

Seat No. \_\_\_\_\_

LAST NAME WST

Section A

FIRST NAME \_\_\_\_\_

There are 7 pages to this exam. Check to make sure you have a complete exam.

PLEASE ALSO PRINT YOUR NAME ON THE TOP OF  
THE BACK OF THE LAST PAGE OF THE EXAM

**CHEMISTRY 331**

**EXAM III**

Fall 2006 (10/24/06)

I. (22 points) \_\_\_\_\_

II. (24 points) \_\_\_\_\_

III. ( 8 points) \_\_\_\_\_

IV. (17 points) \_\_\_\_\_

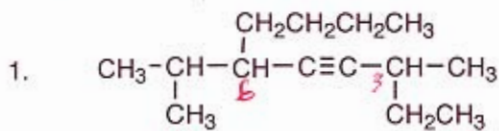
V. (16 points) \_\_\_\_\_

VI. (13 points) \_\_\_\_\_

TOTAL (100 points) \_\_\_\_\_

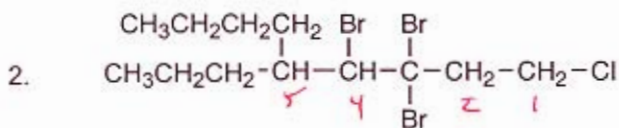
I. (22 pts)

A. (6 pts) Give a correct name for each of the following compounds.



6-isopropyl-3-methyldec-4-yne

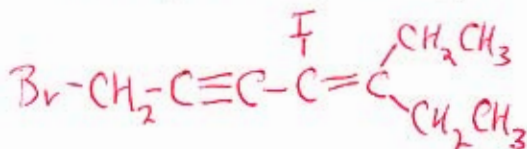
or 4 here



3,3,4-Tribromo-1-chloro-5-propylnonane

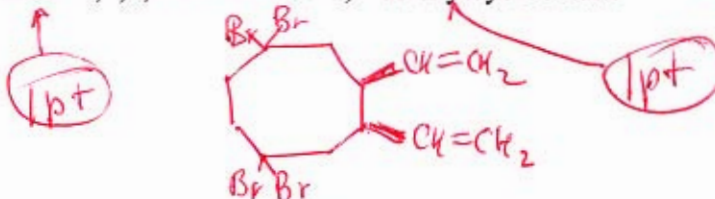
B. (6 pts) Give a correct structure for each of the following names.

1. 1-bromo-5-ethyl-4-iodohept-4-en-2-yne

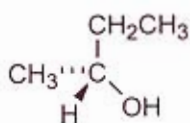


1 pt parent chain  
1 pt substituents  
1 pt substituents in correct position

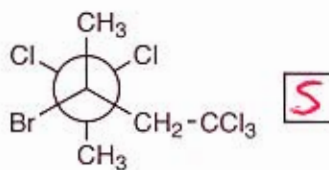
2. meso-1,1,6,6-tetrabromo-3,4-divinylcyclooctane



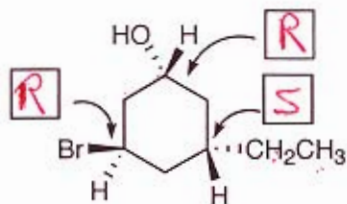
C. (10 pts) Assign R or S to the following stereogenic (chiral) centers.



R



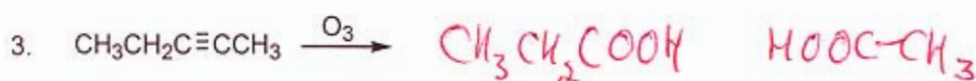
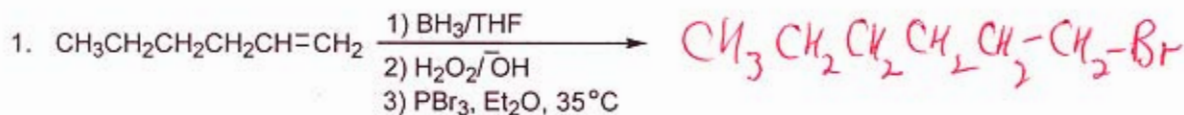
S



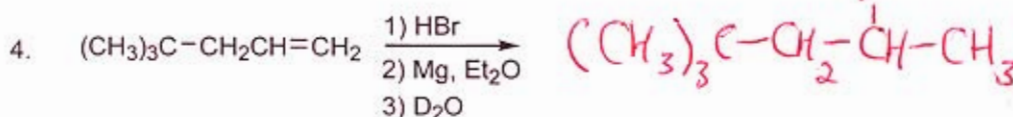
2 pts each

## II. (24 pts)

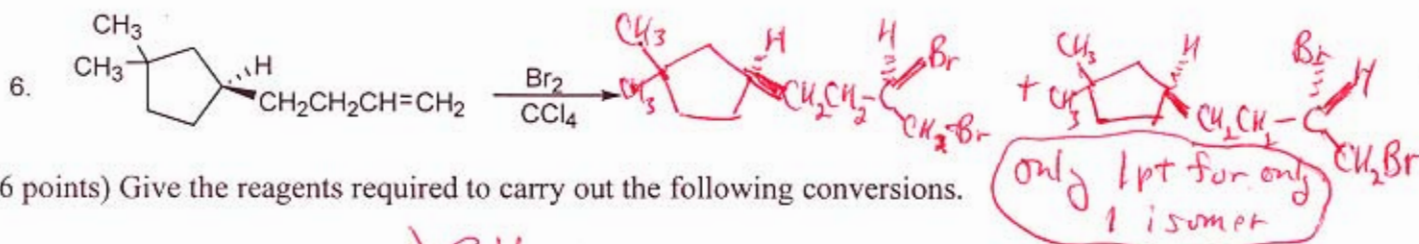
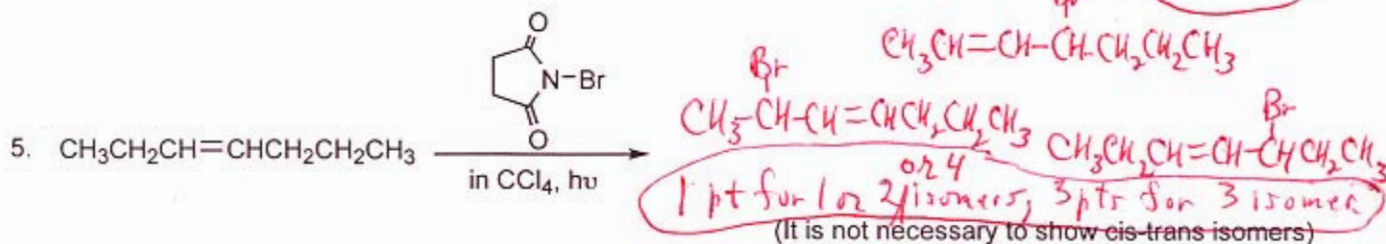
A. (18 points) Complete the following equations giving all organic products. Stereochemistry must be clearly indicated in reactions which are stereoselective.



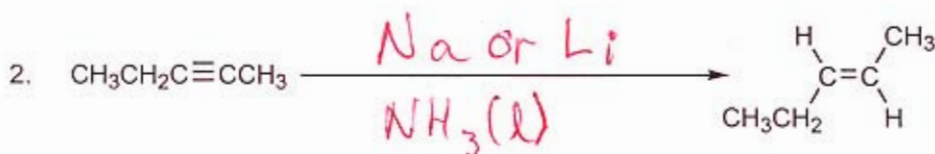
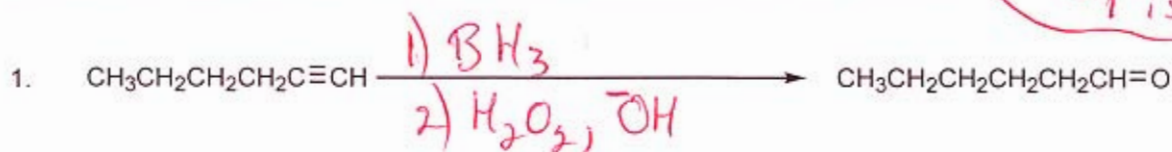
1 pt for only 1 product



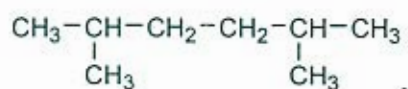
2 pts if D is in the wrong position



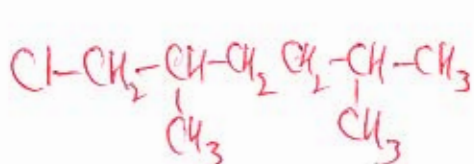
B. (6 points) Give the reagents required to carry out the following conversions.



III. (8 pts) If  $\text{Cl}_2$  is used as the chlorinating agent in the light-induced chlorination of



the relative reactivities (per hydrogen) for  $1^\circ$ ,  $2^\circ$ , and  $3^\circ$  are 1 to 3.5 to 5 at  $25^\circ\text{C}$ . What will the relative proportions of monochloro products (constitutional isomers only) in the reaction mixture be? (Answers may be expressed in fractions). SHOW YOUR WORK. List the reaction products and the fraction of each formed.



$$(12)(1) = 12 \quad 12/36$$

$$12$$

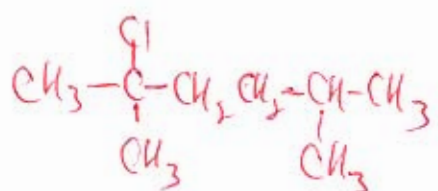
$$10$$

$$14$$

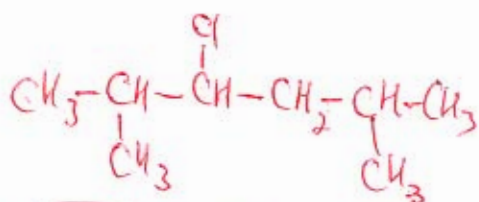
$$36$$

$$\uparrow$$

2 pts



$$(2)(5) = 10 \quad 10/36$$



$$(4)(3.5) = 14 \quad 14/36$$

-1 pt / structure  
-1 pt for duplicate structure.

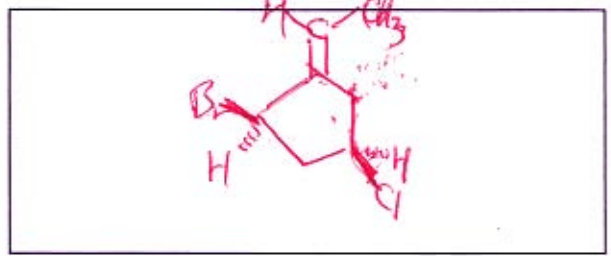
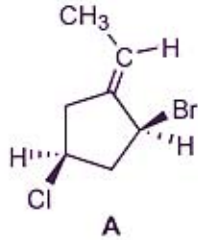
1 pt per structure  
for # of H's x reactivity

Periodic Table of the Elements

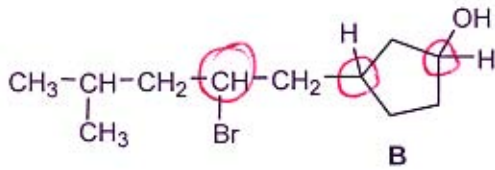
1A 1	2A 2	8B										3A 13	4A 14	5A 15	6A 16	7A 17	8A 18
1 H 1.01	4 Be 9.01											5 B 10.8	6 C 12.0	7 N 14.0	8 O 16.0	9 F 19.0	10 Ne 20.2
11 Na 23.0	12 Mg 24.3	38 3	48 4	58 5	68 6	78 7	8 B	9 9	10 10	18 11	28 12	13 Al 27.0	14 Si 28.1	15 P 31.0	16 S 32.1	17 Cl 35.4	18 Ar 39.9
19 K 39.1	20 Ca 40.1	21 Sc 45.0	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.8	27 Co 58.9	28 Ni 58.7	29 Cu 63.5	30 Zn 65.4	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8
37 Rb 85.5	38 Sr 87.6	39 Y 88.9	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc (98)	44 Ru 101	45 Rh 103	46 Pd 106	47 Ag 108	48 Cd 112	49 In 115	50 Sn 119	51 Sb 122	52 Te 128	53 I 127	54 Xe 131
55 Cs 133	56 Ba 137	57 La 139	58 Ce 140.9	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0	72 Hf 178.5
87 Fr (223)	88 Ra 226	89 Ac 227	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (264)	108 Hs (265)	109 Mt (266)	110 Ds (271)	111 Rg (272)	112 Cn (285)	113 Nh (286)	114 Fl (289)	115 Mc (290)	116 Lv (293)	117 Ts (294)	118 Og (294)

IV. (17 pts) Complete the following.

A. In the box provided, draw the enantiomer of A.

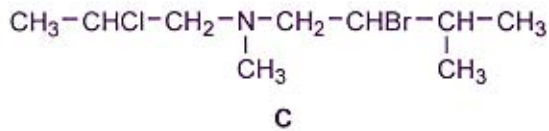


B. Circle the stereogenic (chiral) centers of B.

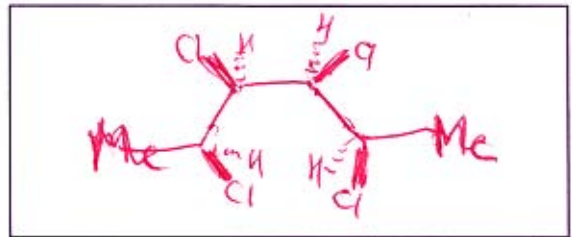
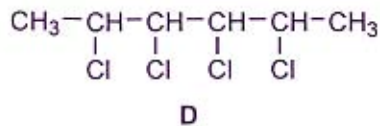


C. (2 pts) How many stereoisomers have the constitution of structure B? 2<sup>3</sup> = 8

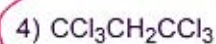
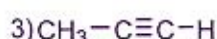
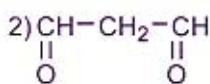
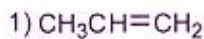
D. The maximum number of stereoisomers (stable at room temperature) for compound C is 2<sup>2</sup> = 4.



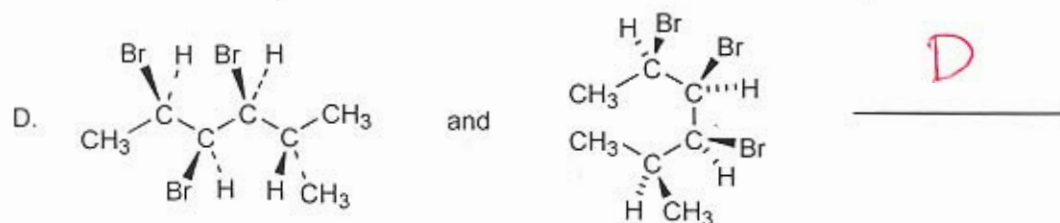
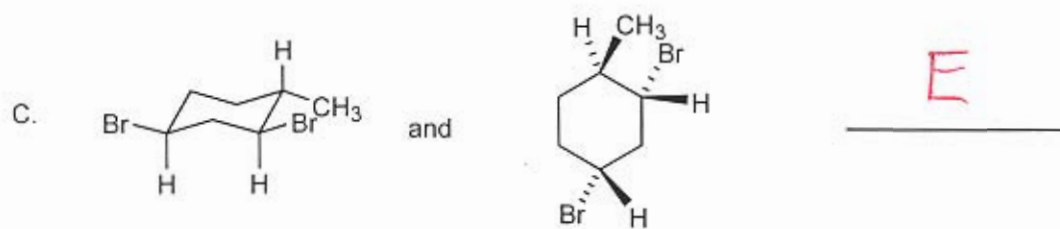
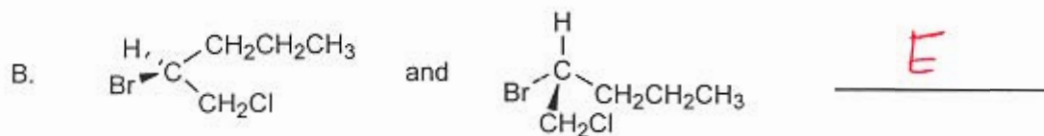
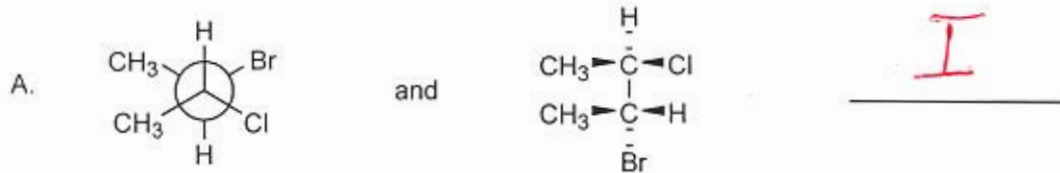
E. In the box provided, draw a meso stereoisomer that has the constitution of structure D.



F. Which compound has the highest oxidation level?

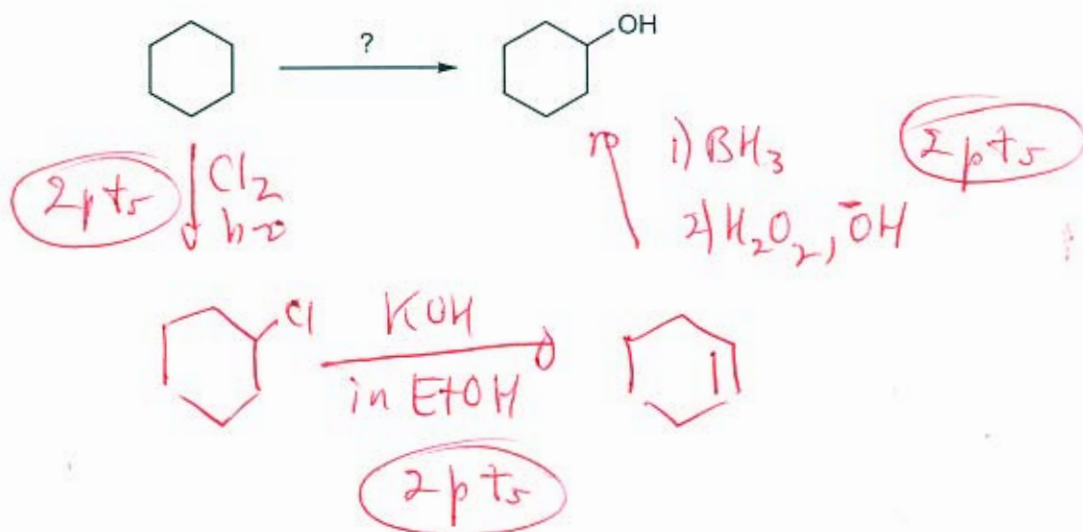


V. (16 pts) Label each pair of structures as I (identical), E (enantiomers), D (diastereomers) or C (constitutional isomers – not stereoisomers).



- VI. (13 pts) Beginning with the starting material indicated, show how to achieve each of the following syntheses by showing all the reactions that are needed. (For each reaction, give the starting material, conditions over the arrow, and the products). You may use any inorganic compound or organic compound with one or two carbons.

A. (6 pts)



B. (7 pts)

