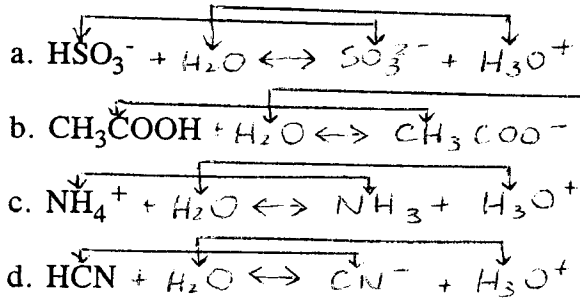
Chemistry 12 Acid Base Worksheet No. 1 Name Key

1. Write the equations for the hydrolysis of the following acids in water and identify the congugate pairs.



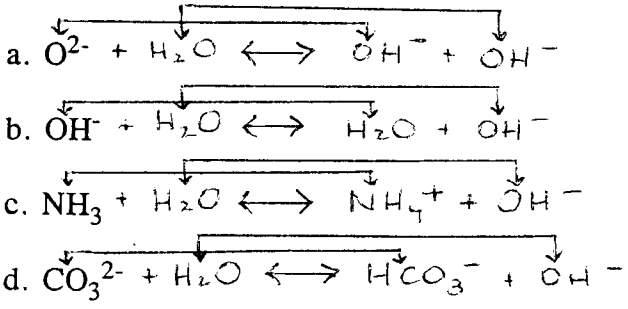
a. $HSO_3^- + H_2O \leftrightarrow SO_3^{2-} + H_3O^+$

b. $CH_3COOH + H_2O \leftrightarrow CH_3COO^- + H_3O^+$

c. $NH_4^+ + H_2O \leftrightarrow NH_3 + H_3O^+$

d. $HCN + H_2O \leftrightarrow CN^- + H_3O^+$

2. Write the equations for the hydrolysis of the following bases in water and identify the conjugate pairs.



a. $O^{2-} + H_2O \longleftrightarrow OH^- + OH^-$

b. $OH^- + H_2O \longleftrightarrow H_2O + OH^-$

c. $NH_3 + H_2O \longleftrightarrow NH_4^+ + OH^-$

d. $CO_3^{2-} + H_2O \longleftrightarrow HCO_3^- + OH^-$

3. Calculate the pH of the following solutions:

a. 0.0020 M HCl strong acid $[H_3O^+] = 0.0020\,M$

$pH = -\log(0.0020) = \underline{2.70}$

b. 0.10 M HNO_3 strong acid $[H_3O^+] = 0.10\,M$

$pH = -\log(0.10) = \underline{1.00}$

c. 0.10 M NaOH soluble hydroxide $[OH^-] = 0.10\,M$

$[H_3O^+] = k_w/[OH^-] = 1.0 \times 10^{-13}\,M$ $pH = -\log(1.0 \times 10^{-13}) = \underline{13.00}$

4. If a solution of acidified water has a pH of 3.00 what is its $[H_3O^+]$?

$[H_3O^+] = \text{antilog}(-3.00) = 1.0 \times 10^{-3}\,M$

5. Arrange the following species according to their strength as bases:

H_2O, F^-, Cl^-, NO_2^-, CN^- weakest base $Cl^- < H_2O < NO_2^- < F^- < CN^-$ Strongest base

6. At 60°C the value of K_w is 1.0×10^{-13}. Calculate $[H_3O^+]$ and $[OH^-]$ at 60°C.

$K_w = [H_3O^+][OH^-]$ $[H_3O^+] = \sqrt{k_w} = 3.2 \times 10^{-7}\,M$

in water $[H_3O^+] = [OH^-]$ $[OH^-] = [H_3O^+] = 3.2 \times 10^{-7}\,M$