CHEM 100 **Name**_____
Quiz 4 **Summer 2011**

1. In a beaker, you mix 35.0 mL of 0.100 M H_2SO_4 and 30.0 mL of 0.200 M NaOH
   a. Write the balanced reaction that you would expect to occur. (2 points)

   $H_2SO_4 + 2\ NaOH \rightarrow Na_2SO_4 + 2H_2O$

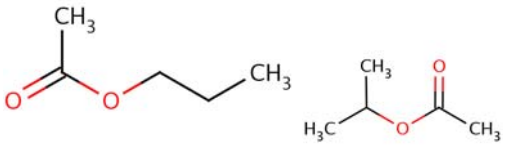
   b. What is the pH of the solution that results after the reaction in part a is complete? ~~You may assume a solution volume of 100.0 mL~~ (6 points)

   We start with:

   0.035L x 0.100 mol H_2SO_4/L x 2 mol H^+/1mol H_2SO_4 = 0.0070 mol H^+ and
   0.030L x 0.200 mol NaOH/L x 1 mol OH^-/1mol NaOH = 0.0060 mol OH^-

   After reaction, there will be 1.0 x 10^{-3} mol H^+ left over. This H^+ is in 65 mL of solution for a concentration of 1/0x10^{-3} mol/0.065L = 0.0154 M H^+.
   Therefore, pH is –log[0.0154M] = 1.81

2. Draw organic compounds that fit the following criteria (there may be more than one structure that fits the criteria, you only need to draw one):
   a. A compound that contains an ester and has the formula $C_5H_{10}O_2$. (4 points)



   Here's an example of possible structures:

   b. A compound that contains and amine and an ether and has the formula $C_4H_{11}NO$. (4 points)

   Here's an example of one possible structure:

3. How do plasticizers and cross-linking lead to modified properties of a polymer? (8 points)

   Plasticizers are small molecules that help allow polymer chains to move more freely relative to one another by serving as a type of "lubricant". As the plasticizers evaporate, the plastic will become more rigid.

   Cross-linking covalently bonds polymer chains to one another, producing less-flexible, more rigid structures.

Possibly Useful Information

$pH = -\log[H^+]$	$[H^+][OH^-] = 1.0 \times 10^{-14}$

PERIODIC CHART OF THE ELEMENTS

IA	IIA	IIIB	IVB	VB	VIB	VIIB	VIII		IB	IIB	IIIA	IVA	VA	VIA	VIIA	INERT GASES
1 H 1.00797															1 H 1.00797	2 He 4.0026
3 Li 6.939	4 Be 9.0122										5 B 10.811	6 C 12.0112	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.183
11 Na 22.9898	12 Mg 24.312										13 Al 26.9815	14 Si 28.086	15 P 30.9738	16 S 32.064	17 Cl 35.453	18 Ar 39.948
19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.909	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc (99)	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.904	54 Xe 131.30
55 Cs 132.905	56 Ba 137.34	*57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59	81 Tl 204.37	82 Pb 207.19	83 Bi 208.980	84 Po (210)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	‡89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 ? (271)	111 ? (272)	112 ? (277)						

Numbers in parenthesis are mass numbers of most stable or most common isotope.

Atomic weights corrected to conform to the 1963 values of the Commission on Atomic Weights.

The group designations used here are the former Chemical Abstract Service numbers.

*Lanthanide Series

58 Ce 140.12	59 Pr 140.907	60 Nd 144.24	61 Pm (147)	62 Sm 150.35	63 Eu 151.96	64 Gd 157.25	65 Tb 158.924	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.97

‡Actinide Series

90 Th 232.038	91 Pa (231)	92 U 238.03	93 Np (237)	94 Pu (242)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (249)	99 Es (254)	100 Fm (253)	101 Md (256)	102 No (256)	103 Lr (257)