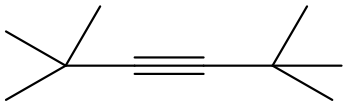
Organic 211 Test # 4 December 4, 2018

Name:_____

Directions: The test is worth 106 points but scored out of 100.

1) Give a molecular formula for a molecule that contains three nitrogens and weighs 415. Show your work. (3 pts.)

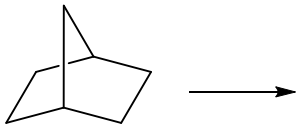
2) Give the structure if given the name or the name if given the structure.
a) (R)-5-(prop-1-yn-1-yl)undecane (3 pts.)

b)  (3 pts.)

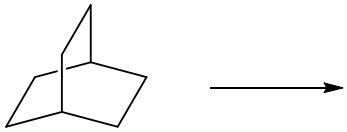
3) a) Draw the products of free radical halogenation of pentane including stereochemistry. (3 pts.)

b) If the reactivities are 1 for primary, 3.9 for secondary, and10.0 for tertiary,calculate how much of each product is formed. SHOW YOUR WORK! (3 pts.)

4) Excluding enantiomers, free-radical chlorination of bicyclo[2.2.1]heptane (A) yields four monochloro derivatives but bicycle[2.2.2]octane (B) give only two. Draw structural formulas for each monochloroderivative. (4 pts.)



A

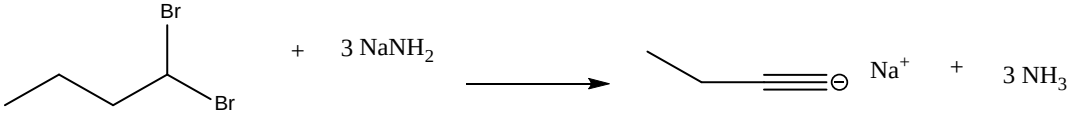


B

5) Nucleophilic addition can occur with alkynes that bear strong electron-attracting substituents such as CF_3 on the triple bond. Predict the product of nucleophilic addition of CH_3OD to 3,3,3-trifluoropropyne. The stereochemistry of addition is anti, and the first step in the mechanism is bond formation $CH3O^-$ and one of the carbons of the triple bond. (3 pts.)

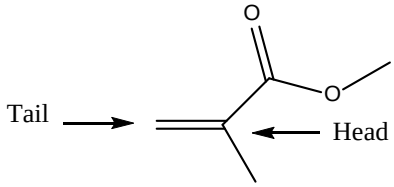
6) Electrophilic addition of flurorosulfonic acid (FSO_2OH) to propyne proceeds by way of a very unstable vinyl cation intermediate. What is the most reasonable structure, including geometry, of this intermediate? (3 pts.)

7) Give the first step in the mechanism for the following reaction with arrows. (3 pts.)



8) Ethylene lacks a peak in its IR spectrum for C=C stretching.Why? (3 pts.)

9) Monomers can add in a head to head fashion or head to tail fashion to form polymers.



a) Draw a small portion of the head to tail fashion dimer. (3 pts.)

b) Draw a small portion of the head to head dimer. (3 pts.)

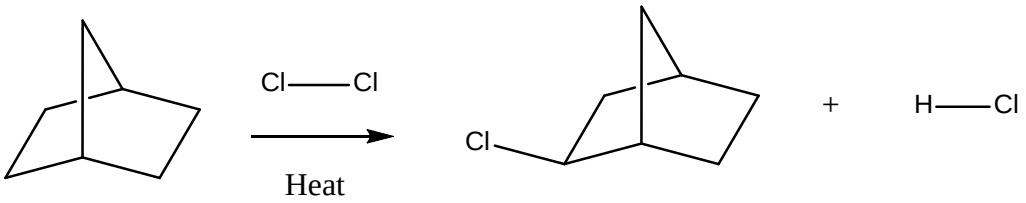
10) Work the following problem. Put the letter that corresponds to the number in the list below. (For example, if C fits III, put a C in the blank for III.) Hint: NOT snow day. (7 pts.)

I. A molecule that can ONLY undergo Markovnikov addition and is an acid.
II. Conditions that will give Markovnikov addition of water to an alkene.
III. A reagents that will alkenes to epoxides.
IV. A reagent that will add HBr to alkenes in Markovnikov fashion.
V. Addition of this reagent will give anti addition of alcohols from epoxides under basic conditions.
VI. This will result in syn addition of hydrogen to alkynes when reacted with hydrogen.
VII. A reagent that will add HBr to alkenes in ANTI-Markovnikov fashion.

A. HBr/peroxides	L. How fast?	W. H_2/Pt
B. H_2O	M. How far?	X. ACS
C. HBr/ NO Peroxides	N. Gauche	Y. Br_2/H_2O
D. $^{-}NH_2$	O. 1) BH_3:THF, 2) H_2O_2/OH^-	
E. MCPBA	P. H^+/H_2O	Z. Zaitsev (aka Bunny)
F. Diet Coke/Mentos	Q. Anti	
G. sp^3	R. Lindlar's catalyst	
H. sp^2	S. HCl	
I. sp	T. $^{-}OH/H_2O$	
J. BAM!	U. Cl_2	
K. Br_2/CCl_4	V. Ethanol	

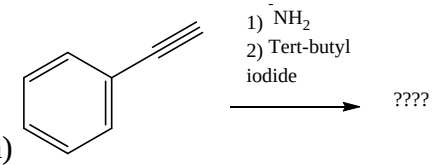
I _____ II _____ III _____ IV _____ V _____ VI _____ VII _____

11) Mechanism: Work the following mechanism showing every step. (6 pts.)

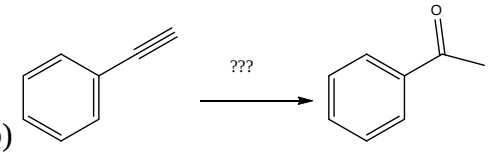


12) Give the missing reactant, reagent, or product for the following reactions. If a radical reaction, assume monohalogenation. Indicate if no reaction is possible. If enantiomers are formed, you may draw one enantiomer and write +E. If diasteromers are formed, you may draw one diasteromer and write +D. Show stereochemistry if important. (3 pts. each)

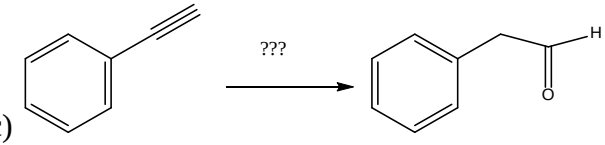
a)



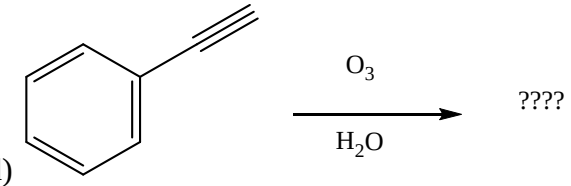
b)



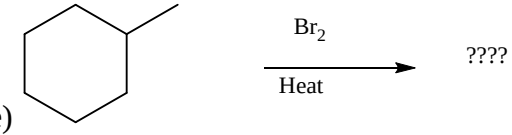
c)

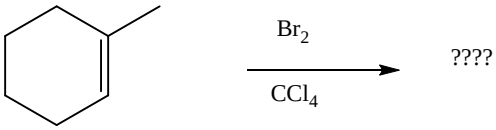


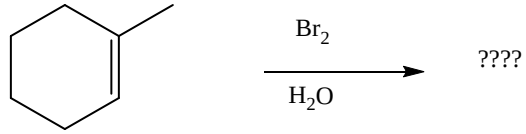
d)

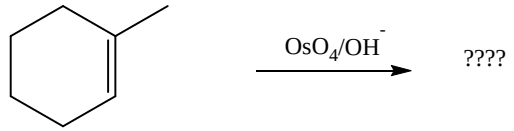


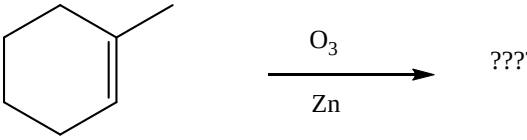
e)

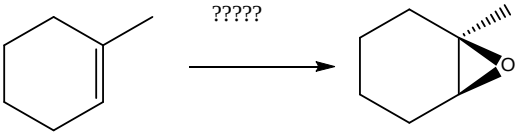


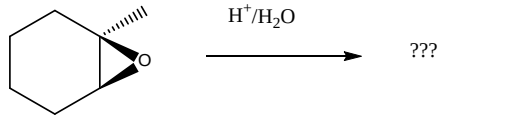
f) 

g) 

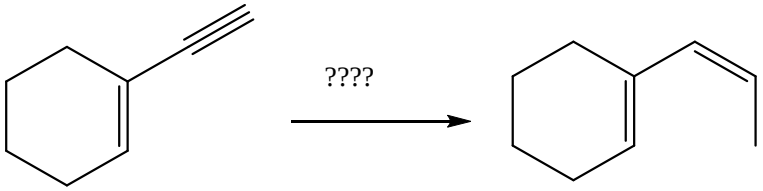
h) 

i) 

j) 

k) 

13) Outline a synthesis of D from C using any necessary reagents needed. (5 pts)



C D

14) Give the structure of a molecule that will give the following spectra. Please put answer here. Partial credit will be given.(5 pts. each)

a)

b)

c)

15) Free Question: Give something that you will remember about Organic 211. (3 pts.)