EXTRA PRACTICE PROBLEM (similar to Practice Problem 13, page 600)

13. Find the value of $[OH^-]$ for a solution with a pH of 8.00.

If pH = 8.00, pOH = 6.00 because pH + pOH = 14.

$pOH = -\log [OH^-]$

$6.00 = -\log [OH^-]$

$-6.00 = \log [OH^-]$

$10^{-6.00} = 10^{\log [OH^-]}$

$[OH^-] = 10^{-6}$

GUIDED PRACTICE PROBLEM 16b (page 601)

16b. Calculate the pH of this solution: $[H^+] = 8.3 \times 10^{-10} M$.

Step 1. Identify the known and unknown values.	**Known** $[H^+] =$ 8.3 $\times 10^{-10} M$	**Unknown** pH = ?
Step 2. Substitute values into the pH equation.	$pH = -\log [H^+]$ $= -\log (8.3 \times$ 10^{-10} $)$	
Step 3. The logarithm of a product equals the sum of the logs of its factors.	$= -$ (log 8.3 + log 10^{-10})	
Step 4. Evaluate log 8.3 by using a calculator. Evaluate log 10^{-10} by using the definition of logarithm.	$= -(0.919 +$ -10 $)$	
Step 5. Add and simplify. Write your answer with two significant figures to the right of the decimal point.	$= -(-9.081) =$ 9.08	

GUIDED PRACTICE PROBLEM 22 (page 610)

22. For a solution of methanoic acid exactly 0.1 *M*, $[H^+] = 4.2 \times 10^{-3} M$. Calculate the K_a of methanoic acid.

Analyze

Step 1. What is known about the acid?

It is a 0.1*M* solution, $[H^+] = 4.2 \times 10^{-3} M$, and the equation for dissociation is

$HCOOH \rightleftharpoons HCOO^- + H^+$.

Step 2. What is the unknown? K_a

Step 3. What is the expression for the K_a of methanoic acid?

$$K_a = \frac{[HCOO^-] \times [H^+]}{[HCOOH]}$$

Solve

Step 4. What expression can you write to find the equilibrium concentration of HCOOH?

$0.1000 - 4.2 \times 10^{-3} = 0.0958$

Step 5. Substitute values into the formula for K_a and solve.

$$K_a = \frac{(4.2 \times 10^{-3}) \times (4.2 \times 10^{-3})}{0.0958} = \frac{1.764 \times 10^{-5}}{0.0958}$$

$$= 184.1 \times 10^{-6} = 1.8 \times 10^{-4}$$

Analyze

Step 6. Look at Table 19.7 on page 607. Explain why your answer is reasonable.

The value for K_a is the same as the one given in the table.