Principal Species in Solution / Net Ionic Equations **Prof. Hanson**

Answers to Practice 3:

In each case, follow the steps and indicate (1) the characteristics of the substances present, (2) the principal species that will be present *in solution*, and (3) the net ionic equation for the reaction.

$NaOH(aq)$ and $H_2S(aq)$
(1) strong base and weak acid
(2) $Na^+(aq)$, $OH^-(aq)$, and $H_2S(aq)$
(3) $OH^-(aq) + H_2S(aq) \rightarrow H_2O + HS^-(aq)$

$HF(aq)$ and $NH_3(aq)$
(1) weak acid and weak base
(2) $HF(aq)$ and $NH_3(aq)$
(3) $HF(aq) + NH_3(aq) \rightarrow F^-(aq) + NH_4^+(aq)$

$HClO_4(aq)$ and $NH_3(aq)$
(1) strong acid and weak base
(2) $H^+(aq)$, $ClO_4^-(aq)$, and $NH_3(aq)$
(3) $H^+(aq) + NH_3(aq) \rightarrow NH_4^+(aq)$

$H_3PO_4(s)$ and $NH_3(aq)$
(1) solid that will dissolve to be a weak acid; weak base
(2) in *solution*: $H_3PO_4(aq)$ and $NH_3(aq)$
(3) $H_3PO_4(s) \rightarrow H_3PO_4(aq)$
and $H_3PO_4(aq) + NH_3(aq) \rightarrow H_2PO_4^-(aq) + NH_4^+(aq)$
overall:
$H_3PO_4(s) + NH_3(aq) \rightarrow H_3PO_4^-(aq) + NH_4^+(aq)$

$H_2CO_3(aq)$ and $NH_3(aq)$
(1) weak acid and weak base
(2) $H_2CO_3(aq)$ and $NH_3(aq)$
(3) $H_2CO_3(aq) + NH_3(aq) \rightarrow HCO_3^-(aq) + NH_4^+(aq)$

$C_2H_3O_2H(aq)$ and $NaOH(aq)$
(1) weak acid and strong base
(2) $C_2H_3O_2H(aq)$, $Na^+(aq)$, and $OH^-(aq)$
(3) $C_2H_3O_2H(aq) + OH^-(aq) \rightarrow H_2O + C_2H_3O_2^-(aq)$

$HBr(aq)$ and $C_5H_5N(aq)$
(1) strong acid and weak base
(2) $H^+(aq)$, $Br^-(aq)$, and $C_5H_5N(aq)$
(3) $H^+(aq) + C_5H_5N(aq) \rightarrow C_5H_5NH^+(aq)$

25 mL of 0.2 *M* $H_3PO_4(aq)$ and 50 mL of 0.3 *M* $LiOH(aq)$

(1) weak acid and strong base
(2) 0.005 moles of $H_3PO_4(aq)$, 0.015 moles of $Li^+(aq)$, and 0.015 moles of $OH^-(aq)$
(3) $H_3PO_4(aq) + 3\ OH^-(aq) \rightarrow PO_4^{3-}(aq) + 3\ H_2O$