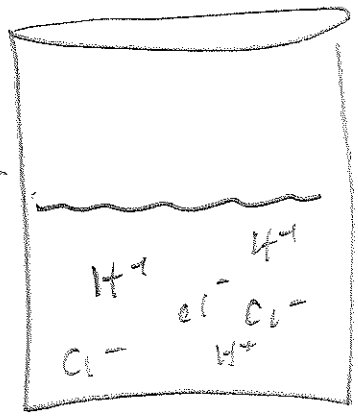
What happens if I mix acids and bases? (#8-6)
Weak Acids and Stoichiometry
Kb for NH_3 = 1.75E-5

A Beaker Contains 25mL of HCl. Draw a picture/model of this solution.

A beaker contains 25 ml of .5M NH_3.

a) Write the Hydrolysis reaction for this base?

$HCl + H_2O \rightarrow H_3O^+ + Cl^-$



b) What is the pH of this base?

$1.75E-5 = \frac{x^2}{.5}$ $x = 0.93$ $-\log(\quad) = 0.31$ pH

c) .25M HCl is added to the base. Write the neutralization reaction.

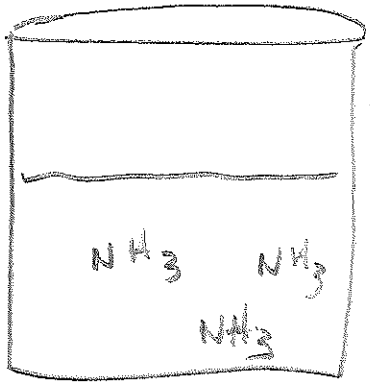
$HCl + NH_3 \rightarrow NH_4Cl$

d) How many moles of HCl will be needed to convert half of the NH_3 to NH_4^+.

$0.5 = \frac{x}{.025} = 0.0125/2 = 0.00625$ mol

e) How many mL of HCl are needed at this point?

$M = \frac{mol}{L}$ 25 mL ½ as conc, only need to neutralize ½.



f) What will be the pH at this point?

$-\log(1.75E-5) = 4.75$

g) How many moles & mL of HCl will be needed to reach the equivalency point?

50 / 0.0125 mol

h) Will this solution be acidic/basic or neutral at this point? How do you know?

acidic, only NH_4^+ present ← acidic conjugate of NH_3

i) What is the hydrolysis reaction for NH_4^+?

$NH_4^+ + H_2O \rightarrow NH_3 + H_3O^+$

j) What is the value of K for NH_4^+?

$\frac{1.0E-14}{1.75E-5} = 5.7E-10$

K) Calculate the pH of the NH_4^+ solution.

$[NH_4^+] = \frac{.0125}{.075\text{ mL}} = 0.166$

0.5 + 50

$5.7E-10 = \frac{x^2}{.166}$

$x = 9.79E-6$ M

$-\log(\quad) = 5.01$