

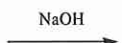
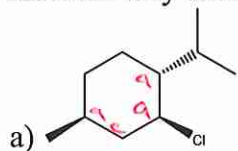
# Assignment # 12

Organic 211

Fall 2020

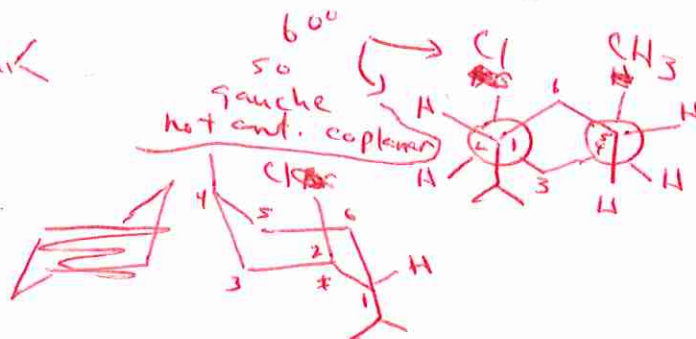
Name: \_\_\_\_\_

1) Give the product for the reaction below. Indicate with a chair conformation of the starting material why that is the ONLY product formed.

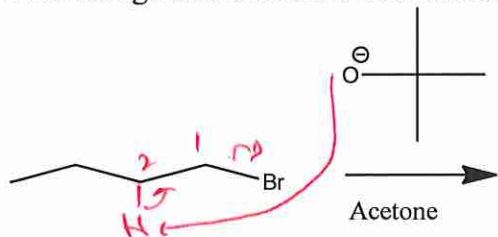


???

chlorine (leaving group must be axial to have anti coplanar hydrogen)



2) Give the product for the reaction below. Explain why the following reaction is an E<sub>2</sub> reaction even though substitution is indicated for alkoxide reactions with primary halides.

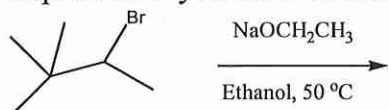


Acetone



tert-butoxide is too large due to 3° carbon and van der Waals strain to substitute.

3) Identify the mechanism most responsible for the major product in the following reaction. Explain how you came to that conclusion.



a) S<sub>N</sub>1

b) S<sub>N</sub>2

c) E<sub>1</sub>

d) E<sub>2</sub>

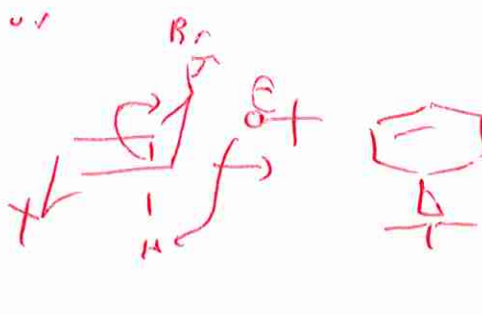
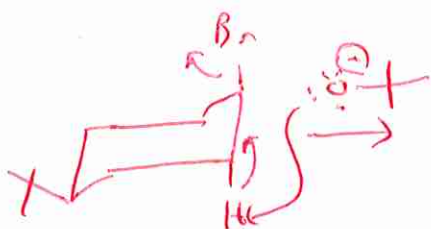
e) Beats the heck out of me.

2° halide

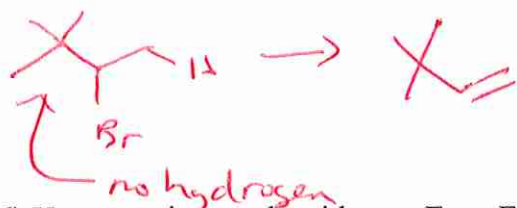
not PKa 16

50

4) Use curved arrows to show the bonding changes in the reaction of cis-4-tert-butylcyclohexyl bromide with potassium tert-butoxide [KOC(CH<sub>3</sub>)<sub>3</sub>]. Be sure your drawing represents the spatial relationship between the leaving group and the proton that is lost.



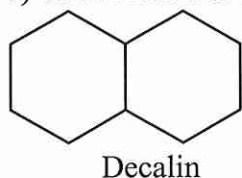
- 5) a) How many alkene(s) (if any) would you expect to be formed from 3-bromo-2,2-dimethylbutane under conditions of E<sub>2</sub> elimination? B) Identify the alkene(s) formed (if any).



- 6) Your reaction can be either an E<sub>1</sub> or E<sub>2</sub> reaction. How could you tell?

Kinetics. Hold alkyl halide concentration the same, double concentration of base. if rate doubles, E<sub>2</sub>. if no rate change, E<sub>1</sub>.

- 7) Given below is decalin and it is the framework for the following questions.



- a) Draw the most stable alkene possible using decalin as the framework.



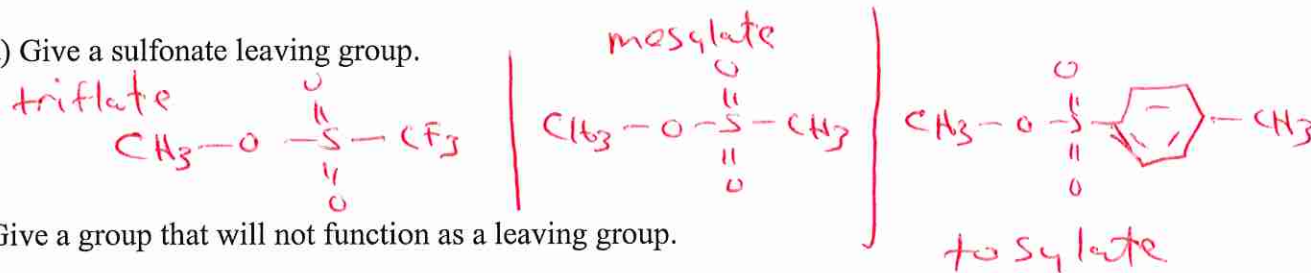
- b) Draw the least stable alkene possible using decalin as the framework.



- c) Draw an alkene of stability that falls between the alkene in part a and the alkene in part b.



- 8) a) Give a sulfonate leaving group.



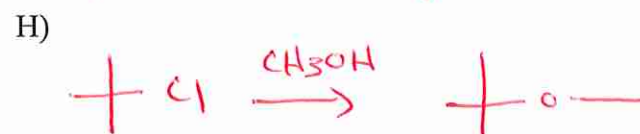
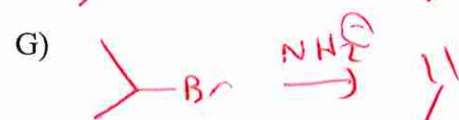
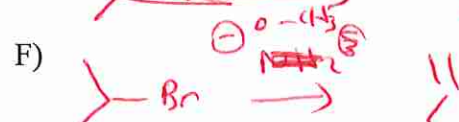
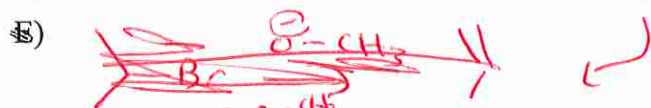
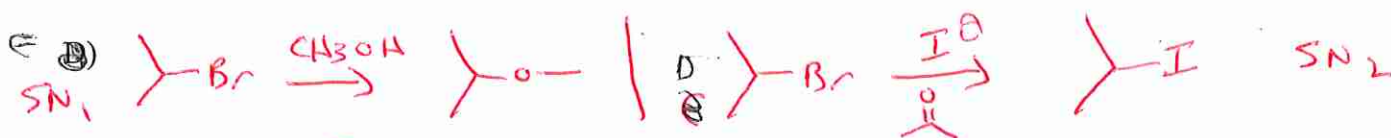
- b) Give a group that will not function as a leaving group.

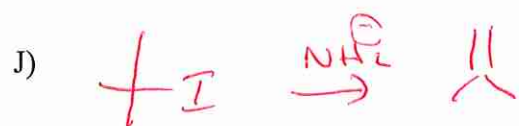
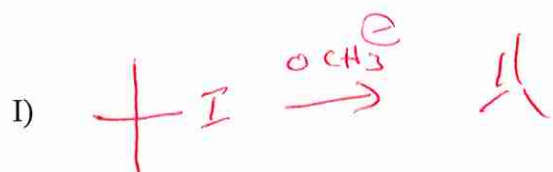
lots of possibilities



9) Given below is the chart to decide whether your reaction goes SN2, SN1/E1, or E2. A letter has been added to each box of the chart. Give a reaction that will fall in its lettered box. For example, for A you could show ethyl bromide reacting with sodium cyanide in acetone. There is no need to show the E1 product.

pKa of conjugate acid of nucleophile	Primary Halides	Secondary Halides	Tertiary Halides
<10	A SN <sub>2</sub>	SN <sub>2</sub> – polar aprotic solvent D SN <sub>1</sub> /E <sub>1</sub> – polar protic solvent E	H SN <sub>1</sub> /E <sub>1</sub>
10-25	B SN <sub>2</sub>	F E <sub>2</sub>	I E <sub>2</sub>
>25	C E <sub>2</sub>	G E <sub>2</sub>	J E <sub>2</sub>





10) Give a molecule that will undergo an E1 reaction AND have a kinetic isotope effect.

(for example)

$\text{E}_1$  is tertiary halide and loss of halide is first and rate determining step. So halide must be an isotope.

