Ch. 17 Suggested problems:

6, 9, 12, 14, 18, 21, 30, 31, 34, 38, 46, 49, 53, 63, 8

Anions of strong acids → neutral

Anions of weak acids → basic

Cations of weak bases → acidic

Metals (transition metals) → acidic

Metals (Group I + II) → neutral

CHEM 1220 Summer 2007 Quiz 4 Name_____

1) What is the pH of a solution of 0.05 M sodium hydroxide?

$NaOH \rightarrow Na^+ + OH^-$

$[OH^-] = .05$ $pOH = -\log .05$

$pH = 14 - pOH$

2) Calculate the base equilibrium constant (K_b) for carbonate (CO_3^{2-}). Carbonic acid (H_2CO_3) has $K_{a1}=4.3\times10^{-7}$ and $K_{a2}=5.6\times10^{-11}$.

$H_2O + H_2CO_3 \rightleftharpoons HCO_3^- + OH^- \quad H^+ \; K_{a1}$

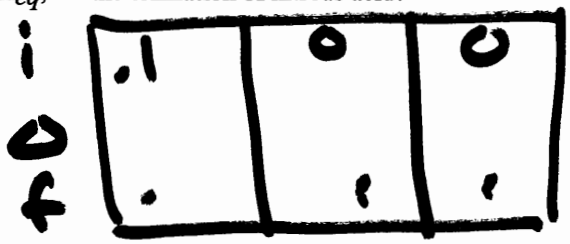
$H_2O + HCO_3^- \rightleftharpoons CO_3^{2-} + OH^- \quad H^+ \; K_{a2}$

$K_w = K_A \times K_B \qquad K_b = \frac{K_w}{K_{a2}} =$

3) Nitrous acid is a weak acid that dissociates into the nitrite ion and a proton in aqueous solution:

$$HNO_2\,(aq) \rightleftharpoons NO_2^-\,(aq) + H^+\,(aq)$$

At equilibrium at 25°C, a 0.100 M solution of nitrous acid has a pH=2.17. What is the equilibrium constant, K_{eq}, for the ionization of nitrous acid?



$[H^+] = 10^{-2.17}$

$= .0068$

$K_{eq} = \frac{(.0068)^2}{(.1 - .0068)} =$

4) Predict whether aqueous solutions of the following salts are acidic, neutral or basic.

a) ammonium chloride (NH_4Cl)

$NH_4Cl(s) \rightarrow NH_4^+ + Cl^-$ Acidic

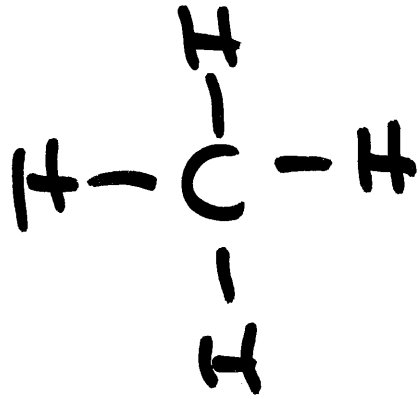
b) sodium chloride (NaCl)

$NaCl(s) \rightarrow Na^+ + Cl^-$ neutral

c) sodium chlorate ($NaClO_3$)

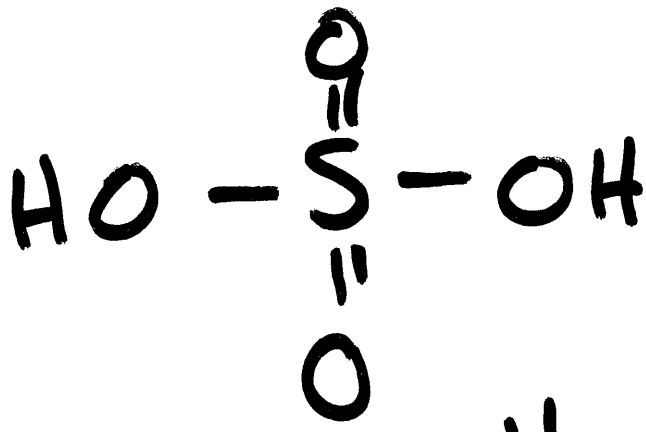
$NaClO_{3(s)} \rightarrow Na^+ + ClO_3^-$ base neutral

CH_4



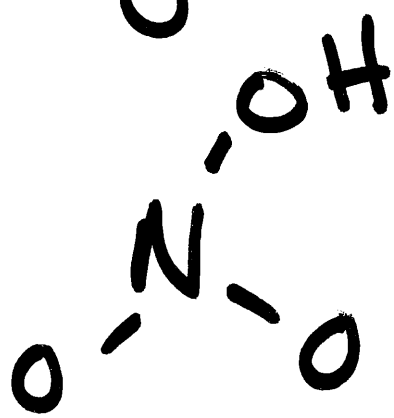
Not Acid or Base

H_2SO_4



Acid

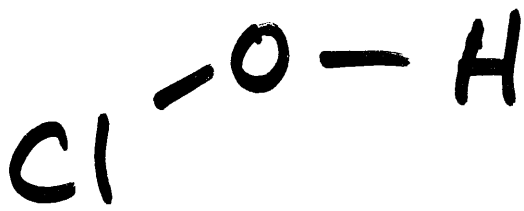
HNO_3



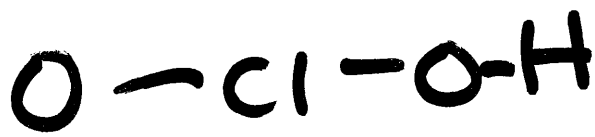
Acid

$HClO$ hypochlorous acid

weak

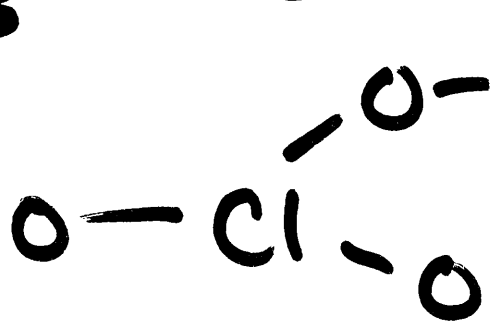


$HClO_2$ chlorous acid



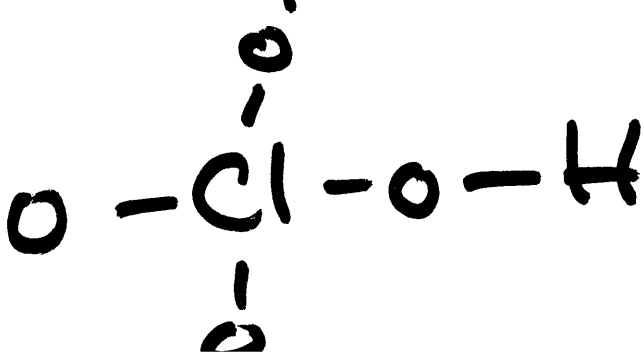
Stronger, but still weak

$HClO_3$ chloric acid



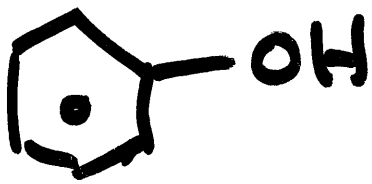
strong

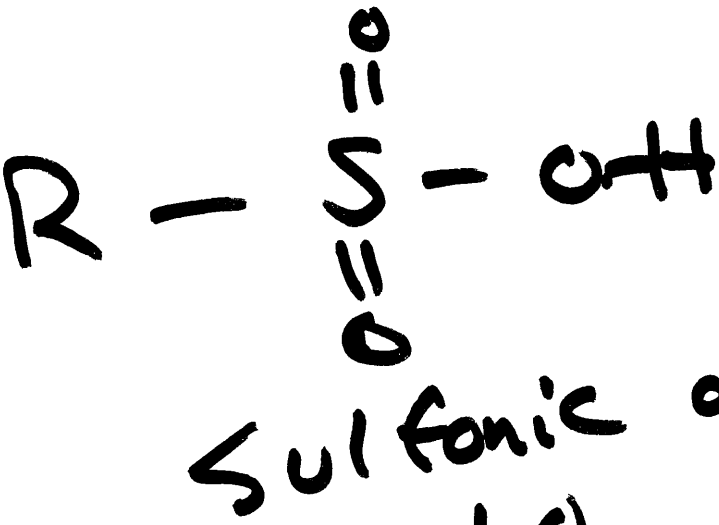
$HClO_4$ perchloric acid



Strongest

Other organic acids





Sulfonic acids