EXAMINATION 2

Arlyn Myers Peter Vollhardt March 30, 1999 Please check the name of your TA and corresponding section number. Complete the remaining information if applicable. 111 Joe Ringgenberg	Peter Vollhardt			Name:				
remaining information if applicable. 111 Joe Ringgenberg 361 Ryan Smith 121 Polly Berseth 371 Kristina Haman 131 Jun Yin 381 Jocelyn Grunwell 141 David Nauman 391 Kathy Winans 151 Jeff Janes 411 David Gray 211 Jennifer Tripp 421 Sara Paisner 221 David Tully 431 Scarlett Goon 311 Jason Robinson 511 Andy Martin 321 Alex Adronov 521 Fabian Fischer 331 Matt Purdy 531 Tony Tang 341 Greg Watkins 541 Marcus Strawn 351 Lily Huang 551 Lei Wang Making up an I Grade (If you are, please indicate the semester during which you took previous Chem 3A previously have received a complete exam. A good piece of advice: read carefully over the questions (at least twice); make sure that you understand exactly what is being asked; avoid sloppy structures or phrases. It is better to be pedantic in accuracy! Good Luck! DO NOT WRITE IN THIS SPACE 1. (15) 11. (60) 111. (40)				[Print first name before second! Use capital letters!]				
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II. (60) III. (40)	DO NOT WRITI	E IN THIS SPACE	1.		(15)			
III. (40)								
					•			
			IV.		(30)			

(30)

(25)

(200)

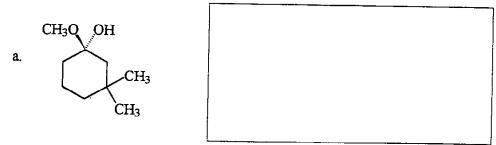
V.

VI.

Total:

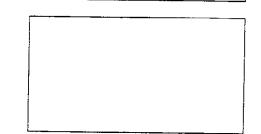
I. [15 Points]

Name or draw, as appropriate, the following molecules according to the IUPAC rules. Indicate stereochemistry where necessary (cis, trans, R, S, or meso).



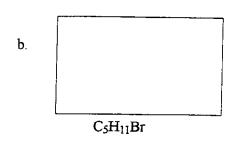
Hint: RO is alkoxy.

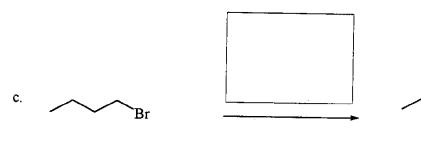
b. (S) -2-(Methylethyl)-1-pentanol

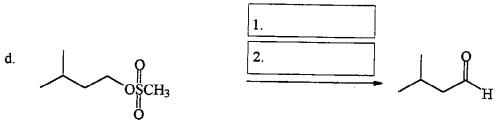


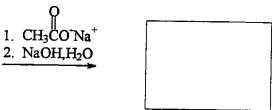
c. H—OH H—OH II. [60 Points]

Add the missing starting materials, reagents, or products (aqueous work up is assumed where necessary). Don't forget stereochemistry! Do not write a mechanism!









 C_3H_4O

III. [40 Points]

Explain the following observations by a detailed **mechanism** (i.e. write a scheme with structures, use arrow-pushing to illustrate the flow of electrons, do **not** add any reagents!).

a.
$$CH_3OH$$
 achiral product

Mechanism:

both racemic

5

b.
$$\frac{Br}{HBr}$$
 $\frac{Br}{CH_3}$ $+$ CH_3

Mechanism:

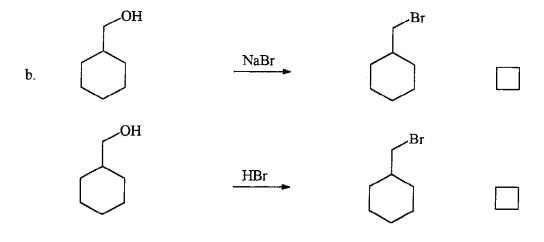
Suggest an explanation for the excess trans product.

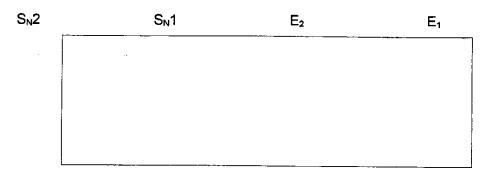
Explanation:	 	 	

IV. [30 Points]

For each pair of reactions shown below, mark the box on the right with an "X" indicating which will go faster and circle the mechanism by which it proceeds (e.g. S_N2 , S_N1 , E_2 , E_1). In one <u>complete</u>, <u>grammatically correct</u> sentence, provide a brief explanation in each case in the bottom box provided (i.e., explain why so-and-so is a better nucleophile, leaving group, solvent, etc.). No credit will be given for the right answer with an incorrect reason.

a.	<u> </u>	Br	NaCN,CH ₃ OH	^	CN	
	<u>~</u>	Br	NaCN,CH ₃ OH →		CN	
	S _N 2		S _N 1	E ₂	E ₁	



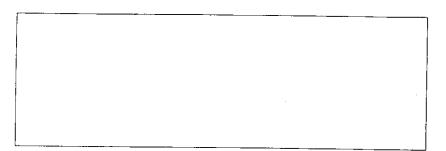


S_N2

S_N1

 E_2

E₁



đ.

CH₃S⁻,CH₃OH





$$\begin{array}{c|c} CH_3 \\ H - CI \\ H_3C - H \\ CH_3 \end{array}$$

CH₃S⁻,CH₃OH

(CH ₃
CH ₃ S—	—н
H ₃ C	—Н
ć	 "H_

S_N2

_	
SN	1
\sim N	•

E₂

E₁

e.	CH ₃ CH ₂ I	NaNH ₂	CH ₃ CH ₂ NH ₂		
	CH₃CH₂I	NaOH	CH ₃ CH ₂ OH		
	S _N 2	S _N 1	E ₂	E ₁	

V. [30 Points]

Provide a viable synthetic route from starting material to product. Use the back of the page(s) for retrosynthetic analyses. Write the answer in the forward direction indicating all necessary reagents. Do **not** show mechanisms (arrows).

a. ---

(as the only organic starting material)

OCH

(mixture of diastereomers)

b.



optically pure

SCH₃

optically pure

VI. [25 Points]

Consider the following transformation:

$$NH_3$$
 $H_3N^{\dagger}F$

a. Provide two ways with which you could distinguish between an S_N2 and an S_N1 mechanism.

1st Method : (specify)		
Expected res	sult for S _N 2 :	
	•	
Expected res	sult for S _N 1 :	
·		

2nd Method : (specify)

Expected result for S_N2 :

Expected result for S_N1:

b. Draw rough potential energy diagrams for both processes.

