Chapter 13 & 14 – Review Set

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1. Calculate:

   (a) pH when $\left[OH^-\right] = 2.3 \cdot 10^{-6}$

   $$-\log_{10}\left(\frac{1 \cdot 10^{-14}}{2.3 \cdot 10^{-6}}\right) = 8.36 \tag{1}$$

   (b) pOH when $\left[H_3O^+\right] = 2.8 \cdot 10^{-8}$

   $$-\log_{10}\left(\frac{1 \cdot 10^{-14}}{2.8 \cdot 10^{-8}}\right) = 6.45 \tag{2}$$

   (c) $[H_3O^+]$ when pH is 8.53

   $$10^{-8.53} = 2.95 \cdot 10^{-9}\,[\text{M}] \tag{3}$$

   (d) $[OH^-]$ when pH is 2.36

   $$\frac{1 \cdot 10^{-14}}{10^{-2.36}} = 2.29 \cdot 10^{-12}\,[\text{M}] \tag{4}$$

2. Write the dissociation equation:

   (a) $HBr \longrightarrow H^+ + Br^-$
   (b) $F^- + H_2O \longrightarrow HF + OH^-$
   (c) $HC_2H_5O \longrightarrow H^+ + C_2H_5O^-$
   (d) $HClO_4 \longrightarrow H^+ + {ClO_4}^-$
   (e) $HNO_2 \longrightarrow H^+ + {NO_2}^-$

(f) $PO_4^{3-} + H_2O \longrightarrow HPO_4^{2-} + OH^-$

3.

$$\begin{aligned} \frac{x^2}{1.5} &= .00014 \\ x &= .0145[\mathrm{M}] \end{aligned} \tag{5}$$

4.

$$\begin{aligned} \frac{x^2}{.126} &= 1.5 \cdot 10^{-9} \\ x &= \sqrt{.126 \cdot 1.5 \cdot 10^{-9}} \\ 14 + \log_{10}(x) &= 9.14 \end{aligned} \tag{6}$$

5.

$$\begin{aligned} [\mathrm{H}^+] &= 10^{-9.8} = 1.585 \cdot 10^{-10} \\ [\mathrm{OH}^-] &= 6.31 \cdot 10^{-5} \\ \frac{(6.31 \cdot 10^{-5})^2}{.0278} &= 1.432 \cdot 10^{-7}\,[\mathrm{M}] \end{aligned} \tag{7}$$

6.

$$\frac{.3 \cdot .5 + .42 \cdot .137}{.72} = .28825[\mathrm{M}] \tag{8}$$

7. (a)

(9)

(b)

(10)

8. (a)

(11)

(b)

(12)

9.

(13)

10.

(14)