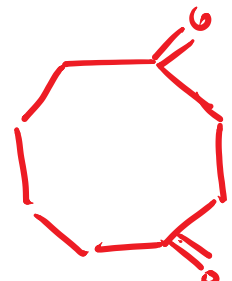




(a)

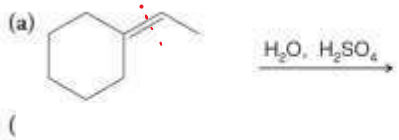


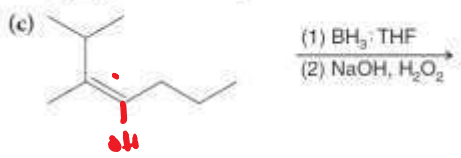
(b)

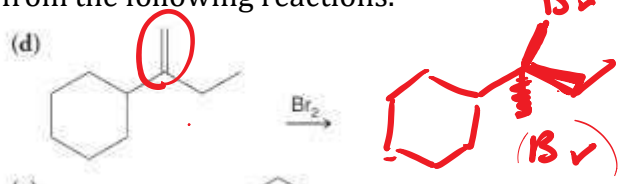


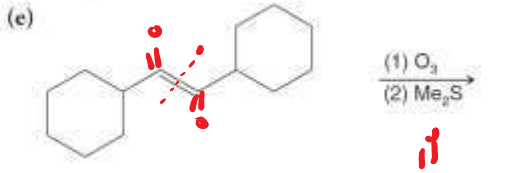
(c)

11. Write structures for the major organic products from the following reactions.

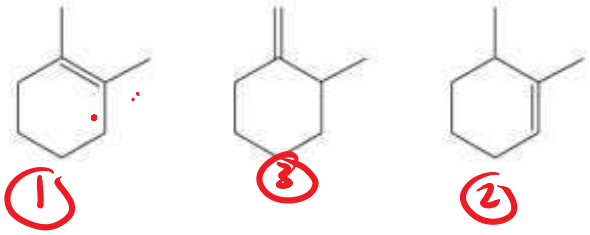








12. Rank the following cycloalkenes in order of increasing stability.



13. Write structures for the major organic products from the following reactions.