*Chem 1515*
Problem Set #12
Fall 2001

Name_____

TA Name _____

Lab Section #_____

ALL work must be shown to receive full credit. **Due 5:00 pm on Tuesday, November 6, 2001.**

PS12.1. Calculate the pH of a 0.200 M $H_3PO_4$. Calculate the $[PO_4^{3-}]$ in the solution.

PS12.2. Predict the products of the following neutralization reactions.

a) $HCl_{(aq)} + NaOH_{(aq)} \rightarrow$

b) $HNO_{3(aq)} + Ba(OH)_{2(aq)} \rightarrow$

c) $NaOH_{(aq)} + H_2CO_{3(aq)} \rightarrow$

d) $NH_{3(aq)} + H_2SO_{4(aq)} \rightarrow$

e) $HC_6H_5O_{(aq)} + NaOH_{(aq)} \rightarrow$

f) $HCN_{(aq)} + KOH_{(aq)} \rightarrow$

PS12.3. Given a solution containing the following ions (neglect the counter–ion for the moment), write a reaction (with water) and indicate whether the ion acts as an acid or as a base.

a) $F^-_{(aq)}$

b) $ClO_2^-{}_{(aq)}$

c) $NO_2^-{}_{(aq)}$

d) $NH_4^+{}_{(aq)}$

e) $CH_3NH_3^+{}_{(aq)}$

f) $C_2H_5NH_3^+{}_{(aq)}$

PS12.4. Can you make any generalizations about the acid-base character of the ions in Problem #12.3? If so, state them.

PS12.5. Indicate an acid and a base which could react, in a neutralization reaction, to form each of the following salts. In some cases water will be present as another product.

a) $NaC_6H_7O_{6(aq)}$

b) $KClO_{(aq)}$

c) $(CH_3)_2NH_2NO_{3(aq)}$

d) $NH_4Br_{(aq)}$

e) $KCl_{(aq)}$

f) $(NH_4)_2SO_{4(aq)}$

PS12.6. If each salt in Problem 12.5 is added to water, indicate whether the resulting solution is acidic, basic or neutral.

PS12.7. Calculate the pH of the following salt solutions

a) 0.243 M $NaC_6H_7O_6$

b) 0.319 M $C_5H_5NHClO_4$

c) 0.890 M KCl

d) 0.572 M $KC_3H_5O_2$

e) 1.00 M $NaHSO_4$

PS12.8. In the series of oxyacids, XOH, OXOH, and $O_2XOH$, list the acids in order of increasing acid strength. Justify your answer.