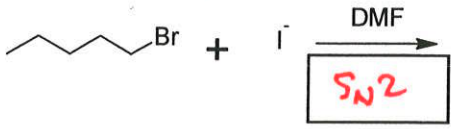
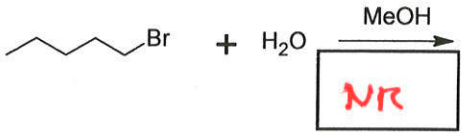
Organic Chemistry 1
Exam 3, Ch 7-8, Fall 2017
Name_____

_____/50 Fong	_____/50 Rugg	_____/100 Total

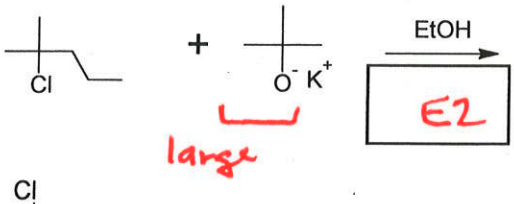
1) Write the likely major mechanism (E1, E2, S_N1 , S_N2 or none) in the box below the arrow and write down the likely final product(s) that could occur for the proposed reactions below: (3 pts each)

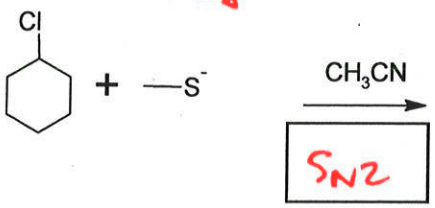
Likely product(s) (if any)

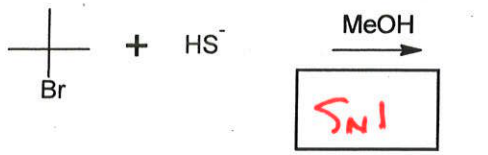
a) 

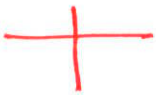
b) 

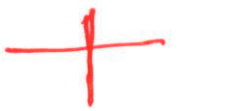
weak nucleophile in poor solvent

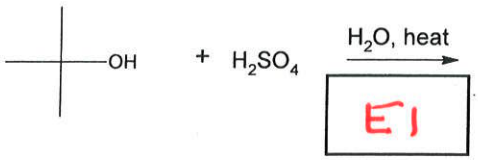
c) 

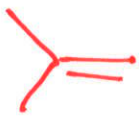
d) 

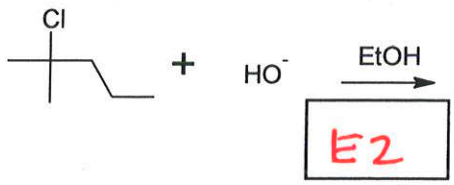
e) 

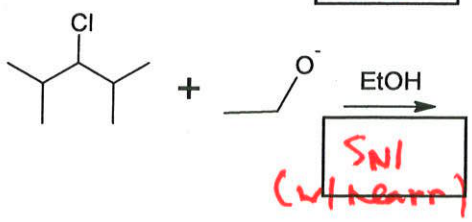


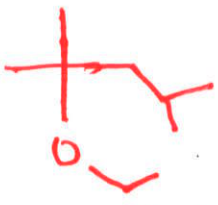


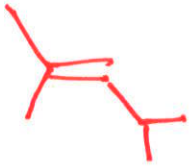
f) 



g) 

h) 





or E2

SN1 major

E2

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2) Order the reactions below in order from fastest to slowest for S_N2 substitution. (3 pts)

E > D > B > C > A

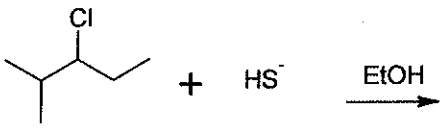
reaction	Substrate	solvent	nucleophile
A	2-fluoro-2-methylpropane	Methanol	Cl^-
B	1-iodopropane	ethanol	methoxide (CH_3O^-)
C	2-iodo-2-methylpropane	Methanol	Cl^-
D	bromoethane	CH_3CN	I^-
E	bromomethane	DMF	I^-

3) Order the reactions below in order from fastest to slowest for S_N1 substitution. (3 pts)

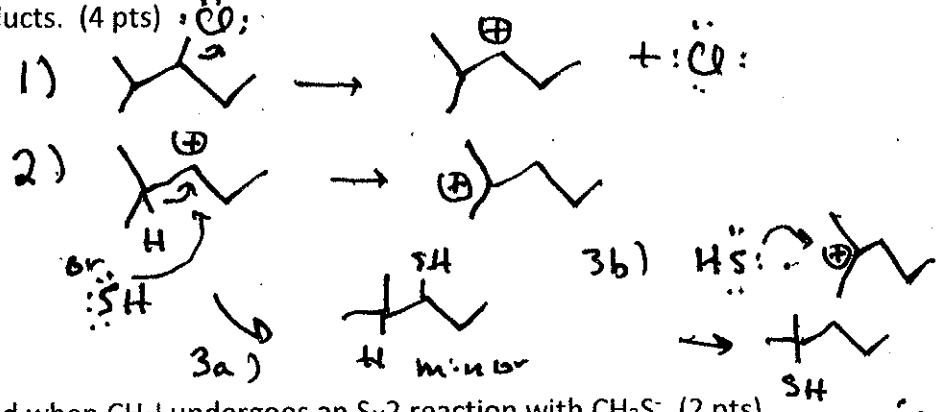
A > C > D > B

Reaction	Substrate	solvent
A	t-butyl-iodide	methanol
B	ethyl iodide	DMF
C	t-butyl-fluoride	methanol
D	2-iodopropane	ethanol

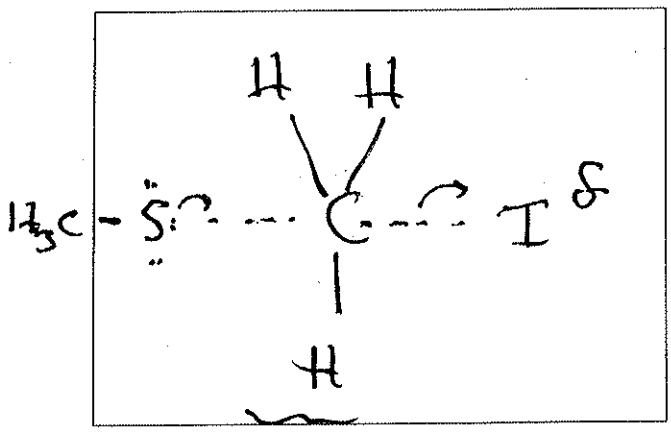
4) Given that the reaction below runs S_N1 , write out the mechanism (curved arrow notation) and indicated major and minor products. (4 pts)



Both solvolysis & HS^- subst. accepted (HS^- mech. shown)



5) Draw the activated complex expected when CH_3I undergoes an S_N2 reaction with CH_3S^-. (2 pts)



~ trigonal plane

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6) Which will run faster? (circle your choice) (4 pts)

a) CH_3I with OH^- in methanol — CH_3I with OH^- in CH_3CN

b) t-butyl chloride with I^- in methanol — t-butyl chloride with I^- in acetone

c) t-butyl fluoride with H_2O — t-butyl fluoride with I^-

d) 1-chloropropane with I^- in acetone — 1-chloro-2,2-dimethylpropane with I^- in acetone

7) Circle the feature that doesn't apply in each line below for S_N2. (3 pts)

a)	inversion occurs	favors 1° and 0° α carbons	features intermediate	likes aprotic polar solvents
b)	best leaving group's source acid has $pK_a<0$	works best with low steric hindrance	has 5-coordinated transition state	rate independent of nucleophile
c)	$I^->Br^->Cl^->F^-$ as Nuc in aprotic polar solvent	favors 1° and 2° β carbons	CH_3CN favored over CH_3OH as solvent	strong base is often a good Nuc^- for S_N2

8) Circle the feature below that doesn't apply in each line below for S_N1. (3 pts)

a)	racemization occurs	runs best with aprotic, polar solvents	rate independent of Nuc–	has intermediate
b)	solvolysis happens if no Nuc–	rate limit is formation of carbocation	favors 3° α carbons	I^- faster than F^- as Nuc^-
c)	rearrangement possible	works best in polar, protic solvents	retention of configuration	best leaving group's source acid's $pK_a<0$

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9) Once upon a time, Joe Chemist was asked by his incessantly cackling and height-challenged professor to run several reactions. The first was a substitution to convert n-butanol to 1-bromobutane. Which of the possible, initial steps makes the most sense? (circle your answer)

a) mixing KOH and ether
b) Adding NaBr to an 80% sulfuric acid solution
c) adding a small sliver of I_2 to the butanol
d) mixing NaBr with with acetone

10) After wiping drool from his professor off his lab coat, Joe got the reagents for the above reaction into a 50 mL round-bottom flask. His next step to make 1-bromobutane is:

a) solvent extracting the mixture after 20 minutes of standing
b) adding sodium carbonate to neutralize the solution
c) refluxing the mixture vigorously for 40 minutes
d) chilling the flask and the adding KOH in ethanol

11) Just as Joe finishes his substitution, the obviously drugged-out gnome of an instructor begins ranting and giggling about carrying out an elimination on 1-bromocylohexane. The initial steps of this synthesis should be:

a) refluxing in ethanol with KOH followed by distillation
b) slow distillation in the presence of concentrated sulfuric acid
c) vigorous refluxing followed by solvent extraction in water
d) adding a sliver of I_2 along with Mg to the 1-bromocyclohexane

12) The final product is a mixture of 1-bromocyclohexane (mp: -57 °C, bp: 166 °C) and cyclohex-1-ene (mp -104 °C, bp 83 °C). Which of the following is NOT a method to determine the purity for these compounds?

a) Refractive index
b) Melting point
c) TLC
d) GC

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