Hour Exam #3
Chemistry 343
Professor Gellman
1 December 2010

Last Name _____

First Name _____

00220

General Instructions:

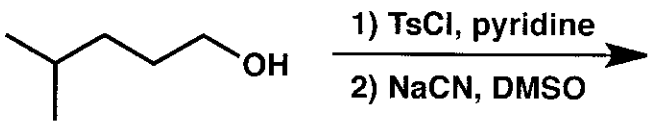
(i) Use scratch paper at back of exam to work out answers; final answers must be recorded at the proper place on the exam itself for credit. Models are allowed.

(ii) Print your name on each page.

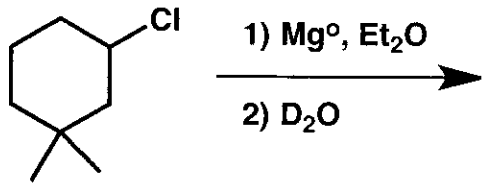
(iii) Please keep your paper covered and your eyes on your own work. Misconduct will lead to failure in the course.

1. (16 points) Show the major product(s) expected from the reactions below.

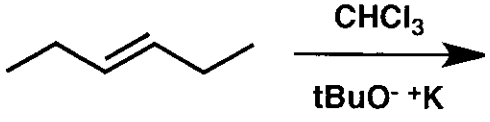
(a)



(b)



(c)



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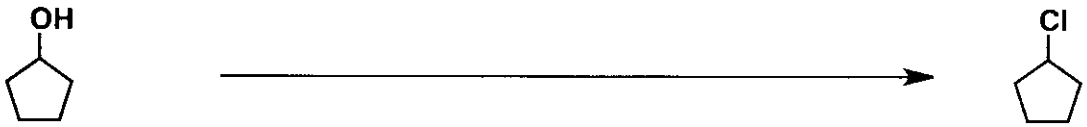
2. (21 points) Show the reagents required to convert the starting molecule to the indicated product. If necessary, be sure to differentiate clearly between distinct steps, by using "1)", "2)", etc. over the arrow.

(a) 

(b) 

(c) 

(d) 

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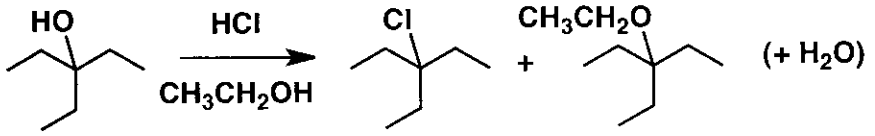
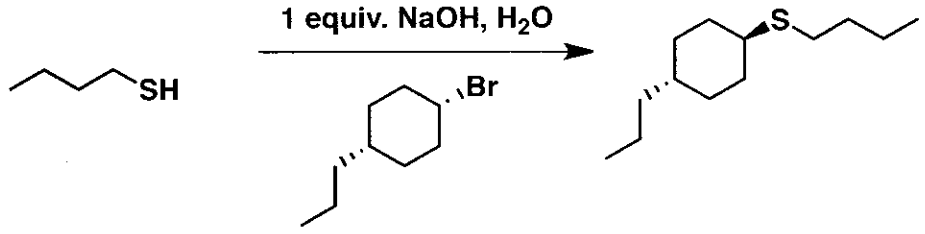
3. (20 points) Provide a mechanism (curved arrows) for each of the reactions shown below.

(a)



[Note: In this case your mechanism should account for formation of both products.]

(b)



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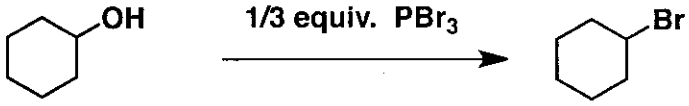
4. (6 points) Using the 'simplified' rules we discussed in class for assigning oxidation states to carbon atoms within molecules, categorize each of the reactions below as "oxidation", "reduction" or "no redox change". These categorizations should be based on the organic starting material and product indicated. (Do not concern yourself with the mechanism of any reaction below, or with other products that might form under the reaction conditions.)

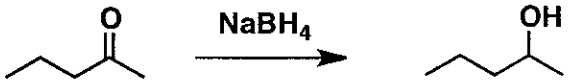
CIRCLE ONE

(a) 

Oxidation

Reduction

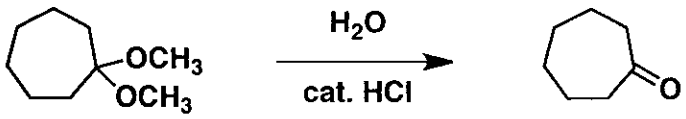
No redox change

(b) 

Oxidation

Reduction

No redox change

(c) 

(+ 2 equiv. CH_3OH)

Oxidation

Reduction

No redox change

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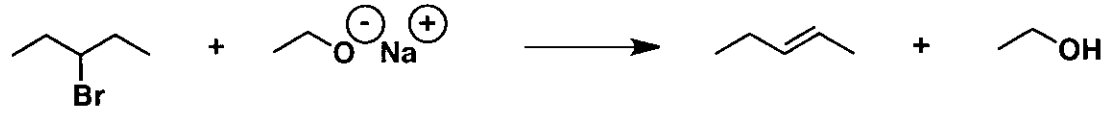
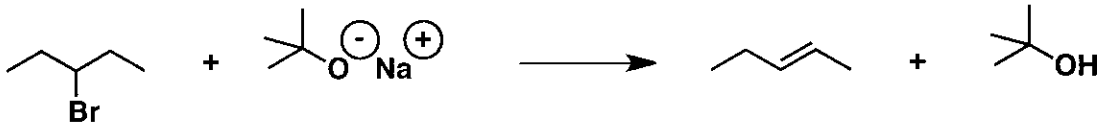
5. (21 points) For each pair of reactions shown below, CIRCLE the one that you would expect to occur MORE RAPIDLY. Briefly explain your reasoning.

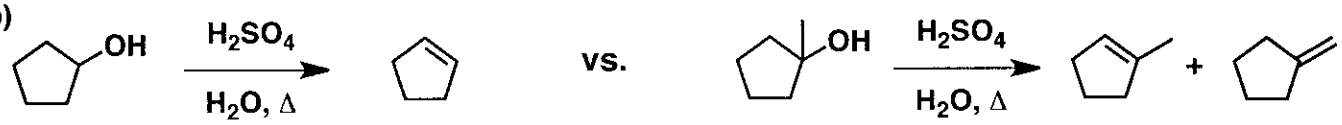
(a)



vs.



(b)

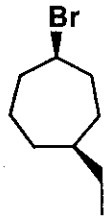


(c)

vs.

6. (16 points) When the compound shown below (a single enantiomer) is heated in methanol, four new products are formed, A, B, C and D. Among these products A and B are isomers, and C and D are isomers. When A or B is treated with H_2 and Pd/C, the same molecule is produced (E). In contrast, when C or D is treated with H_2 and Pd/C, there is no reaction.

In the boxes below, give structures for A-D. Note that you do not have to distiguish between A and B, or between C and D.



(A single enantiomer)

$\xrightarrow[\Delta]{CH_3OH}$ A + B + C + D

A or B $\xrightarrow[Pd/C]{H_2}$ E

C or D $\xrightarrow[Pd/C]{H_2}$ No reaction

Structures of A and B =

Structures of C and D =

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Problem #	Score
1	/ 16
2	/ 21
3	/ 20
4	/ 6
5	/ 21
6	/ 16
Total:	/ 100

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Periodic Table of the Elements

																	2 He 4.003
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.011	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.71	29 Cu 63.55	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc 98.91	44 Ru 101.07	45 Rh 102.91	46 Pd 106.4	47 Ag 107.87	48 Cd 112.40	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.90	54 Xe 131.30
55 Cs 132.91	56 Ba 137.34	57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.97	80 Hg 200.59	81 Tl 204.37	82 Pb 207.19	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.03	89 Ac (227)	104 Unq* (261)	105 Unp* (262)	106 Unh* (263)	107 Uns* (262)	108 Uno* (265)	109 Una* (266)									

Lanthanides	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.35	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
Actinides	90 Th 232.04	91 Pa (231)	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (249)	98 Cf (249)	99 Es (254)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)

*Symbol (and name) provisional.

Numbers in parentheses: available radioactive isotope of longest half-life.