South Pasadena • AP Chemistry

Name Key
Period ___ Date ___/___/___

17 • Acid-Base Equilibria

PRACTICE TEST

1. What is the $[H^+]$ when $[OH^-] = 8.1 \times 10^{-5}$?
   a) 8.1×10^{-5} M
   b) 1.0×10^{-7} M
   c) 1.2×10^{-10} M $[H^+] = \frac{K_w}{[OH^-]} = \frac{1\times10^{-14}}{8.1\times10^{-5}} =$
   d) 3.6×10^{-6} M
   e) 8.1×10^{-5} M

2. What is the $[H^+]$ when $[OH^-] = 3.3 \times 10^{-9}$?
   a) 3.0×10^{-6} M
   b) 1.0×10^{-7} M
   c) 3.3×10^{-5} M $[H^+] = \frac{K_w}{[OH^-]} = \frac{1\times10^{-14}}{3.3\times10^{-9}}$
   d) 6.6×10^{-5} M
   e) 3.3×10^{-9} M

3. What is the $[H^+]$ in a 0.0025 M HCl solution?
   a) 1.0×10^{-7} M
   b) 4.0×10^{-12} M
   c) 2.5×10^{-3} M HCl strong acid $[H^+] = .0025 = 2.5\times10^{-3}$ M
   d) 3.6×10^{-5} M
   e) need more info

4. What is the $[OH^-]$ in a 0.0050 M HCl solution?
   a) 5.0×10^{-3} M
   b) 1.0 M
   c) 1.0×10^{-7} M $[H^+] = .0050$ $[OH^-] = \frac{K_w}{.0050} =$
   d) 6.6×10^{-5} M
   e) 2.0×10^{-12} M

5. A solution in which $[H^+] = 10^{-8}$ has a pH of 8 and is basic.
   a) 8, acidic
   b) 6, basic
   c) -6, basic
   d) -8, neutral
   e) 8, basic

6. What is the pH of a 0.00030 M HNO_3 solution?
   a) 8.11
   b) 3.00
   c) 3.52 $[H^+] = 3\times10^{-4}$ $pH = -\log[H^+] =$
   d) 4.48
   e) none of these

7. What is the pH of a 0.0060 M KOH solution?
   a) 5.12
   b) 2.22
   c) 11.78 $[OH^-] = 6.0\times10^{-3}$ $pOH = 2.22$ $pH = 14 - pOH =$
   d) 8.88
   e) 7.00

8. A sample of lemon juice is found to have a pH of 2.55. What is the H^+ concentration of the juice? $[H^+] = 10^{-pH} = 10^{-2.55}$
   a) 0.0035 M
   b) 0.0028 M
   c) 11.6 M
   d) 0.0080 M
   e) 355 M

9. A sample of milk is found to have a pH of 6.60. What is the OH^- concentration of the milk?
   a) 2.5×10^{-21} M
   b) 1.0×10^{-7} M
   c) 5.0×10^{-7} M $[H^+] = 10^{-6.60} = 2.51\times10^{-7}$ $[OH^-] = \frac{K_w}{[H^+]}$
   d) 4.0×10^{-8} M
   e) 2.5×10^{-7} M

10. What is the concentration of OCl^- in a 0.60 M solution of HOCl? $K_a = 3.1 \times 10^{-8}$.
    a) 1.8×10^{-4} M
    b) 7.1×10^{-11} M
    c) 0.40 M $[OCl^-] = [H^+] = \frac{K_a \cdot .6}{} = x^2$ see scratch paper
    d) 1.4×10^{-4} M
    e) 1.1×10^{-4} M

11. What is the pH of a 0.020 M solution of hydrosulfuric acid, a diprotic acid? $K_{a1} = 1.1 \times 10^{-7}$ $K_{a2} = 1.0 \times 10^{-14}$
    a) 7.00
    b) 9.67
    c) 7.84 see scratch paper
    d) 4.33 only 1st dissociation is signif. ∴ use K_{a1} only.
    e) 3.05

12. What is the concentration of CO_3^{2-} in a 0.010 M solution of carbonic acid? The relevant equilbria are,
    1st $H_2CO_3 \rightleftharpoons H^+ + HCO_3^-$ $K_{a1} = 4.3 \times 10^{-7}$
    2nd $HCO_3^- \rightleftharpoons H^+ + CO_3^{2-}$ $K_{a2} = 5.6 \times 10^{-11}$
    a) 6.6×10^{-5} M
    b) 5.6×10^{-11} M
    c) 6.7×10^{-11} M
    d) 7.5×10^{-7} M
    e) 7.9×10^{-7} M

    From the 1st dissociation, $[H^+] = [HCO_3^-]$ the 2nd dissoc. doesn't change this much.
    $K_{a2} = \frac{[H^+][CO_3^{2-}]}{[HCO_3^-]}$ but $[H^+] \neq [HCO_3^-]$ cancel!
    So... $K_{a2} = [CO_3^{2-}] = 5.6\times10^{-11}$