(14) (1) $H_2SO_{4(aq)} \rightarrow H^+_{(aq)} + HSO_4^-{}_{(aq)}$

(A) (2) $HSO_4^-{}_{(aq)} \rightarrow H^+_{(aq)} + SO_4^{-2}{}_{(aq)}$

(B) The first step ionizes nearly 100%, the second step is much less than 100%.

(15) $HCl_{(aq)} + KOH_{(aq)} \rightarrow KCl_{(aq)} + H_2O_{(l)}$

$H^+_{(aq)} + Cl^-_{(aq)} + K^+_{(aq)} + OH^-_{(aq)} \rightarrow K^+_{(aq)} + Cl^-_{(aq)} + H_2O_{(l)}$

$H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$

(16) $H_3PO_{4(aq)} + 3NaOH_{(aq)} \rightarrow Na_3PO_{4(aq)} + 3H_2O_{(l)}$

$3H^+_{(aq)} + 3OH^-_{(aq)} \rightarrow 3H_2O_{(l)}$

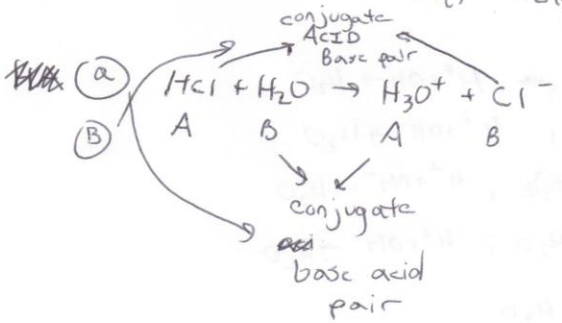
(17) (A) $Zn_{(s)} + 2HCl_{(aq)} \rightarrow H_{2(g)} + ZnCl_{2(aq)}$

(B) $2Al_{(s)} + 3H_2SO_{4(aq)} \rightarrow Al_2(SO_4)_{3(aq)} + 3H_{2(g)}$

(18) $Ca_{(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + H_{2(g)}$

$Ca_{(s)} + 2H^+_{(aq)} \rightarrow Ca^{+2}_{(aq)} + H_{2(g)}$

(19) (A) (B)



(20) (A) The stronger the acid, the weaker the conjugate base.

(B) The stronger the base, the weaker the conjugate acid.

(21) Don't Do....

(22) (A) A compound that behaves as both an acid and a base.

(B) $H_2O + HCl \rightarrow H_3O^+ + Cl^-$ water as a base

$H_2O + NH_3 \rightarrow OH^- + NH_4^+$ water as an acid

(23)

	(A)	(B)	(C)
Acid	CH_3COOH	H_2O	HNO_3
base	H_2O	HCO_3^-	SO_4^{-2}

Conjugate Pairs

(a) CH_3COOH & CH_3COO^-

H_2O & H_3O^+

(B) HCO_3^- & H_2CO_3

H_2O + OH^-

(C) HNO_3 + NO_3^-

SO_4^{-2} + HSO_4^-

(24) (A) HNO_3 (B) H_2S (C) HS^- (D) NO_3^-

(25) A strong acid makes a weak conjugate because it will not gain a proton. Strong acids almost ionize 100%, they will not reform the original.

(26) (a) $HCl + NaOH \rightarrow NaCl + H_2O$, $H^+ + OH^- \rightarrow H_2O$

(b) $HNO_3 + KOH \rightarrow KNO_3 + H_2O$, $H^+ + OH^- \rightarrow H_2O$

(c) $Ca(OH)_2 + 2HNO_3 \rightarrow 2H_2O + Ca(NO_3)_2$, $H^+ + OH^- \rightarrow H_2O$

(D) $Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$, $H^+ + OH^- \rightarrow H_2O$

(27) $H_3PO_4(aq) + Mg(OH_2) \rightarrow Mg_3(PO_4)_2 + H_2O$

$H^+ + OH^- \rightarrow H_2O$

(28) Don't Do

(29) (A) $Rb(OH)_2 + HClO_4 \rightarrow RbClO_4 + H_2O$, $H^+ + OH^- \rightarrow H_2O$

(B) $Ba(OH)_2 + H_2SO_4 \rightarrow BaSO_4 + 2H_2O$, $H^+ + OH^- \rightarrow H_2O$

C, D on your own

(30) $Zn_{(s)} + H_2SO_{4(aq)} \rightarrow ZnSO_{4(aq)} + H_{2(g)}$

100.0mL
6.0M

(A) $M = \frac{mole}{V}$ $6.0M = \frac{x}{.100L}$ $\therefore 6$ moles H_2SO_4

$\cdot 6 \text{ moles } H_2SO_4 \times \frac{1 \text{mol } ZnSO_4}{1 \text{mol } H_2SO_4} \times \frac{161.4 \text{g } ZnSO_4}{1 \text{mol } ZnSO_4} =$ solve

(B) $6 \text{ moles } H_2SO_4 \times \frac{1 \text{mol } H_2}{1 \text{mol } H_2SO_4} \times \frac{22.4 \text{L } H_2}{1 \text{mol } H_2} =$ solve.

@ STP