CHAPTER 6

ASSESSMENT | **Calculating pH**

1. What is the pH of the following solutions given their hydronium ion concentrations?
    (a) $[H_3O^+(aq)] = 5.32 \times 10^{-7}$ mol/L

    (b) $[H_3O^+(aq)] = 6.1 \times 10^{-5}$ mol/L

    (c) $[H_3O^+(aq)] = 2.679 \times 10^{-14}$ mol/L

    (d) $[H_3O^+(aq)] = 0.23$ mol/L

2. Which of the above solutions would be considered acidic?

3. Fill in the following chart:

$[H_3O^+(aq)]$ (mol/L)	pH
1.37×10^{-2}	
2.38×10^{-5}	
2.38×10^{-6}	
1.00×10^{-7}	
3.45×10^{-9}	
3.45×10^{-10}	
3.45×10^{-11}	
5.33×10^{-12}	

4. Notice in the chart that the concentration of $H_3O^+(aq)$ is continually decreasing. What do you notice about the pH values?

5. Generalize what happens to pH as acidity decreases.

6. What do you think happens to pH as basicity decreases?

7. Find some spots on the table when the pH increases by exactly 1 pH unit. What do you notice about the change in concentration of hydronium ions at these points?

8. Find a spot on the table when the pH increases by exactly 2 pH units. What do you notice about the change in concentration of hydronium ions at these points?

9. If a very acidic solution is diluted by a factor of 1000, what change would you expect in its pH?

10. What is the pH of the following solutions?
    (a) a 0.563 mol/L solution of nitric acid, $HNO_3(aq)$

    (b) a 2.3×10^{-4} mol/L solution of hydroiodic acid, $HI(aq)$

    (c) a 9.342×10^{-5} mol/L solution of perchloric acid, $HClO_4(aq)$

11. What is the pH of a solution made by the following methods?

    (a) dissolving 3.62 g of pure hydrogen perchlorate, $HClO_4(aq)$, in 2.0 L of water

    (b) dissolving 2.357 g of pure hydrobromic acid, $HBr(aq)$, in 50.0 L of water

    (c) dissolving 8 μg of pure nitric acid, $HNO_3(aq)$, in 20.0 mL of water