

Name _____

(1 a-j) are TRUE/FALSE. (10pts)

- a) A *leaving group* disconnects and takes with it the two previously bound electrons.
- b) Hept-1-yne and Hept-2-ene are stereoisomers.
- c) All alkynes have a carbon-carbon triple bond.
- d) All π bonds are polar bonds.
- e) Cahn, Ingold and Prelog created the rules for assigning R or S to a chiral center.
- f) S_N1 and E1 reactions both proceed through carbocation intermediates.
- g) An anion has a positive charge.
- h) A *Lewis base* must be a good proton donor.
- i) Saturated compounds have the maximum number of bonds to hydrogen.
- j) Kinetics deals with the speed of chemical reactions.

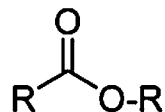
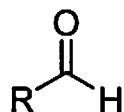
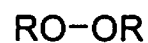
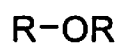
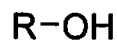
2) Define the following terms (3pts):

Nucleophile.

Tautomers.

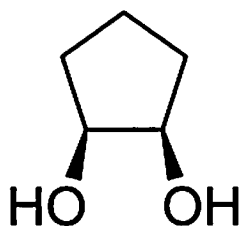
Racemic mixture.

3) Name the classes of compound (functional groups) that the following molecules belong to (e.g. alkane, amide, etc.). (5pts)



4) Circle the above functional group that has the most oxidized Carbon atom. (1pt)

5) (4pts) For the below molecule:



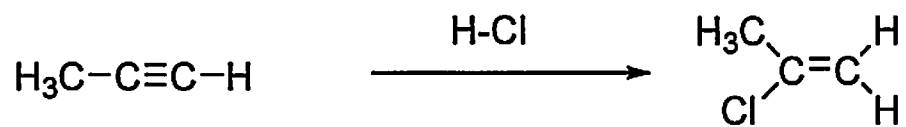
How many Hydrogens are there?

How many π bonds?

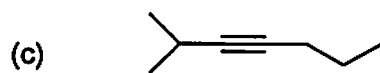
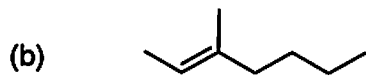
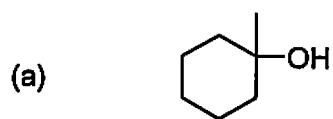
How many sp^3 hybridized Carbons?

What is the hybridization of the Oxygens?

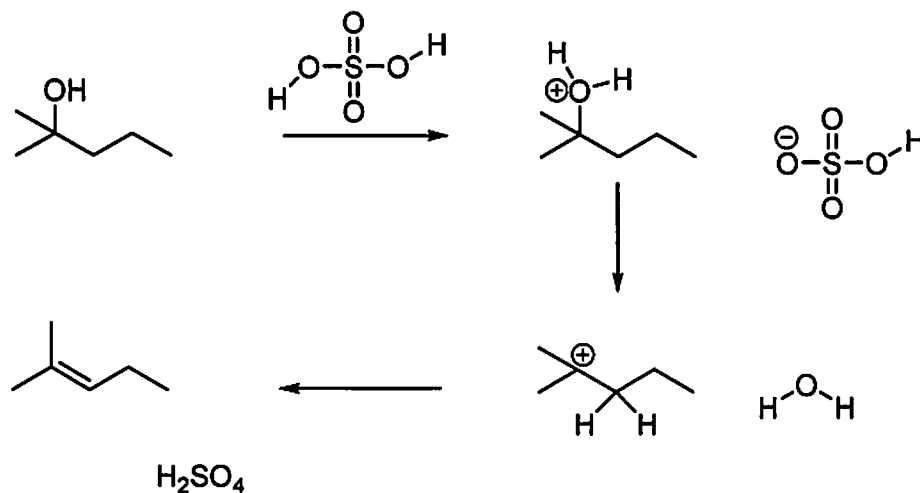
6) Write a mechanism (i.e. curly arrows) for this electrophilic addition.
(6pts)



7) Name the following molecules in IUPAC form. (12pts)

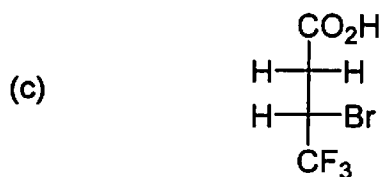
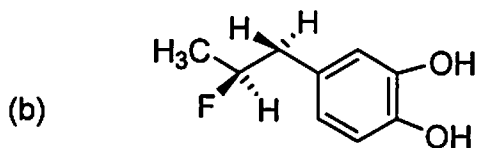
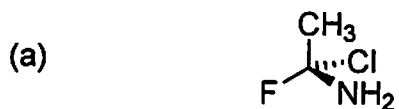


8) (i) Draw in the curly arrows for this acid catalyzed elimination. (6pts)

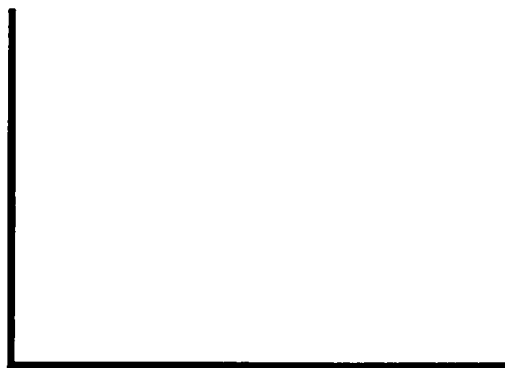


ii) Provide the specific name of the above reaction mechanism type – it should involve at least one letter, and a number. (1pt)

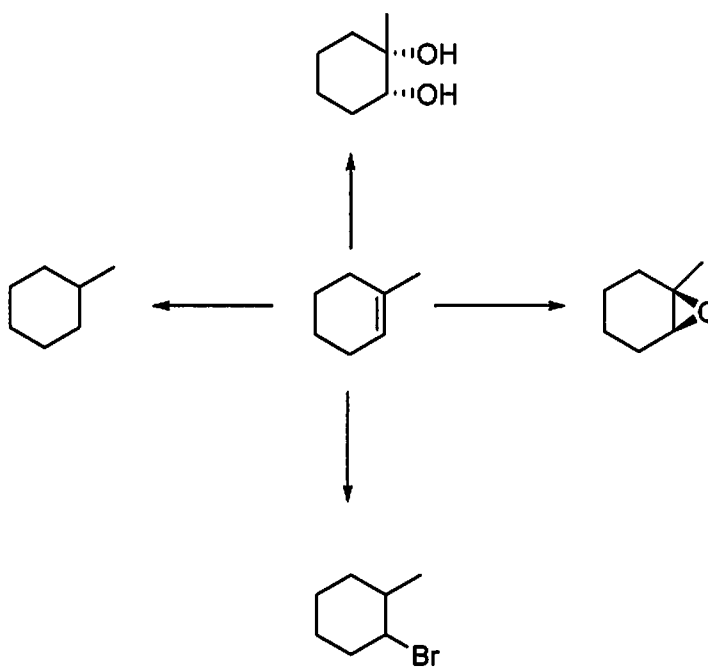
9) Assign R or S to each chiral center in these molecules. (6pts)



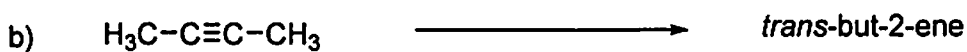
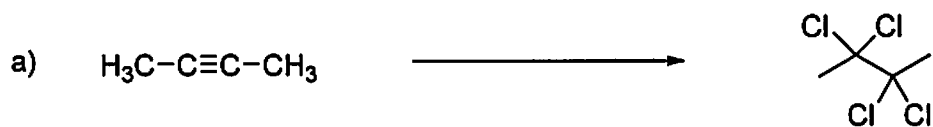
10) (6 pts) Draw an energy level diagram for a typical **exothermic S_N1** process. Make sure to label (a) the axes (b) the *reactants* and *products* (c) any transitions states (d) ΔH° for the overall reaction (e) the rate determining step (f) the cation intermediate.



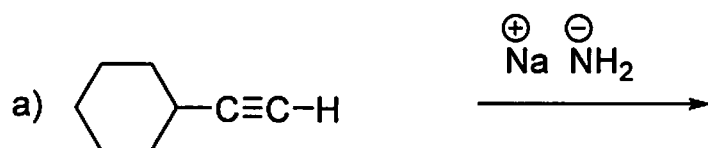
11) Give the **reagents** for the following reactions. (8pts)



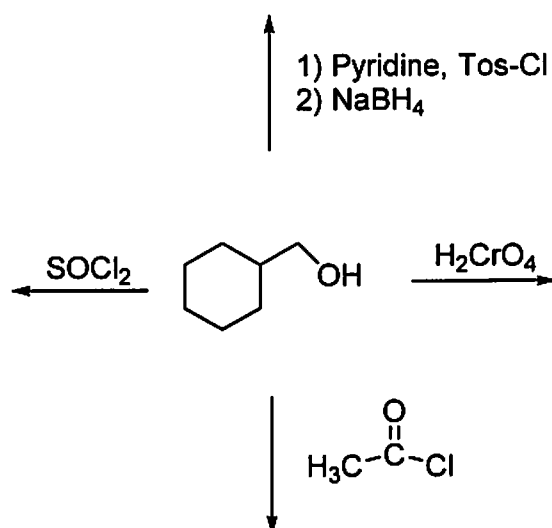
12) Give the reagents (for a & b), and the products (for c & d). (8pts)



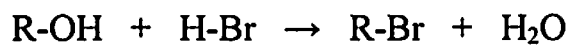
13) Write the mechanism (i.e. curly arrows), and draw all the products for the following acid/base (deprotonation) reactions. (3+3pts)



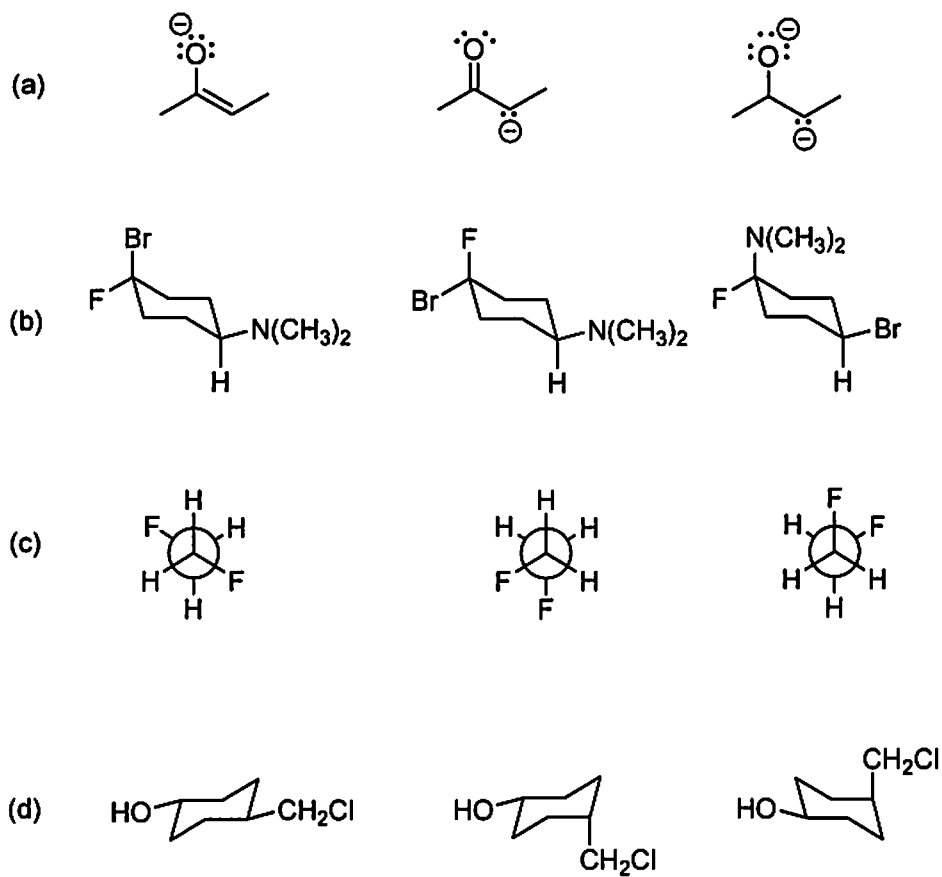
14) Give the products for the following transformations. (8pts)



15) Write the mechanism (i.e. curly arrows) for the following S_N2 transformation. (6pts)



16) Circle the *lowest energy* member of each threesome. (4pts)



*****BONUS POINTS (up to THREE)*****

Provide pairs of structures that are related as:

STRUCTURAL ISOMERS.

DIASTEREOMERS.

TAUTOMERS.

hydrogen 1 H	beryllium 4 Be	scandium 21 Sc	boron 5 B	helium 2 He
lithium 3 Li	boron 5 B	titanium 22 Ti	carbon 6 C	neon 10 Ne
sodium 11 Na	beryllium 4 Be	vanadium 23 V	nitrogen 7 N	argon 18 Ar
22 990 potassium 19 K	magnesium 12 Mg	chromium 24 Cr	oxygen 8 O	39 948 krypton 36 Kr
39 098 rubidium 37 Rb	calcium 20 Ca	manganese 25 Mn	fluorine 9 F	83 80 xenon 54 Xe
85 468 cesium 55 Cs	strontium 38 Sr	iron 26 Fe	neon 10 Ne	131 29 radon 86 Rn
132 91 barium 87 Ba	barium 56 Ba	cobalt 27 Co	carbon 6 C	
Fr	Ra	nickel 28 Ni	nitrogen 7 N	
		copper 29 Cu	oxygen 8 O	
		zinc 30 Zn	fluorine 9 F	
		gallium 31 Ga	neon 10 Ne	
		germanium 32 Ge	argon 18 Ar	
		arsenic 33 As	potassium 19 K	
		selenium 34 Se	calcium 20 Ca	
		bromine 35 Br	beryllium 4 Be	
		krypton 36 Kr	boron 5 B	
		xenon 54 Xe	carbon 6 C	
		radon 86 Rn	nitrogen 7 N	
			oxygen 8 O	
			fluorine 9 F	
			neon 10 Ne	
			argon 18 Ar	
			potassium 19 K	
			calcium 20 Ca	
			beryllium 4 Be	
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			oxygen 8 O	
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			neon 10 Ne	
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			potassium 19 K	
			calcium 20 Ca	
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			boron 5 B	
			carbon 6 C	
			nitrogen 7 N	
			oxygen 8 O	
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			neon 10 Ne	
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Name _____

I.C. Darkefief

(1 a-j) are TRUE/FALSE. (10pts)

- a) A *leaving group* disconnects and takes with it the two previously bound electrons. T
- b) Hept-1-yne and Hept-2-ene are stereoisomers. false
- c) All alkynes have a carbon-carbon triple bond. T
- d) All π bonds are polar bonds. false
- e) Cahn, Ingold and Prelog created the rules for assigning R or S to a chiral center. T
- f) S_N1 and E1 reactions both proceed through carbocation intermediates. T
- g) An anion has a positive charge. false
- h) A *Lewis base* must be a good proton donor. false
- i) Saturated compounds have the maximum number of bonds to hydrogen. T
- j) Kinetics deals with the speed of chemical reactions. T

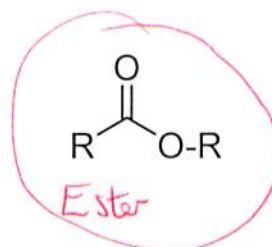
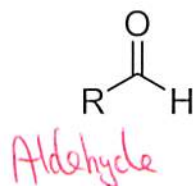
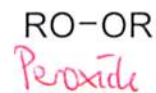
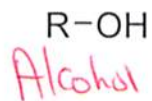
2) Define the following terms (3pts):

Nucleophile A two electron donor.

Tautomer Structural isomers that are in equilibrium.

Racemic mixture An equal mix of both enantiomers.

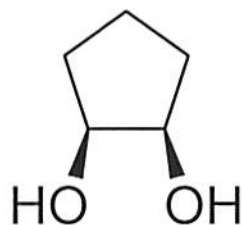
3) Name the classes of compound (functional groups) that the following molecules belong to (e.g. alkane, amide, etc.). (5pts)



4) Circle the above functional group that has the most oxidized Carbon atom. (1pt)

✓

5) (4pts) For the below molecule:



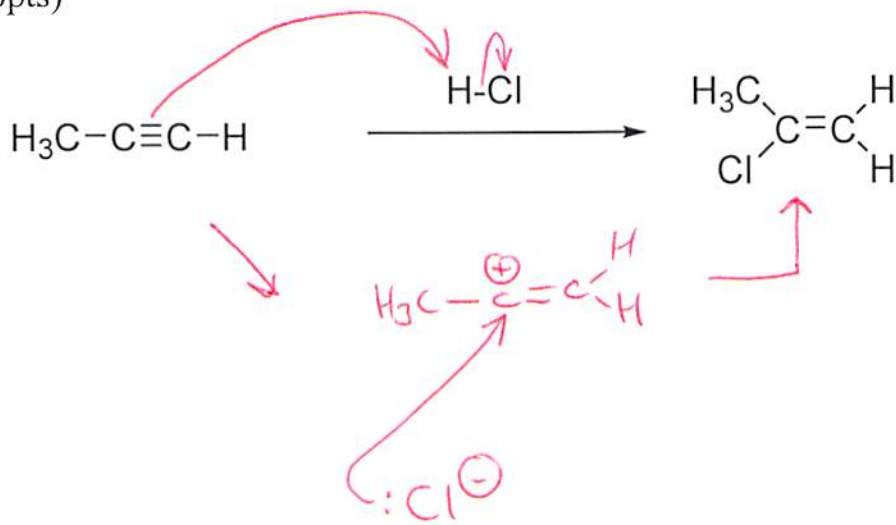
How many Hydrogens are there? 10

How many π bonds? zero

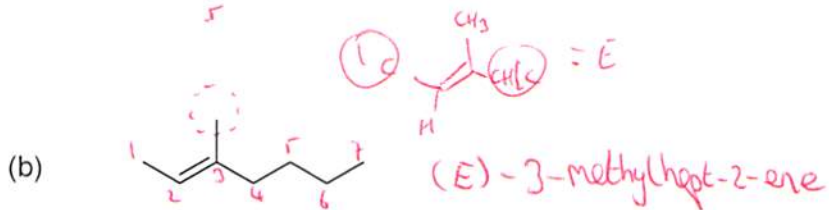
How many sp^3 hybridized Carbons? 5

What is the hybridization of the Oxygens? sp^3

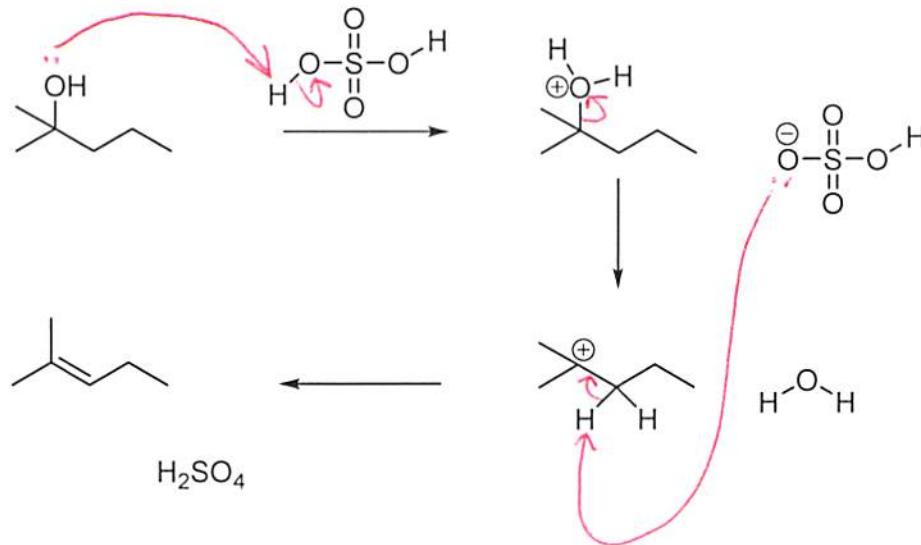
6) Write a mechanism (i.e. curly arrows) for this electrophilic addition.
(6pts)



7) Name the following molecules in IUPAC form. (12pts)



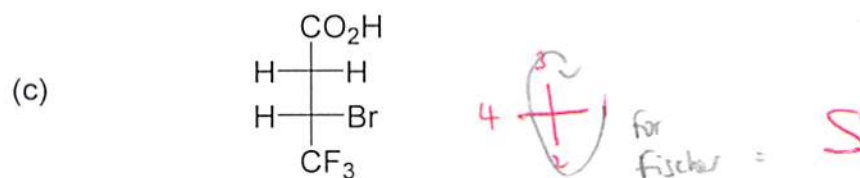
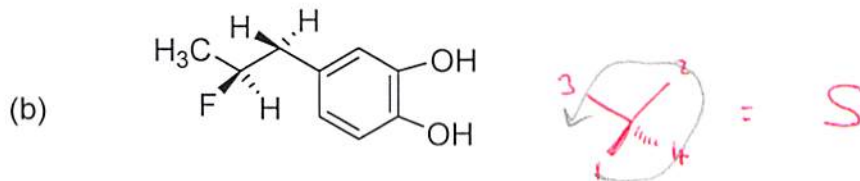
8) (i) Draw in the curly arrows for this acid catalyzed elimination. (6pts)



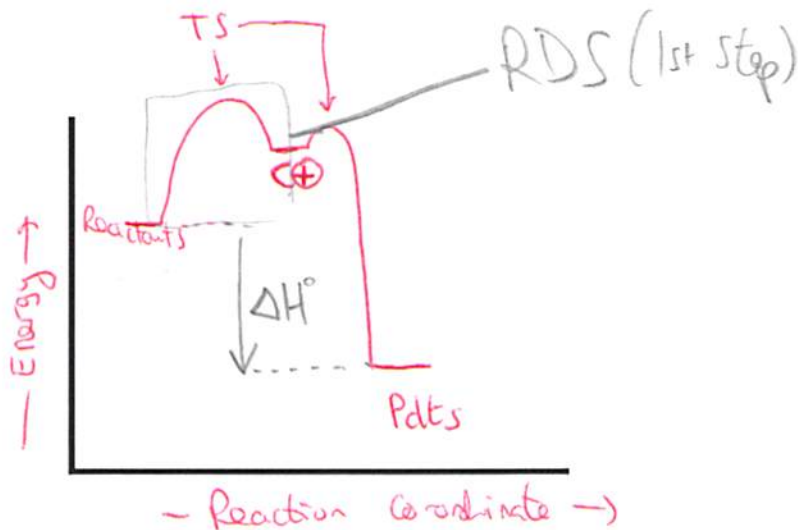
ii) Provide the specific name of the above reaction mechanism type – it should involve at least one letter, and a number. (1pt)

E1

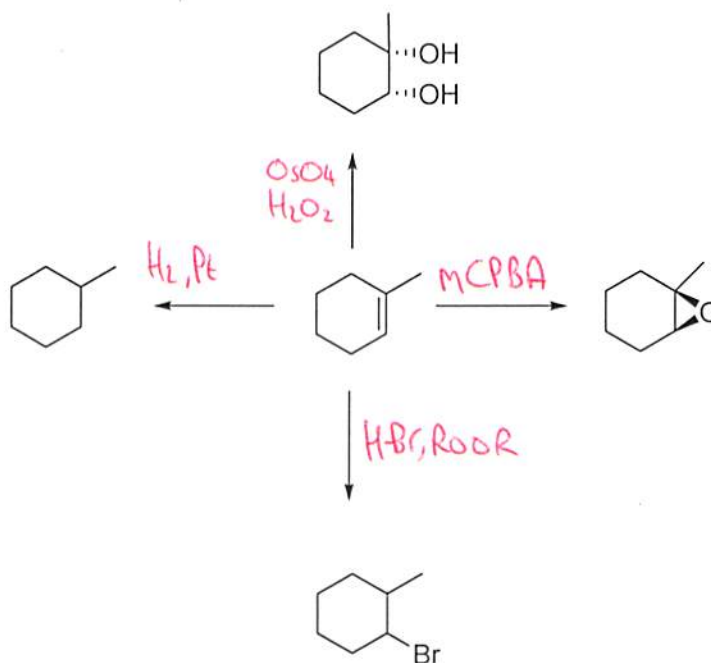
9) Assign **R** or **S** to each chiral center in these molecules. (6pts)



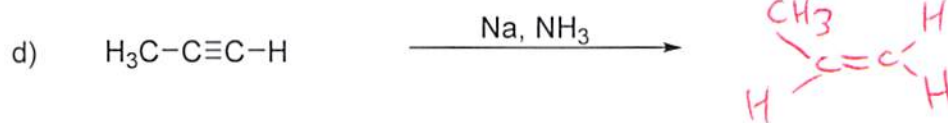
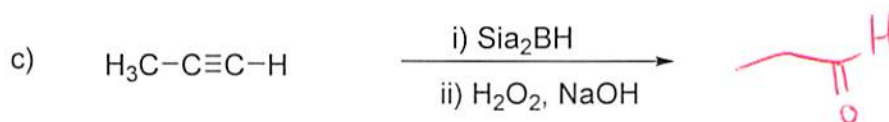
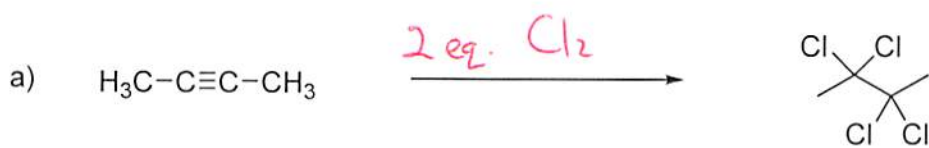
10) (6 pts) Draw an energy level diagram for a typical **exothermic S_N1** process. Make sure to label (a) the axes (b) the *reactants* and *products* (c) any transitions states (d) ΔH° for the overall reaction (e) the rate determining step (f) the cation intermediate.



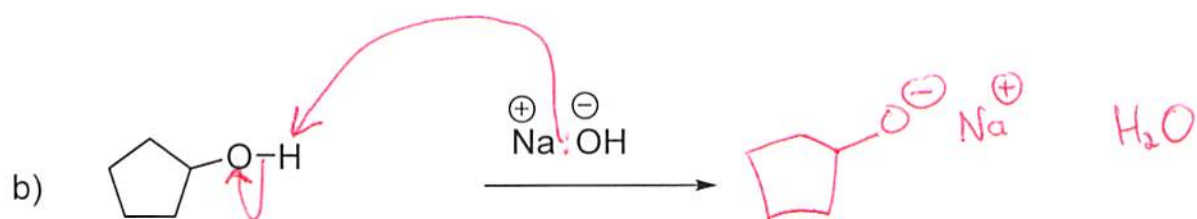
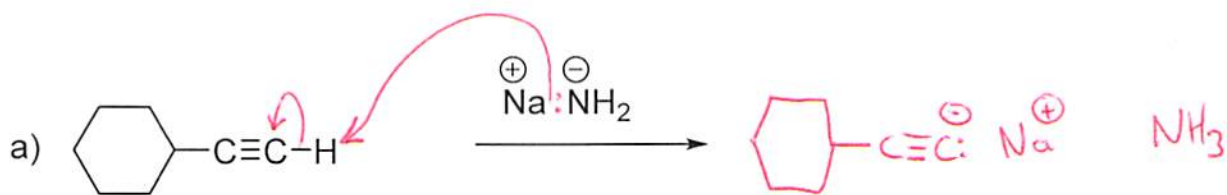
11) Give the **reagents** for the following reactions. (8pts)



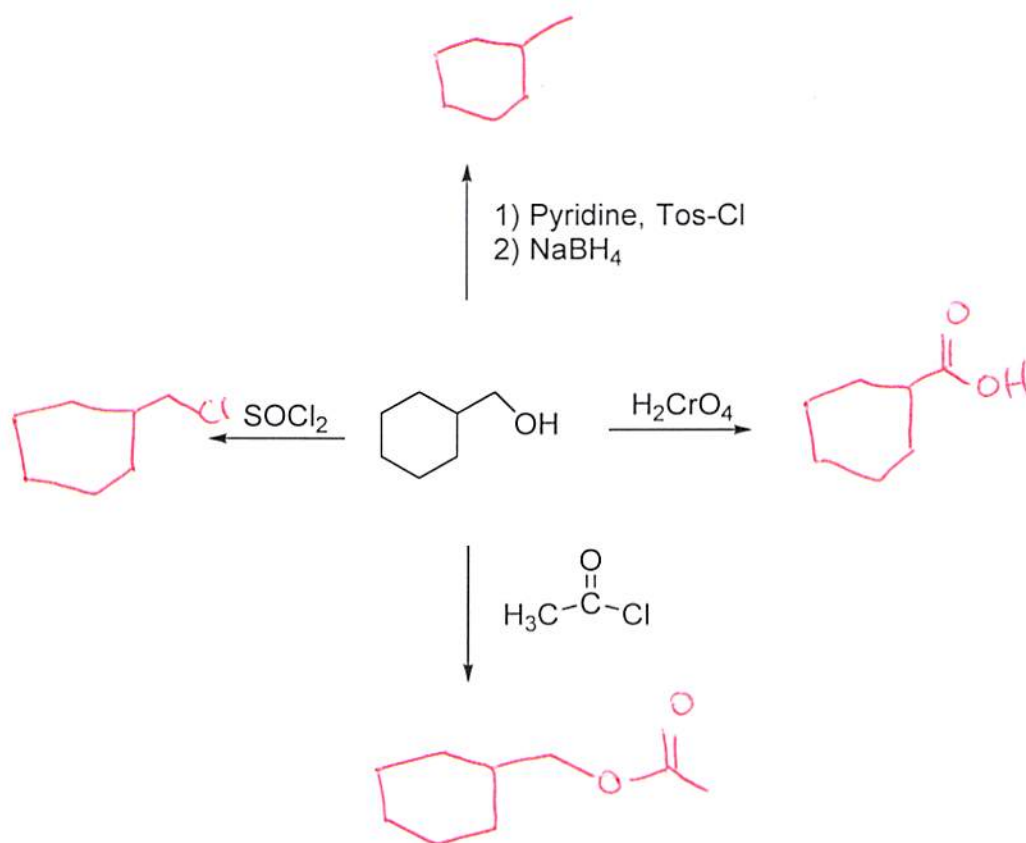
12) Give the reagents (for a & b), and the products (for c & d). (8pts)



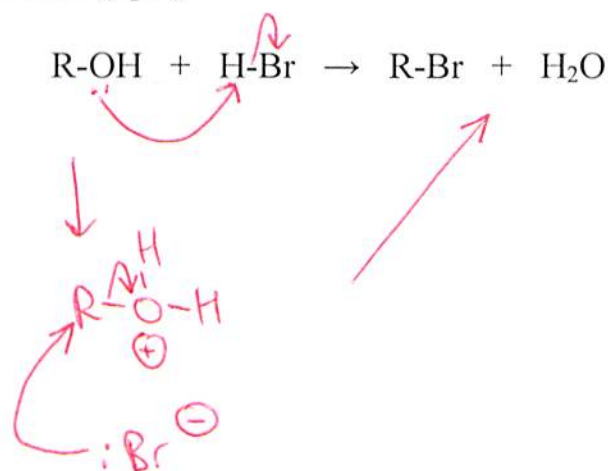
13) Write the mechanism (i.e. curly arrows), and draw all the products for the following acid/base (deprotonation) reactions: (3+3pts)



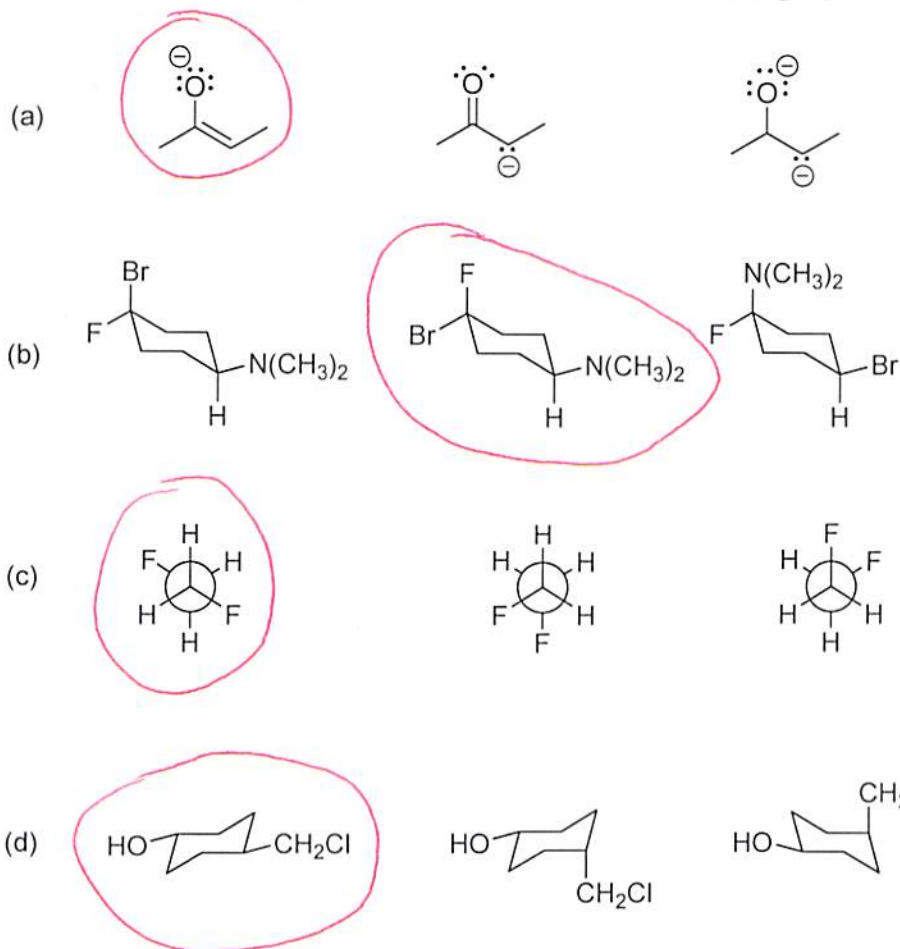
14) Give the products for the following transformations. (8pts)



15) Write the mechanism (i.e. curly arrows) for the following S_N2 transformation: (6pts)



16) Circle the *lowest energy* member of each threesome. (4pts)



BONUS POINTS (up to THREE)

Provide pairs of structures that are related as:

STRUCTURAL ISOMERS



DIASTEREOMERS



TAUTOMERS

