AR Chemistry Review: Acids and Bases 1

1. Which of the following determine if the substance is acidic, basic, or neutral
    a. tastes sour
    b. tastes bitter
    c. reacts with metals to form hydrogen gas
    d. turns litmus blue
    e. turns phenolphthalein pink
    f. reacts with Mg^{+2} to form an insoluble precipitate
    g. turns phenolphthalein clear
    h. has a pH = 7
    i. turns litmus pink
    j. has a pH greater than 7
    k. has $[H^{+1}] = 0.01$
    l. has pH lower than 7
    m. has pH higher than 7
    n. has $[H^{+1}] = 2 \times 10^{-8}$
2. Identify the following as either Arrhenius or Bronsted-Lowry definitions
    a. acids are proton donors
    b. bases release OH^{-1}
    c. bases are proton acceptors
    d. acids release H^{+1}
3. What is the equilibrium expression for water?
4. What is the value of the equilibrium expression for water?
5. What is the $[H^{+1}]$ if the $[OH^{-1}]$ is:
    a. 10^{-3}
    b. 10^{-8}
    c. 4×10^{-5}
6. What is the pH if:
    a. $[H^{+1}] = 10^{-4}$
    b. $[H^{+1}] = 2 \times 10^{-8}$
    c. $[OH^{-1}] = 10^{-9}$
    d. $[OH^{-1}] = 5 \times 10^{-5}$
7. For each change in pH the hydrogen ion concentration changes by a factor of ???
8. What is the change in hydrogen ion concentration between the following pH's:
    a. 3.0 to 5.0
    b. 9.5 to 4.5
9. What is the hydrogen ion concentration in:
    a. 0.20 M HCl
    b. 1.50 M H_2SO_4
    c. 3.50 M HNO_3
    d. 0.10 M NaOH
    e. 0.00020 M KOH
10. How many mL of 6.0 M NaOH are required to make 2000 mL of a 0.50 M solution?
11. How many mL of 9.0 M HCl are required to make 1500 mL of a 0.10 M solution?
12. What is the concentration of 45.9 mL of HCl if it is neutralized by 65.0 mL of 0.100 M NaOH?
13. What is the concentration of 34.8 mL of HCl if it is neutralized by 28.5 mL of 0.100 M NaOH?

AR Chemistry Review: Acids and Bases 1 ANSWERS

1. Which of the following determine if the substance is acidic, basic, or neutral
   a. tastes sour — **acid**
   b. tastes bitter — **base**
   c. reacts with metals to form hydrogen gas — **acid**
   d. turns litmus blue — **base**
   e. turns phenolphthalein pink — **base**
   f. reacts with Mg^{+2} to form an insoluble precipitate — **base**
   g. turns phenolphthalein clear — **acid**
   h. has a pH = 7 — **neutral**
   i. turns litmus pink — **acid**
   j. has a pH greater than 7 — **base**
   k. has $[H^{+1}] = 0.01$ — **acid**
   l. has pH lower than 7 — **acid**
   m. has pH higher than 7 — **base**
   n. has $[H^{+1}] = 2 \times 10^{-8}$ — **base**
2. Identify the following as either Arrhenius or Bronsted-Lowry definitions
   a. acids are proton donors — **Bronsted-Lowry**
   b. bases release OH^{-1} — **Arrhenius**
   c. bases are proton acceptors — **Bronsted-Lowry**
   d. acids release H^{+1} — **Arrhenius**
3. What is the equilibrium expression for water? **$Kw = [H^{+1}][OH^{-1}]$**
4. What is the value of the equilibrium expression for water? **1.0×10^{-14}**
5. What is the $[H^{+1}]$ if the $[OH^{-1}]$ is:
   a. 10^{-3} — **10^{-11}**
   b. 10^{-8} — **10^{-6}**
   c. 4×10^{-5} — **2.5×10^{-10}**
6. What is the pH if:
   a. $[H^{+1}] = 10^{-4}$ — **4**
   b. $[H^{+1}] = 2 \times 10^{-8}$ — **7.7**
   c. $[OH^{-1}] = 10^{-9}$ — **5**
   d. $[OH^{-1}] = 5 \times 10^{-5}$ — **9.7**
7. For each change in pH the hydrogen ion concentration changes by a factor of ??? **10**
8. What is the change in hydrogen ion concentration between the following pH's:
   a. 3.0 to 5.0 — **100 x less H^{+1}**
   b. 9.5 to 4.5 — **100,000 x more H^{+1}**
9. What is the hydrogen ion concentration in:
   a. 0.20 M HCl — **0.20 M**
   b. 1.50 M H_2SO_4 — **3.00 M**
   c. 3.50 M HNO_3 — **3.50 M**
   d. 0.10 M NaOH — **1×10^{-13} M**
   e. 0.00020 M KOH — **5×10^{-11}**
10. How many mL of 6.0 M NaOH are required to make 2000 mL of a 0.50 M solution? **167 mL**
11. How many mL of 9.0 M HCl are required to make 1500 mL of a 0.10 M solution? **16.7 mL**
12. What is the concentration of 45.9 mL of HCl if it is neutralized by 65.0 mL of 0.100 M NaOH? **0.14 M**
13. What is the concentration of 34.8 mL of HCl if it is neutralized by 28.5 mL of 0.100 M NaOH? **0.082 M**