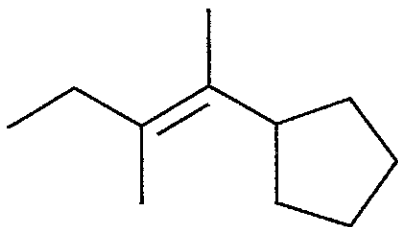


General Instructions:

- (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.

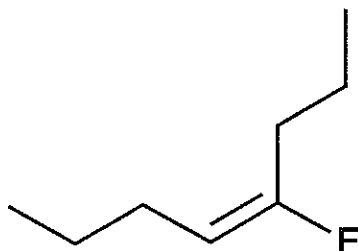
1. (9 points) For each alkene below, circle the proper stereoisomer designation.

(a)



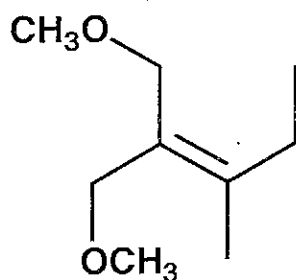
E Z Neither

(b)



E Z Neither

(c)



E Z Neither

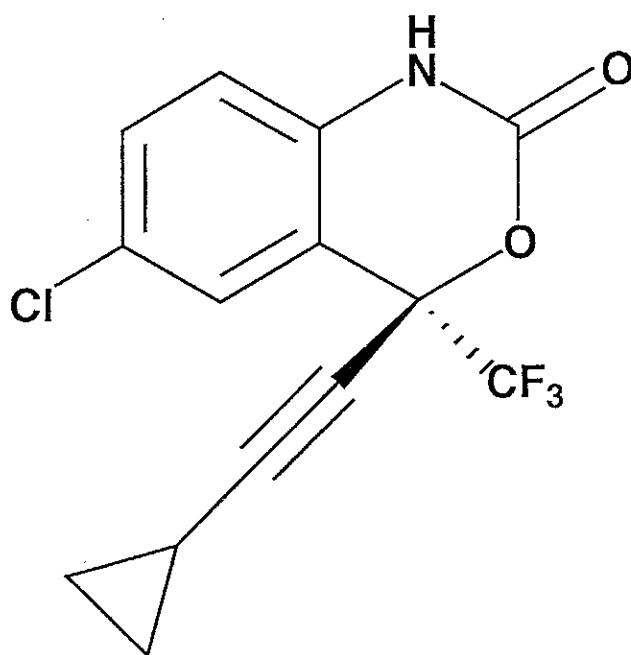
Name _____

2. (8 points) The molecule below, efavirenz, is a drug used for treatment of AIDS.

Put a CIRCLE around each sp^3 -hybridized carbon atom.

Put a TRIANGLE around each sp -hybridized carbon atom.

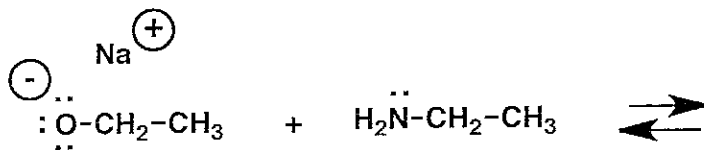
Put a SQUARE around each sp^2 -hybridized carbon atom that is not bonded to another carbon.



Name _____

3. (20 points)

(a) Draw in the other side of the Brønsted acid-base equilibrium involving the two species shown below.



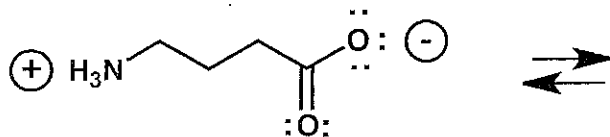
(b) Draw the two bases from the equilibrium above in the space below, and CIRCLE the one that is stronger.

(c) Which side of the the equation in part (a) is favored (circle the correct word below)?

LEFT

RIGHT

(d) Draw in the other side of the Brønsted acid-base equilibrium involving the single species below.

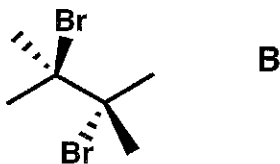


4. (22 points)

(a) Draw all three staggered Newman projections about the central bond of molecule A, which is shown below.



(b) Draw all three staggered Newman projections about the central bond of molecule B, which is shown below.



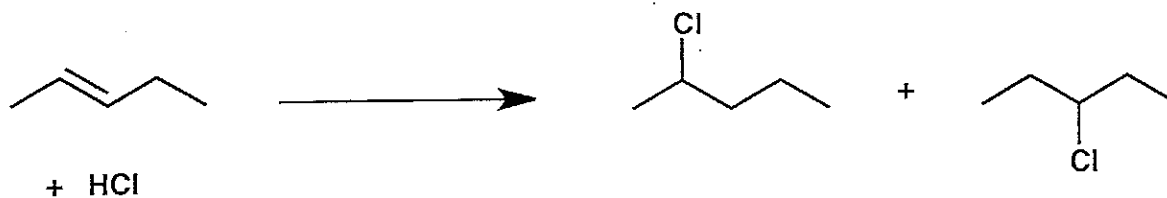
(c) The heats of formation for isomers A and B are negative, but the value for A is slightly more negative than the value for B (i.e., the absolute value of the heat of formation of A is larger than the absolute value of the heat of formation of B).

A bromine atom is nearly the same size as a methyl group.

Based on this information and the answers to parts (a) and (b), explain in one sentence why the heat of formation is more negative for A than for B.

Name _____

5. (16 points) The reaction shown below starts with a single alkene, but two products are produced in comparable quantities. Provide a mechanism ("curved arrows") for this reaction. Show every atom in each structure you draw.



<u>Problem #</u>	<u>Score</u>
1	/ 9
2	/ 8
3	/ 20
4	/ 22
5	/ 16
6	/ 25

Total: / 100

Periodic Table of the Elements

<div style="border: 1px solid black; padding: 5px; display: inline-block;"> ¹H 1.008 </div>																		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> ²He 4.003 </div>					
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 Uuh* (263)	¹⁰⁷ Uns* (262)	¹⁰⁸ Uno* (265)	¹⁰⁹ Uua* (266)															

Lanthanides

Actinides

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
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.