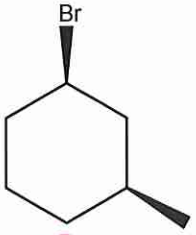
Assignment # 11
Organic 211
Fall 2020

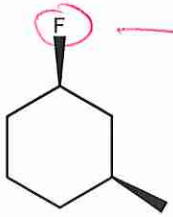
Name:_____

1) Indicate for the following reactions what type of reaction mostly takes place. Show stereochemistry if important. If an enantiomer is formed, write +E. Indicate also if no reaction is possible.

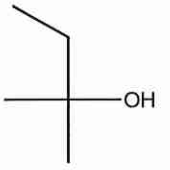
a) 

$^{\ominus}C{\equiv}N$ → SN2
????
Acetone — SN2

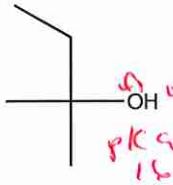

SN2

b) 

no reaction. Fluorine won't leave sp³ carbon.
$^{\ominus}C{\equiv}N$
????
Acetone

c) 

HCl
+Cl + H2O
SN1

d) 

$^{-}NH_2$
pKa 16
pKa 35
+ $^{\ominus}$ + NH_3 Keq > 1
acid / base reaction

e) 

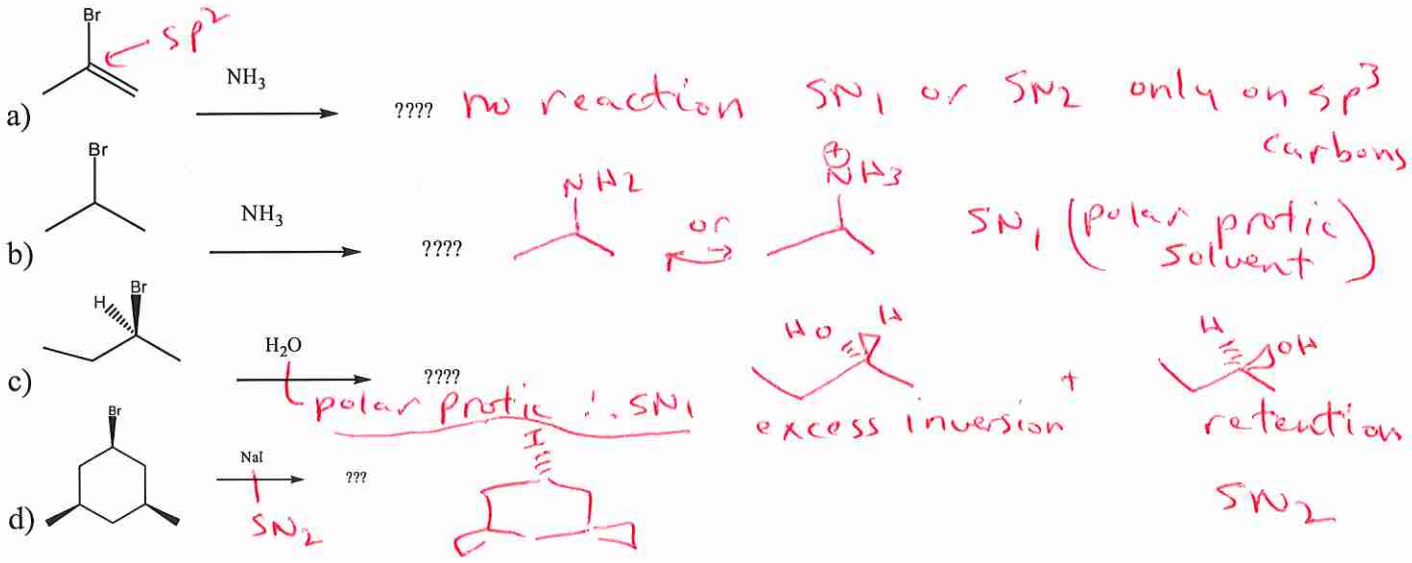
^{-}SH — SN2
Acetone — SN2


f) 

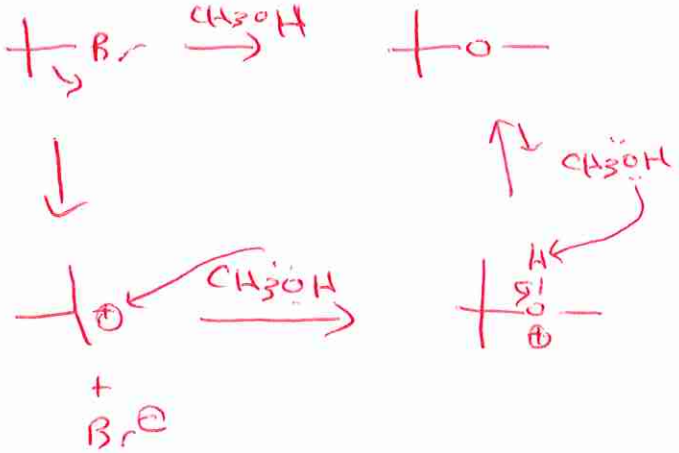
$^{\ominus}O$—
Acetone — SN2


10 halide < 1° pKa = SN2

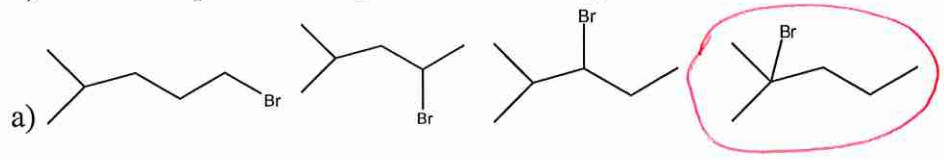
2) Give the product(s) for the following reactions. Show stereochemistry if important. Indicate if no reaction takes place. The product(s) of the reaction will be due to the reaction most likely to take place.



3) Suggest a structure for the product of nucleophilic substitution obtained on solvolysis of tert-butyl bromide in methanol, and outline a reasonable mechanism for its formation. SN_1

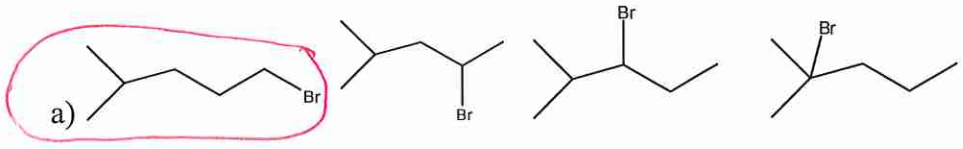


4) Which compound undergoes substitution by the S_N1 mechanism at the fastest rate?



3° carbocation intermediate

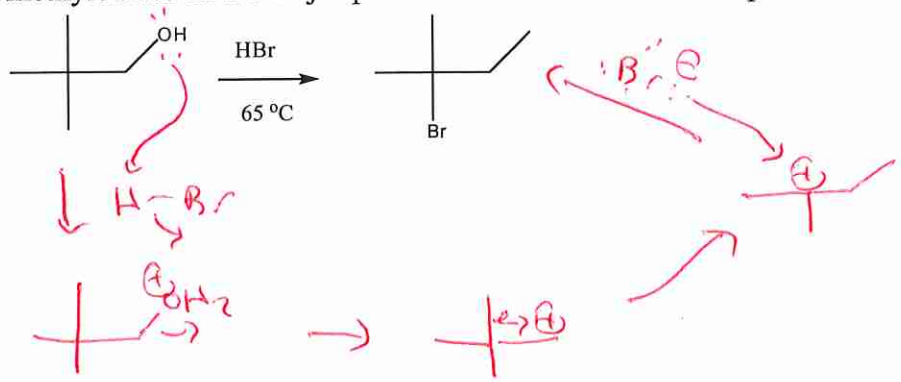
5) Which compound undergoes substitution by the S_N2 mechanism at the fastest rate?



1° halide

forms 1° carbocation

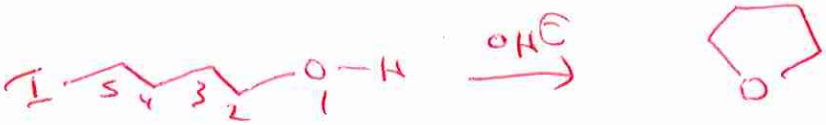
6) The reaction of 2,2-dimethyl-1-propanol with HBr is very slow and gives 2-bromo-2-methylbutane as the major product. Give a mechanistic explanation for these observations.



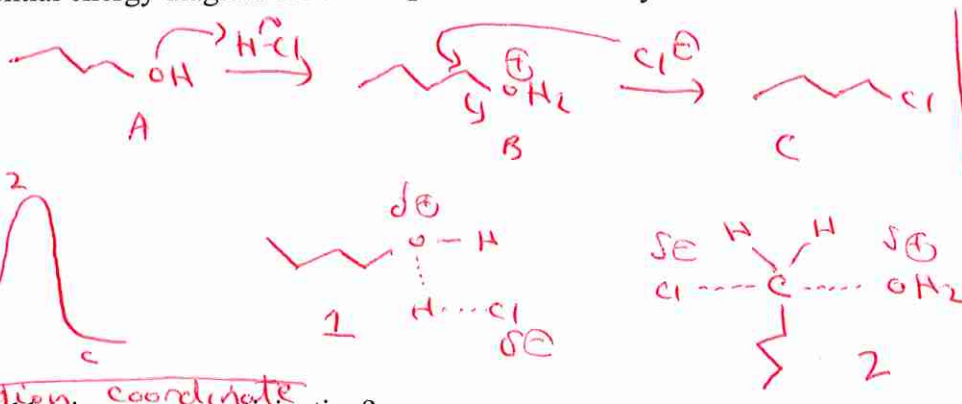
7) What solvent does an SN_2 reaction prefer? Why?

polar aprotic solvent. aprotic solvents do not solvate the nucleophile so the reaction is faster. polar protic solvates the nucleophile.

8) Give an example of an intramolecular SN_2 reaction forming a 5-membered ring.



9) Give the potential energy diagram for the SN_2 reaction of n-butylalcohol with HCl labeling EACH STEP.

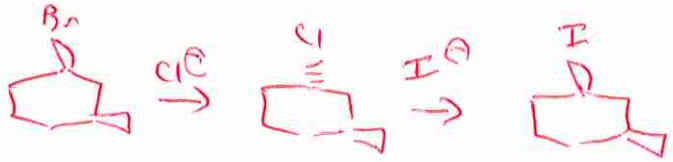


10) What is neighboring group participation?

a group next to the carbon bearing the leaving group that is active in the reaction. see #12 for an example.

11) Your SN_2 reaction has happened with what appears to be retention of configuration. Explain.

an even number of inversions resembles retention.



12) Explain mustard gas's reaction.