

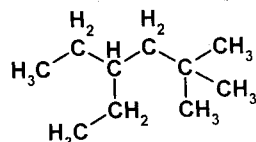
NAME _____ ID# _____

LAB SECTION – enter day/time/TA _____

Note: **Please answer on the test paper.** There is an extra sheet for rough work at the back, but it will not be marked. Tests written in pencil will be marked, but cannot be returned for remarking. For the 'promised' size ranking, see the intro to 4a.

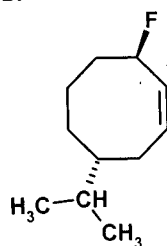
1. Give correct IUPAC names for the following compounds. Include stereochemical descriptors where relevant. (4 marks each, total 20 marks)

a



4-ETHYL-2,2-DIMETHYLHEXANE

b.

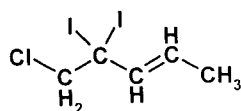


trans 3-FLUORO-7-ISOPROPYLCYCLOOCTENE

or

trans 3-FLUORO-7-METHYLETHYLCYCLOOCTENE

c.



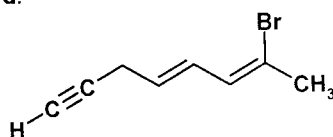
trans or

(E)- 5-CHLORO-4,4-DIODO-2-PENTENE

or

5-CHLORO-4,4-DIODO-PENT-2-ENE

d.



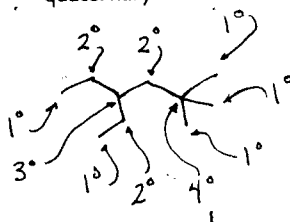
trans, trans or

(4E,6Z)- 7-BROMOOCTA-4,6-DIEN-1-YNE

or

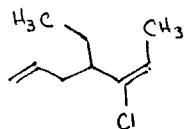
7-BROMO-4,6-OCTADIEN-1-YNE

- e. Indicate for the structure in 1a which carbon atoms are primary, secondary, tertiary and quaternary.

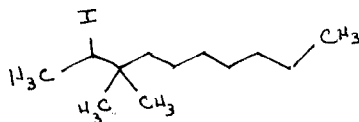


2. Draw structures which correspond to the following given names. Drawings showing only carbons and other non-hydrogen atoms are acceptable. Please include the appropriate stereochemical aspects of the structure where it is needed. (4 marks each, total 12)

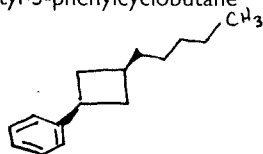
a. (5E)-5-chloro-4-ethyl-1,5-heptadiene



b. 2-iodo-3,3-dimethyldecane

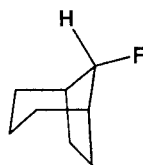
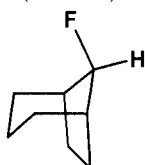


c. cis-1-pentyl-3-phenylcyclobutane



3. (Total 17 marks) For each of the (a-d) below, assign the appropriate terminology (structural isomers, geometric (cis/trans) isomers, different conformations of the same molecule, identical) to the following.

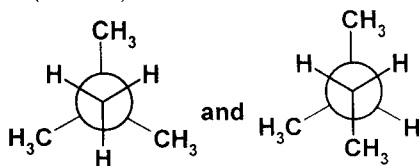
a. (2 marks)



I'll ACCEPT GEOMETRIC OR CIS/TRANS ISOMERS

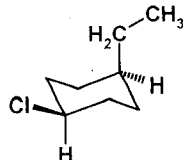
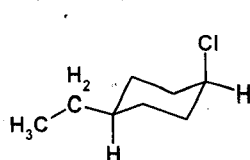
'DIASTEREOMERS' IS THE BEST TERM

b. (2 marks)



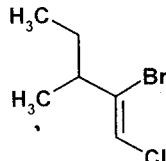
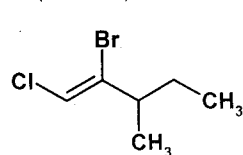
STRUCTURAL ISOMERS

c. (2 marks)



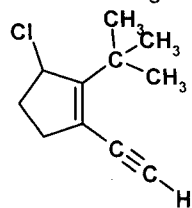
DIFFERENT CONFORMATIONS

d. (2 marks)



IDENTICAL

e. Assign the Z- or E- stereochemical descriptor to the following systematically. Show your work. Do not give the complete name of the compound (5 marks).



TOP C LEFT C vs C RIGHT C THE ON THAT C.....

WINS (Cl)C,H vs C,C,C.

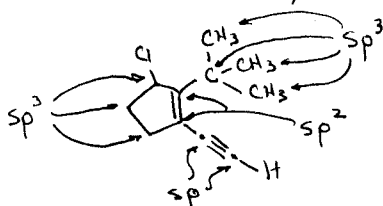
∴ LEFT IS HIGHEST PRIORITY

LEFT RIGHT
BOTTOM C vs C
(THE)
ON THOSE C'S
C,H,H vs C(C)C
WINS
∴ RIGHT IS HIGHEST PRIORITY

HIGHEST PRIORITY GROUPS ARE ON OPPOSITE SIDES

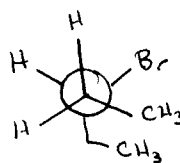
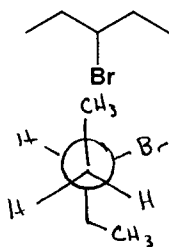
∴ (E)-

f. Indicate the hybridization of each carbon atom in the above structure (in e). (4 marks)



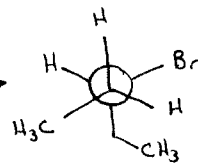
4 (Total 12 marks)

a. Draw the possible Newman projections of all the possible staggered conformations of the following compound, viewed down the C2-C3 bond. Rank them in terms highest to lowest stability. (In terms of size, $C(CH_3)_3 > CH(CH_3)_2 > CH_2CH(CH_3)_2 \approx CH_2CH_3 > CH_3 > NH_2 > OH > F, Cl, Br, I > H$) (9 marks)



WORST OF THESE

(2 SYNCLINAL INTERACTIONS)



MIDDLE CASE

1 SYNCLINAL INTERACTION
- IT'S BIGGEST GROUP ON C-2 W THE BIGGEST GROUP ON C-3

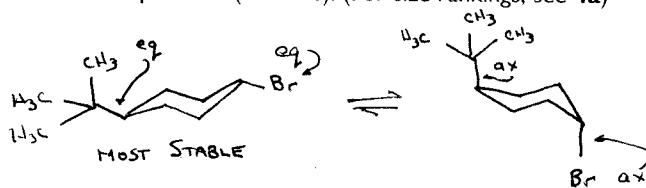
BEST
1 SYNCLINAL INTERACTION,
BUT IT'S BIGGEST GROUP ON C-2 W 2ND BIGGEST GROUP ON C-3

SYNCLINAL

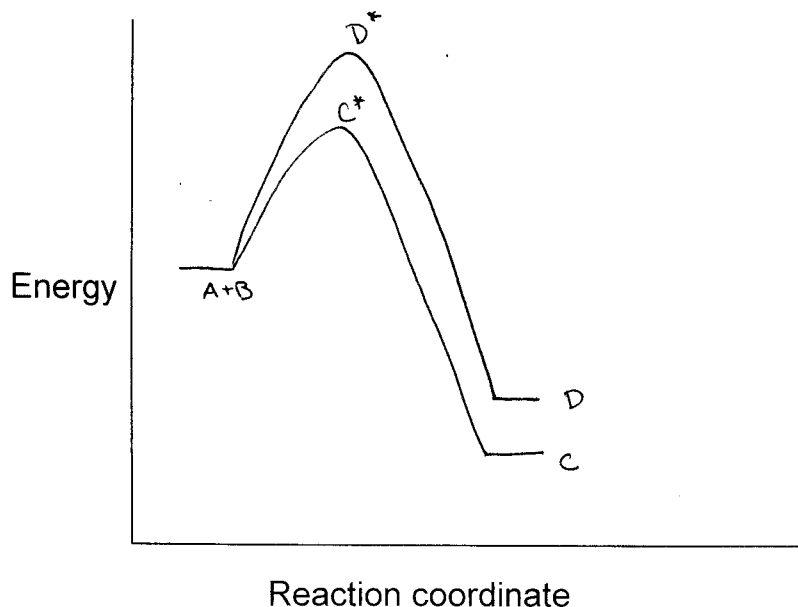
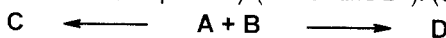
SYNCLINAL

ANTIPERIPLANAR

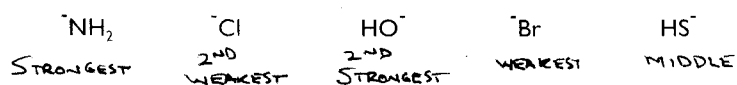
a. Draw the two possible chair structures of *trans* 1-bromo-4-(1,1-dimethylethyl)cyclohexane. Indicate which is the most stable conformation and label the (non-hydrogen) substituents as axial or equatorial. (9 marks). (For size rankings, see 4a)



b. Draw a reaction profile (energy versus reaction coordinate) for the following situation. The one step reaction of A and B can give either compound C or compound D. When the reaction is conducted at -78°C for 1 minute (lets consider these minimum conditions), there is 90% C and 10% D produced. When the reaction is conducted at 57°C for 1 day (let's call these forcing conditions), there is 92% C and 8% D produced. Label A, B, C, and D, and the transition states in the reaction to C and D, respectively (use C^* and D^*). (6 marks)



c. Rank the following from strongest to weakest conjugate base (4 marks).



Bonus. (Up to 4 additional marks) Propose a reasonable candidate for a substituted cyclohexane where the largest substituent(s) prefer(s) to be axial.

ADAMANTANE IS AN EXCELLENT EXAMPLE

