Chapter 14 − Problems 2, 12, 30

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2. (a) $H^+(aq) + C_2H_3O_2{}^-(aq) \longrightarrow HC_2H_3O_2(aq)$
   (b) $OH^-(aq) + H^+(aq) \longrightarrow H_2O$
   (c) $HOCl(aq) + CN^-(aq) \longrightarrow HCN(aq) + OCl^-(aq)$
   (d) $HNO_2(aq) + OH^-(aq) \longrightarrow NO_2{}^-(aq) + H_2O$

12. $H^+(aq) + F^-(aq) \longrightarrow HF(aq)$

$$\begin{aligned} \left[H^+\right] &= k_a \cdot \frac{n_{HF}}{n_{F^-}} \\ 6.9 \cdot 10^{-4} \cdot \frac{.127 \cdot .0399}{.062} &= 5.64 \cdot 10^{-5} \\ -\log_{10}\left(5.64 \cdot 10^{-5}\right) &= 4.25 \end{aligned} \tag{1}$$

30. (a)

$$\begin{aligned} .137 \cdot .288 &= .039456[\text{mol}] \\ .239 \cdot .187 &= .044693[\text{mol}] \\ [H^+] &= \frac{.044693}{.039456} \cdot 4.55 \cdot 10^{-5} \\ &= 5.154 \cdot 10^{-5} \\ -\log_{10}\left(5.154 \cdot 10^{-5}\right) &= 4.288 \end{aligned} \tag{2}$$

   (b) $H^+(aq) + C_4H_4O_6{}^{2-}(aq) \longrightarrow HC_4H_4O_6{}^-(aq)$

$$\begin{aligned} \frac{.025}{.376} &= .0665[\text{M}] \\ .187 + .0665 &= .2535[\text{M}] \\ .288 - .0665 &= .2215[\text{M}] \\ \text{pH} &= 4.34 + \log_{10}\left(\frac{.3545}{.1205}\right) \end{aligned} \tag{3}$$

   (c)