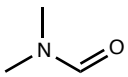
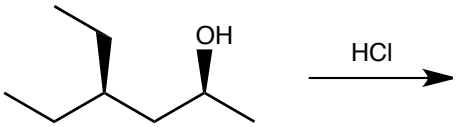
Name _____ Test 3 (4/18)
CHEM 0203 (Organic II) Spring 2012

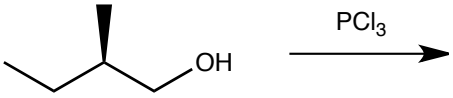
Common solvents used in organic chemistry.

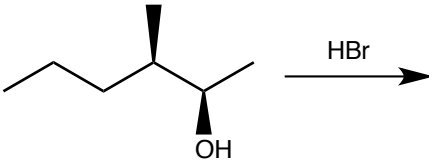
THF =  2-propanol =  DMSO =  DMF =  acetone = 

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

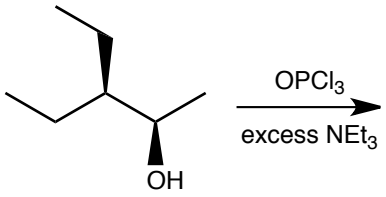
1. (6 pts. ea.) Predict the outcome of the following substitution reactions. Remember to use wedge and dashed bonds to indicate the stereochemical outcome of the reaction where appropriate.

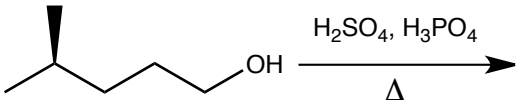
a. 

b. 

c. 

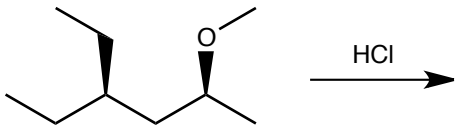
2. (6 pts. ea.) Predict the outcome of the following elimination reactions.

a. 

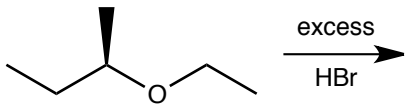
b. 

3. (6 pts. ea.) Predict the outcome of the following substitution reactions. Ignore stereochemistry.

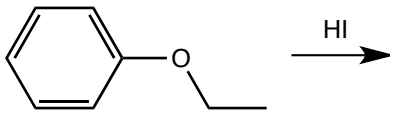
a.



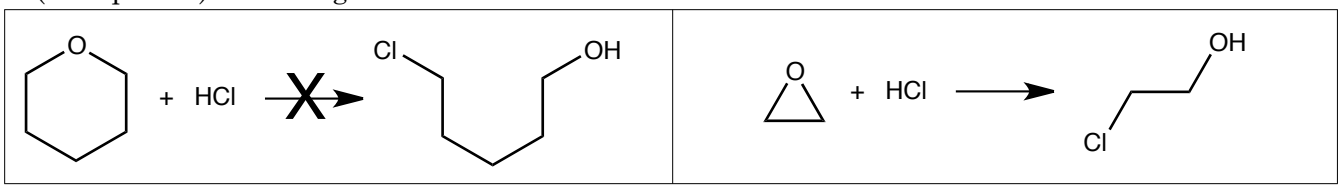
b.



c.



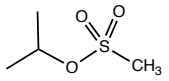
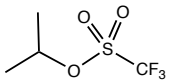
4. The reaction of HCl with the cyclic ether on the left fails, yet it succeeds with the cyclic ether (the epoxide) on the right.



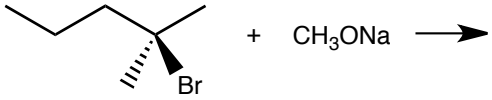
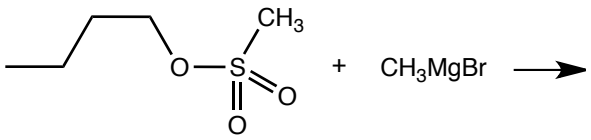
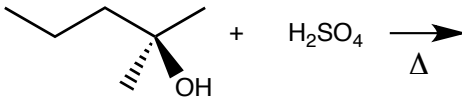
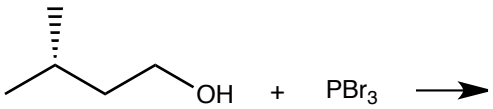
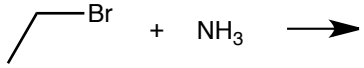
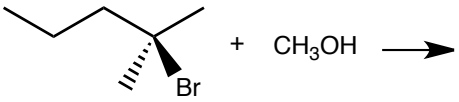
a. (6 pts.) Explain why the lefthand reaction fails.

b. (6 pts.) Explain why the righthand reaction succeeds.

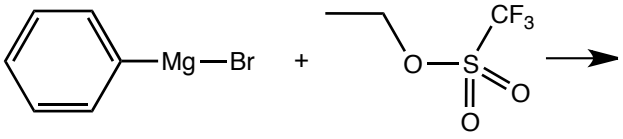
5. (10 pts.) Determine which of the following molecules has the better leaving group (circle the molecule) and explain your choice.

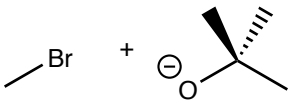
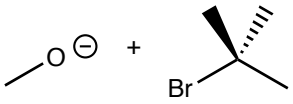
6. (12 pts.) Determine the mechanism that is most likely to predominate (S_N1, E1, S_N2, or E2) under the following reaction conditions.

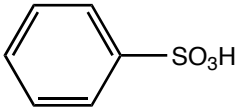
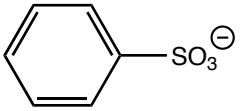
	
	
	

7. (6 pts.) Predict the product of the following reaction.



8. (8 pts.) If one wishes to make methyl-t-butyl ether (MTBE), which reaction would be the better route. Explain your response.

Acid	pK_a	Conjugate Base
HI	–10	I^-
HBr	–9.0	Br^-
HCl	–7.0	Cl^-
	–6.5	
H_2SO_4	–5.0	HSO_4^-
$CH_3OH_2^+$	–2.5	CH_3OH
H_3O^+	–1.7	H_2O
HF	3.2	F^-
CH_3CO_2H	4.8	$CH_3CO_2^-$
H_2S	7.0	HS^-
$HC{\equiv}N$	9.1	$^{\ominus}C{\equiv}N$
NH_4^+	9.4	NH_3
CH_3CH_2SH	10.5	$CH_3CH_2S^-$
$(CH_3)_3NH^+$	10.8	$(CH_3)_3N$
CH_3OH	15.5	CH_3O^-
H_2O	15.7	HO^-
$HC{\equiv}CH$	25	$^{\ominus}C{\equiv}CH$
H_2	35	H^-
NH_3	36	NH_2^-

Relative Nucleophilicity toward CH_3I in Methanol
$RS^- > I^- > {}^{\ominus}C{\equiv}N > Br^- > NH_3 > Cl^- > F^- > CH_3OH$

pK_a data and Nucleophilicity order from Organic Chemistry, 6th ed. Bruice, Prentice Hall (2009)