Hour Exam #2 (PM)
Chemistry 343
Professor Gellman
2 November 2011

Last Name _____

First Name _____

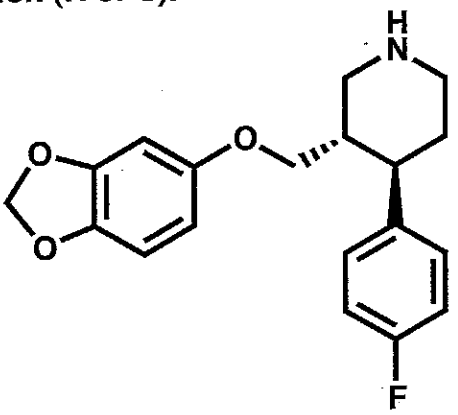
General Instructions:

(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.

(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.

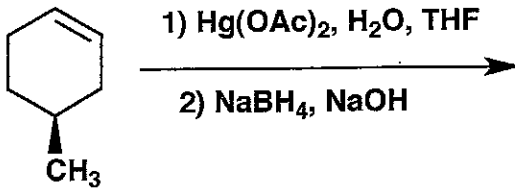
1. (9 points) Shown below is the drug paroxetine, an antidepressant. CIRCLE each sp^3 stereogenic center, and assign the configuration (R or S).



2. (14 points) Draw all achiral (i.e., non-chiral) stereoisomers of difluoro-cyclopentane.

3. (24 points)

(a) Show all expected products from the reaction below. Note that the starting material is a single enantiomer. Draw the products in the "regular hexagon" format (as the starting material is drawn), rather than as chairs.



(*S*) enantiomer only

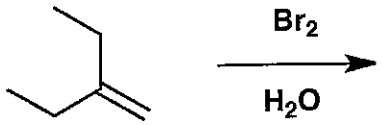
(b) Draw the MOST STABLE chair conformation for each of the products of the reaction above. In choosing the most stable chair, consider the following facts.

-- For methyl-cyclohexane, the conformation with equatorial methyl is 1.8 kcal/mol more stable than the conformation with axial methyl.

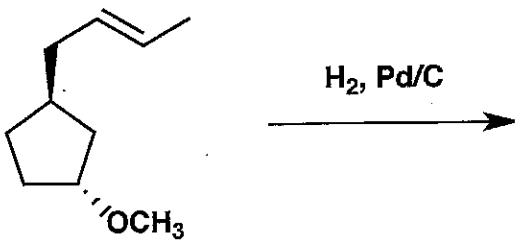
-- For hydroxy-cyclohexane, the conformation with equatorial hydroxyl is 0.9 kcal/mol more stable than the conformation with axial hydroxyl

4. (24 points) Show the major product(s) expected from the reactions below.

(a)

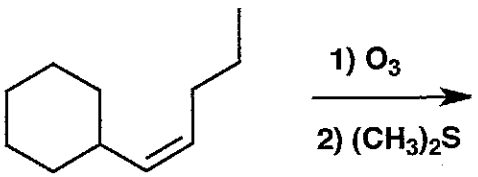


(b)

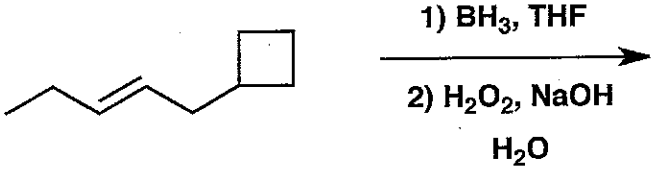


(The starting material is a single enantiomer.)

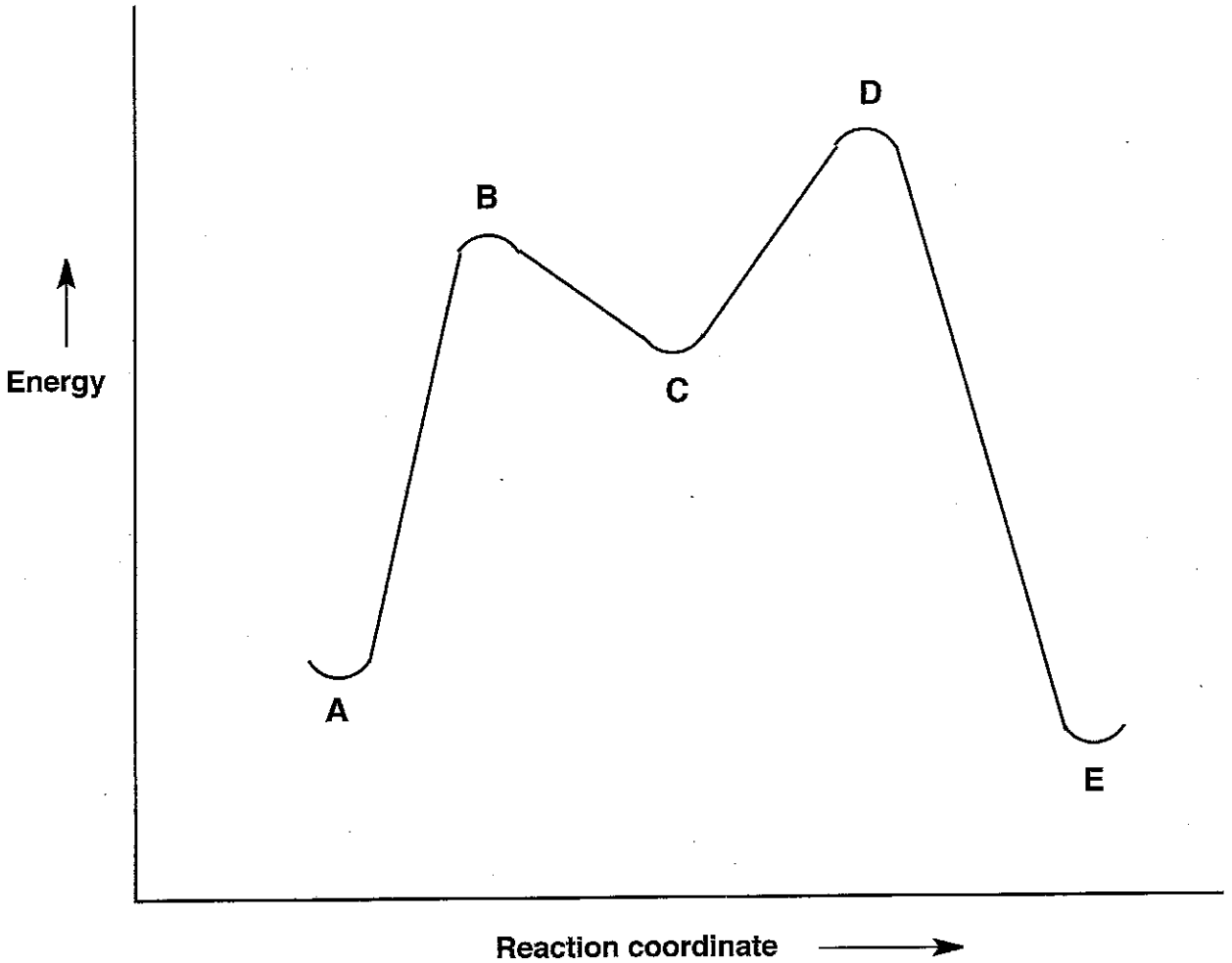
(c)



(d)



5. (12 points) Answer the questions below based on the reaction energy diagram.



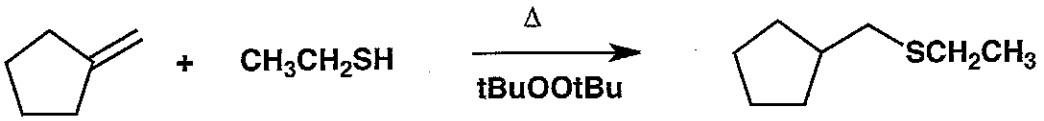
Which species among A-E is the product? ☐

Which species among A-E is the intermediate in the reaction mechanism? ☐

Which species among A-E is the rate-determining transition state? ☐

6. (9 points) Shown below is a reaction between a thiol and an alkene that proceeds via a mechanism that involves radicals. Show the propagation steps for this mechanism.

Overall reaction:



Initiation produces this species: $CH_3CH_2-\ddot{S}\cdot$

Propagation steps:

7. (8 points) Draw a mechanism (curved arrows) for the reaction shown below. Be sure to draw all intermediates.

Name _____ 00252

Problem #	Score
1	/ 9
2	/ 14
3	/ 24
4	/ 24
5	/ 12
6	/ 9
7	/ 8

Total: / 100

A Periodic Table of the Elements

The shaded elements will be encountered most frequently in the text.

Group numbers recommended by the IUPAC are in green.

Older group numbers are in red. (These are used in the text for calculating formal charge for the A-group elements.)

(Atomic weights in parentheses are for the isotope of longest life.)

Period	1 1A	2 2A	Transition elements 3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B	13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
1	1 H 1.00797																	2 He 4.0026
2	3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
3	11 Na 22.9898	12 Mg 24.305											13 Al 26.9815	14 Si 28.085	15 P 30.974	16 S 32.06	17 Cl 35.453	18 Ar 39.948
4	19 K 39.098	20 Ca 40.08	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.61	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.80
5	37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.96	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
6	55 Cs 132.91	56 Ba 137.33	71 Lu 174.97	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
7	87 Fr (223)	88 Ra (226)	103 Lr (262)	104 Rf (267)	105 Db (268)	106 Sg (271)	107 Bh (272)	108 Hs (270)	109 Mt (276)	110 Ds (281)	111 Rg (280)	112 Uub (285)	113 Uut (284)	114 Uuq (289)	115 Uup (288)	116 Uuh (293)	117 Uus	118 Uuo (294)

Lanthanides	57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.06
Actinides	89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)