Hour Exam #1 (PM)
Chemistry 343
Professor Gellman
5 October 2011

Last Name _____

First Name _____

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

(a) 3,3-difluoro-octane

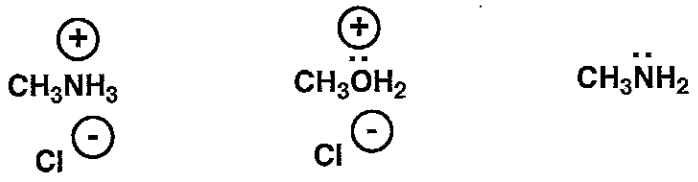
(b) 4-methyl-cycloheptene

(c) *E*-3-methyl-2-hexene

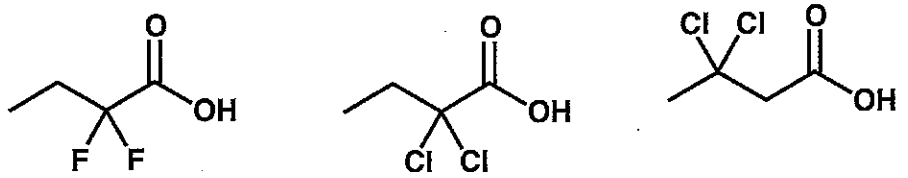
Name _____

2. (14 points) For each set of three structures shown below, redraw them in the order of DECREASING pK_a, left to right. (Note: Positive charges are balanced by a chloride counterion.)

(a)



(b)



3. (7 points) Consider the alkane indicated below.

$(CH_3)_3CCH_2CH_2CH_2CH(CH_3)CH_2CH_2CH(CH_2CH_3)_2$

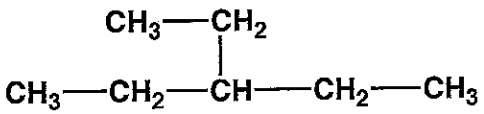
(a) Redraw the molecule so that ALL atoms are indicated by the appropriate atomic symbol (e.g, C for carbon), AND all bonds are shown as lines.

(b) Provide a SKELETAL drawing for this molecule (lines only).

4. (20 points)

(a) Propane has two carbon-carbon bonds, but these bonds are equivalent in terms of their local environments (i.e., the bonding partners of the pair of carbons). Thus, one can say that propane contains only one TYPE of carbon-carbon bond.

Shown below is 3-ethyl-pentane. How many different TYPES of carbon-carbon bond are found in this molecule?

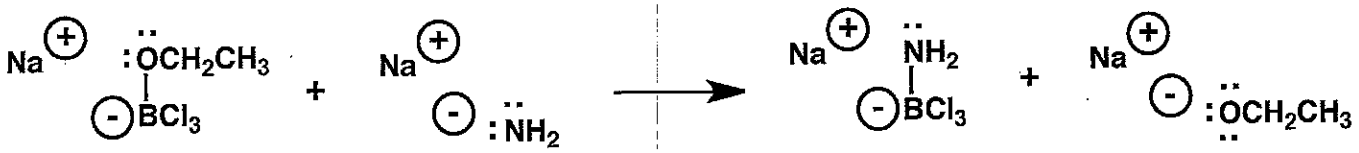


Number of TYPES of C-C bond = _____

(b) Draw Newman projections for all staggered conformations about the bond between carbon-2 and carbon-3 bond of 3-ethyl-pentane. CIRCLE the conformation(s) that you expect to be most stable.

Name _____

5. (14 points) Consider the reaction below, which involve Lewis acids and bases and their complexes.



(a) Propose a mechanism (curved arrows) in which the reaction shown above occurs in a single step (no intermediates). [Note: Do not be confused by the sodium (Na) counterions, which are just 'bystanders' in this process.]

(b) Propose a mechanism (curved arrows) in which the reaction shown above occurs in two steps. [Note: Do not be confused by the sodium (Na) counterions, which are just 'bystanders' in this process.]

Name _____

6. (30 points)

(a) Identify (with appropriate drawings) TWO hydrocarbon molecules corresponding to the formula C_6H_{12} that would be expected to produce only ONE product upon reaction with HBr.

(b) Identify (with appropriate drawings) TWO hydrocarbon molecules corresponding to the formula C_6H_{12} that would be expected to produce TWO products upon reaction with HBr.

(c) Identify (with appropriate drawings) TWO hydrocarbon molecules corresponding to the formula C_6H_{12} that would NOT be expected to react with HBr.

Name _____ 00170

Problem #	Score
1	/ 15
2	/ 14
3	/ 7
4	/ 20
5	/ 14
6	/ 30

Total: / 100

A Periodic Table of the Elements

The shaded elements will be encountered most frequently in the text.

Group numbers recommended by the IUPAC are in green.

Older group numbers are in red. (These are used in the text for calculating formal charge for the A-group elements.)

(Atomic weights in parentheses are for the isotope of longest life.)

Period	1 1A	2 2A	Transition elements										13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
			3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B						2 He 4.0026
1	1 H 1.00797																	
2	3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
3	11 Na 22.9898	12 Mg 24.305											13 Al 26.9815	14 Si 28.085	15 P 30.974	16 S 32.06	17 Cl 35.453	18 Ar 39.948
4	19 K 39.098	20 Ca 40.08	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.61	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.80
5	37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.96	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
6	55 Cs 132.91	56 Ba 137.33	71 Lu 174.97	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
7	87 Fr (223)	88 Ra (226)	103 Lr (262)	104 Rf (267)	105 Db (268)	106 Sg (271)	107 Bh (272)	108 Hs (270)	109 Mt (276)	110 Ds (281)	111 Rg (280)	112 Uub (285)	113 Uut (284)	114 Uuq (289)	115 Uup (288)	116 Uuh (293)	117 Uus	118 Uuo (294)

Lanthanides	57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.06
Actinides	89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)