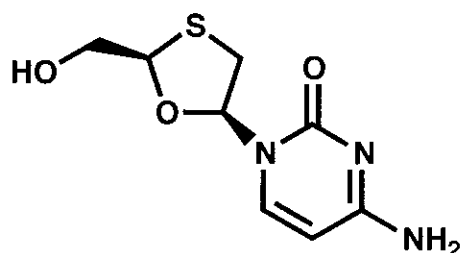


General Instructions:

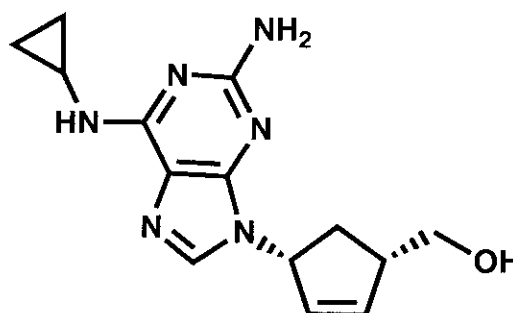
- (i) Use scratch paper at back of exam to work out answers; final answers must be recorded at the proper place on the exam itself for credit.
- (ii) Print your name on each page.
- (iii) Please keep your paper covered and your eyes on your own work. Misconduct will lead to failure in the course.

1. (15 points) Shown below are three drugs used to treat HIV infection. Each molecule inhibits the viral enzyme reverse transcriptase.

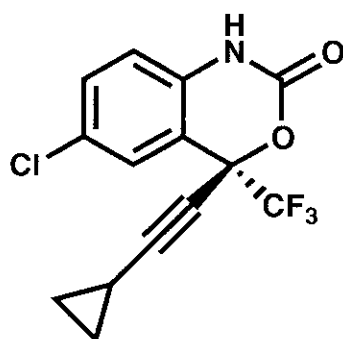
For each molecule, CIRCLE each asymmetric carbon, and assign the configuration (R or S).



Lamivudine



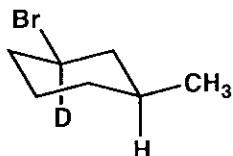
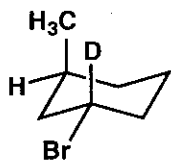
Abacavir

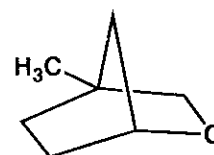
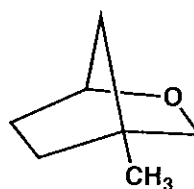


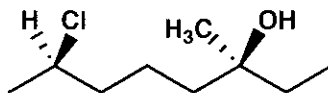
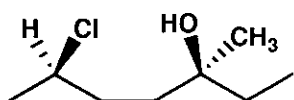
Efavirenz

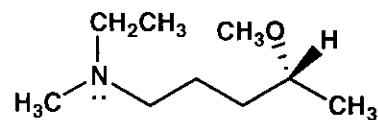
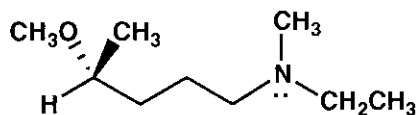
2. (16 points) For each pair of structures below, indicate (on the line below the pair) the relationship between the molecules (at room temperature), choosing from the following possibilities.

Identical
Enantiomer
Diastereomer
Constitutional isomer
Non-isomeric

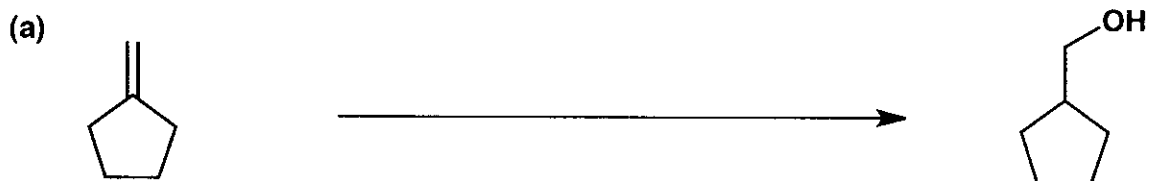








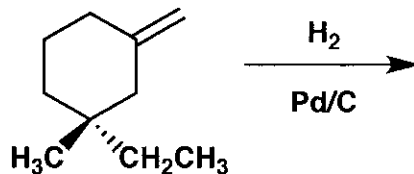
3. (17 points) Show the reagents required to convert the starting molecule to the indicated product. If necessary, be sure to differentiate clearly between distinct steps, by using "1)", "2)", etc. over the arrow.



4. (12 points) Draw three meso molecules with the formula $C_7H_{14}Br_2$.

5. (24 points)

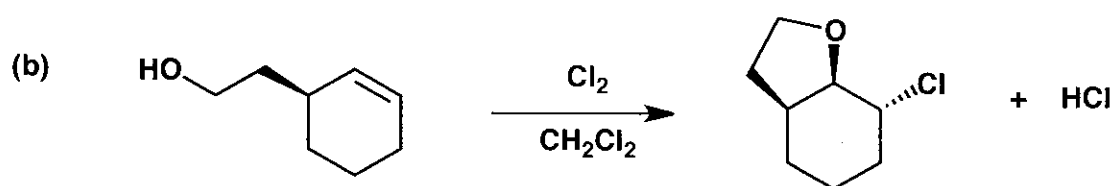
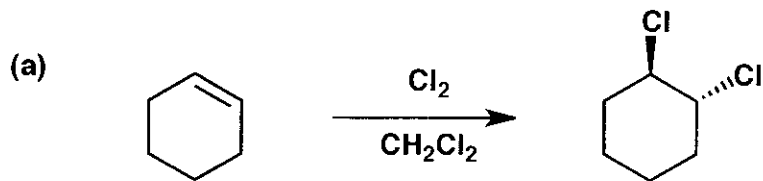
(a) Draw all products expected from the reaction below in "flat" mode (i.e., analogous to the way the starting material is drawn).



(The starting material is a single enantiomer.)

(b) For each product you drew above, draw all chair conformations. For each molecule, CIRCLE the most stable chair conformation.

6. (16 points) Draw a mechanism (curved arrows) for each reaction shown below. Be sure to draw all intermediates.



<u>Problem #</u>	<u>Score</u>
1	/ 15
2	/ 16
3	/ 17
4	/ 12
5	/ 24
6	/ 16

Total: / 100

Periodic Table of the Elements

		¹ H 1.008																		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.