Hour Exam #1 (AM)
Chemistry 343
Professor Gellman
8 October 2012

Last Name _____

First Name _____

00029

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) $H_2C{=}CFCF_3$ 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 $H_2C{=}CFCF_3$ 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 sp3 hybridized.

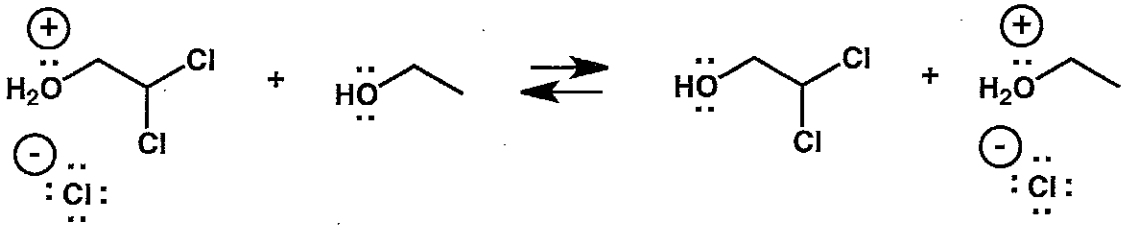
Name _____

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

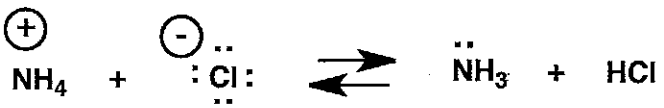
(i) Put a SQUARE around the WEAKER ACID, of the two species that are serving as acids in the equlibrium.

(ii) Put a CIRCLE around the SIDE of the equilibrium that you expect to be LESS FAVORED.

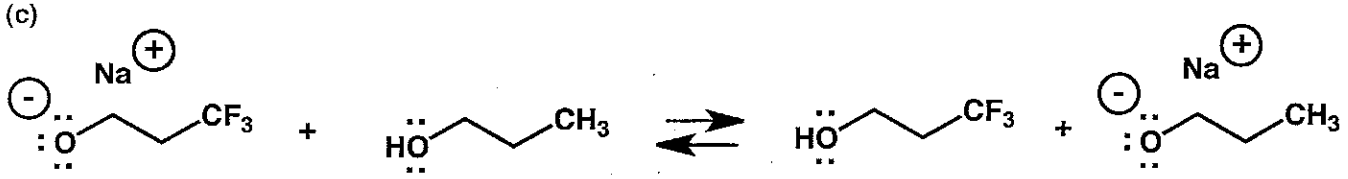
(a)



(b)



(c)

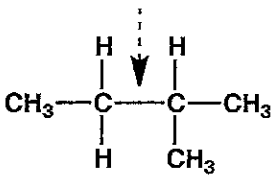


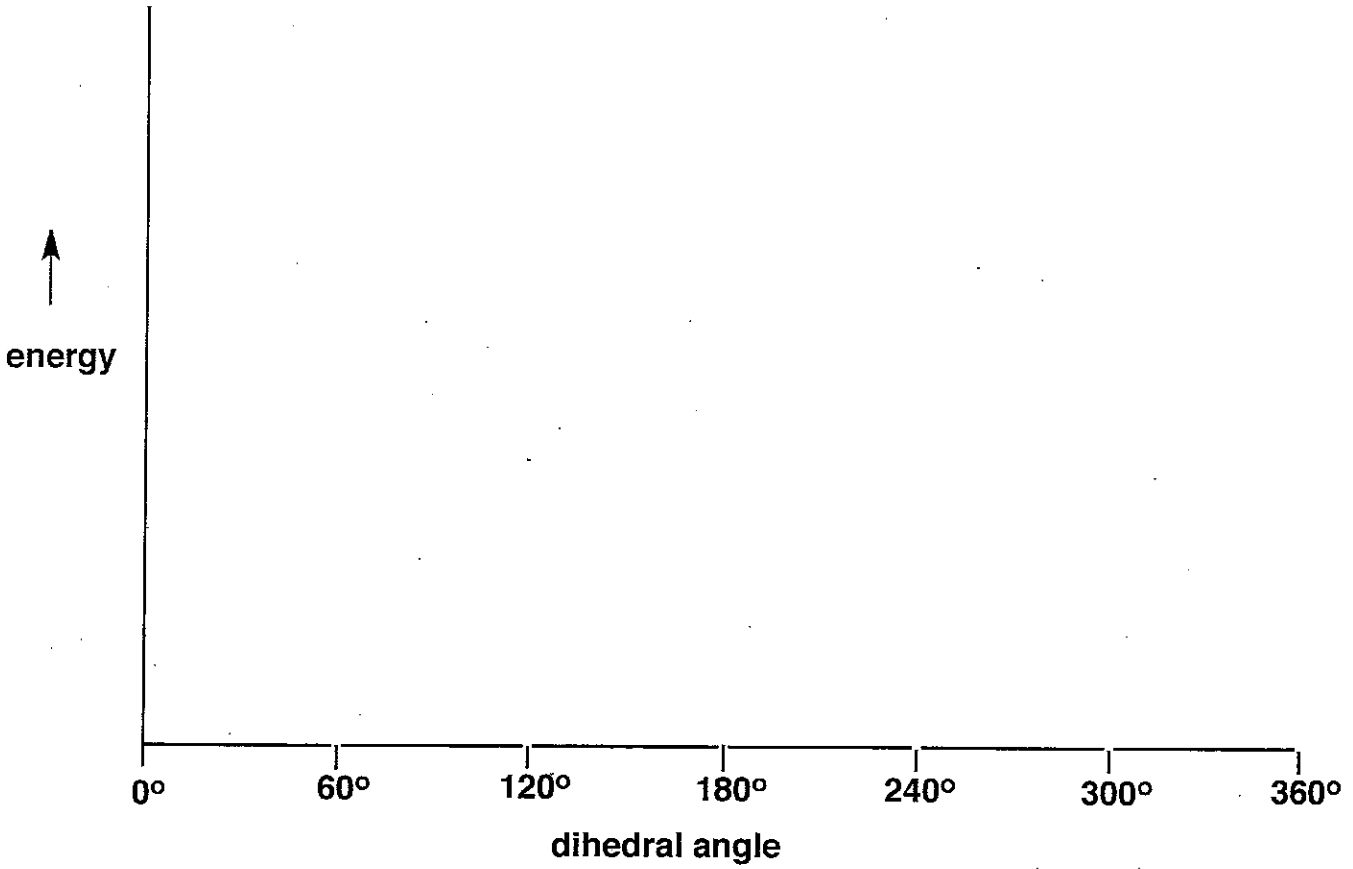
Name _____ 00029

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.

+ HCl

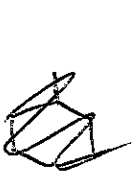
Name _____

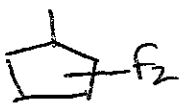
6. (25 points)

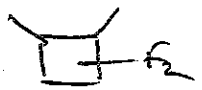
A molecule with the formula $C_6H_{10}F_2$ does not undergo any reaction when combined with H_2 in the presence of the catalyst Pd/C. Propose FIVE possible structures for this molecule (via appropriate drawings).

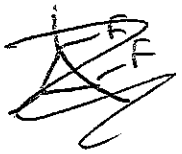
$C_6H_{10}F_2$

1 unsaturation = (ring









Name _____ 00029

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

Total: / 100

Periodic Table of the Elements

																	2 He 4.003
												5 B 10.81	6 C 12.011	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
1 H 1.008												13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
3 Li 6.94	4 Be 9.01																
11 Na 22.99	12 Mg 24.31																
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.

00029