

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. (10 points) Draw a structure that corresponds to each of the following names. Show all atoms in each structure, including hydrogen atoms.

(a) *E*-3-methyl-3-octene

(b) 1-bromo-3-fluorocyclohexene

Name _____

2. (16 points) $\text{H}_2\text{C}=\text{CFCF}_3$ is a relatively new refrigerant that has a smaller greenhouse effect (i.e., lower global warming effect) than currently popular refrigerants such as CHFCl_2 . Answer the following questions.

(a) Provide a drawing of $\text{H}_2\text{C}=\text{CFCF}_3$ that indicates the three-dimensional structure.

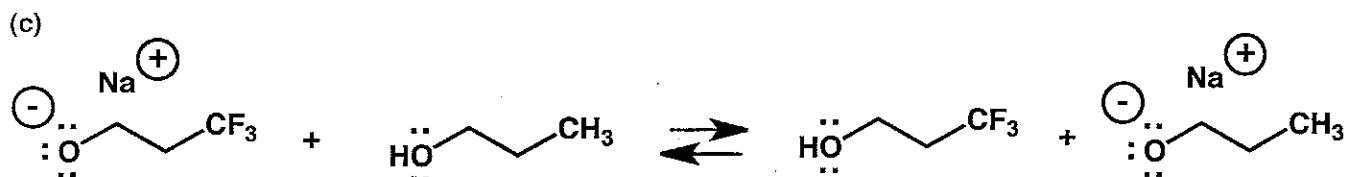
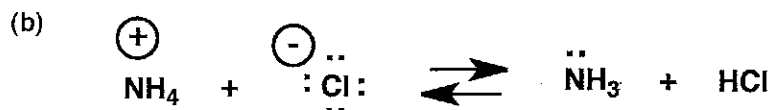
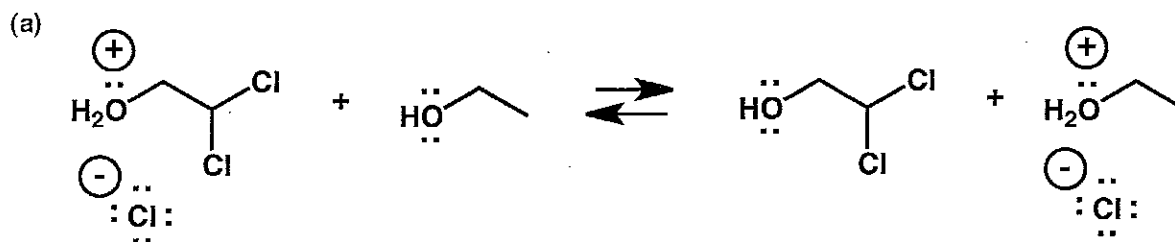
(b) Indicate the H-C-H bond angle (approximation) in the box.



(c) Provide an energy diagram that shows how the relevant atomic orbitals combine to form the molecular orbitals of the C-F bond involving the central carbon, and where the bonding electrons are expected to reside. Assume that F is sp^3 hybridized.

Name _____

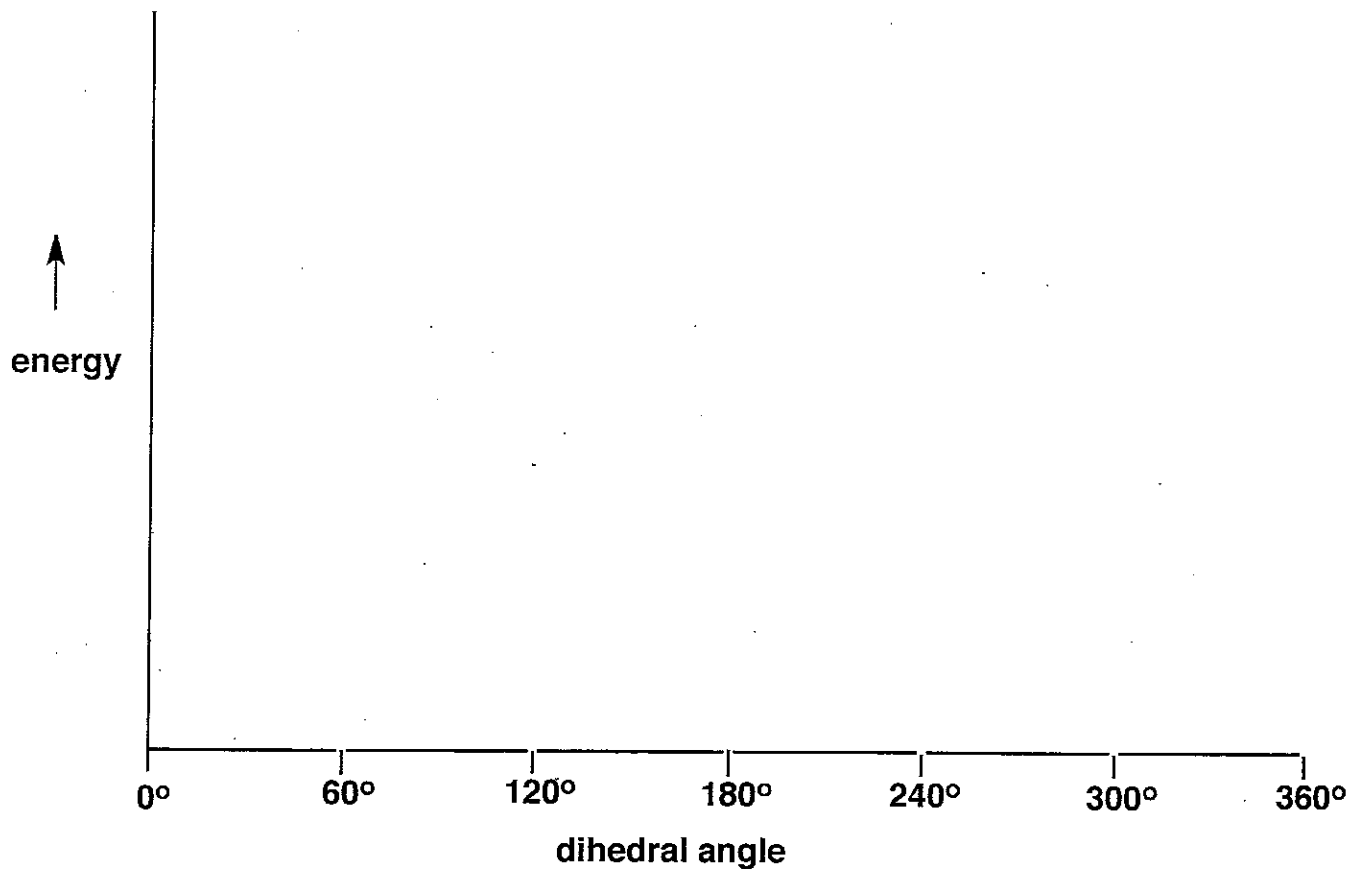
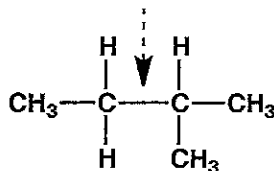
3. (12 points) For each equilibrium shown below, do two things:

(i) Put a **SQUARE** around the **WEAKER ACID**, of the two species that are serving as acids in the equilibrium.(ii) Put a **CIRCLE** around the **SIDE** of the equilibrium that you expect to be **LESS FAVORED**.

4. (25 points)

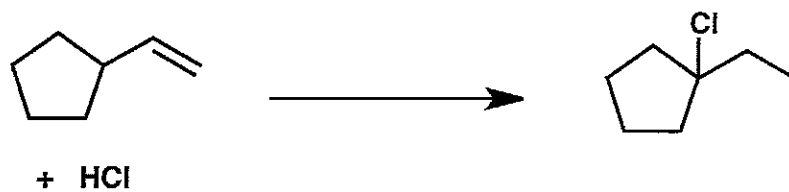
Draw an energy diagram for rotation about the indicated carbon-carbon bond (dotted arrow) of the molecule below. Show the structure for each energy minimum and each energy maximum.

CIRCLE the most stable structure(s).



Name _____

5. (12 points) Provide a mechanism ("curved arrows") for the reaction shown below. Show every atom in each structure you draw.



Name _____

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6. (25 points)

A molecule with the formula $C_6H_{10}F_2$ does not undergo any reaction when combined with H_2 in the presence of the catalyst Pd/C . Propose FIVE possible structures for this molecule (via appropriate drawings).

<u>Problem #</u>	<u>Score</u>
1	/ 10
2	/ 16
3	/ 12
4	/ 25
5	/ 12
6	/ 25

Total: / 100

