# ANSWERS for the Practice Test for Acids and Bases

1. What is a hydronium ion? H_3O^{+1} ion, another way to write an acid ion.
2. What are the 2 products of every Arrhenius Acid + Arrhenius Base neutralization?
   It always forms a salt and water. Salts are ionic compounds.
3. Most acid base indicators are weak acids.

4. When sulfuric acid is in the beaker, the only negative ion in solution would be SO_4^{-2}.
5. When vinegar is in your beaker, name 4 ways to describe the only positive ion present.
    H^{+1} ions or protons, or H_3O^{+1} ions or, H^{+1} ion donors in solution.

6. For each of the acids in table K, put mono, di, or tri next to each one for monoprotic, diprotic, or triprotic. All of the acids are monoprotic (one H^{+1} ion in the formula), except sulfuric, sulfurous, + carbonic which are diprotic (have 2 H^{+1} in formula), while phosphoric is triprotic (3 H^{+1} in formula).

7. In an alternate theory of acids and bases, a base is a hydrogen ion acceptor (like NH_3)
8. In an alternate theory of acids and bases, an acid is a hydrogen ion donor (like H_2O)

9. When you add bromcresol green to a solution with pH of 4.5, what color is expected?
   It would turn green (yellow blue mix)

10. When you add phenolphthalein to a solution of carbonated water, what color is expected? It would be an acid, so colorless. What could you add to get a different color? Add some base, get pH over 8 to get to the pink color.

11. You neutralize 25.00 mL of 2.28 M hydrochloric acid with 20.0 mL calcium hydroxide solution.
    What is the molarity of the base? Use $M_A V_A = M_B V_B$ formula to get:

    $(1)(2.28 \text{ m})(25.00 \text{ mL}) = (M_B)(20.0 \text{ mL})(2)$ then, solve for M_B = 1.43 M Base (3 SF)

12. Write the balanced chemical equation for what happens when you eat tums (calcium hydroxide) for an upset stomach (excess stomach acid).

$$2HCl_{(AQ)} + Ca(OH)_{2(S)} \longrightarrow CaCl_{2(AQ)} + 2HOH_{(L)}$$

13. skip

14. If your solution is 10,000 x more acidic than mine is, and my solution has pH 6.2, what's your solution's pH?
     10X would be 5.2, 100X would be 4.2, 1000X would be 3.2, and 10,000X would be 2.2
     All whole number changes in pH are 10X.

15. If a solution with a pH of 5.0 has a hydrogen ion concentration of 1 x $10^{-5.0}$ moles H^{+1} per liter, describe in terms of hydrogen ion concentration, what strength is a solution with pH 1.43?   It would be $1 \times 10^{-1.43}$ moles H^{+1} per liter

16. If my other solution has a H^{+1} concentration of 1×10^{-2}, what's the solution's pH?   The pH is 2

17. How many hydroxide ions would it take to neutralize the solution in question 16?
    A solution with pH 2 has a hydrogen ion concentration of 1 x 10^{-2} moles H^{+1} per liter, or one-hundredth of a mole of hydrogen ions per liter. One mole is Avogadro's number, so one-hundredth of a mole of hydrogen ions is 6.02×10^{21} H^{+1} ions. It would take exactly that many hydroxide ions to reach neutral.

18. If 305. mL of 4.11 M H_2SO_4 is used to neutralize 1234 ml of KOH, what's the base molarity?
     Use $M_A V_A = M_B V_B$ formula to get: $(2)(4.11 \text{ M})(305. \text{ mL}) = (M_B)(1234 \text{ mL})(1)$
                                         and solve for the M_B
                                            2.03 M = M_B with 3 SF

19. Show the chemical reaction of ammonia going into water that explains how $NH_{3(AQ)}$ is a base.

$$NH_{3(G)} + HOH_{(L)} \longrightarrow NH_4^{+1}{}_{(AQ)} + OH^{-1}{}_{(AQ)}$$
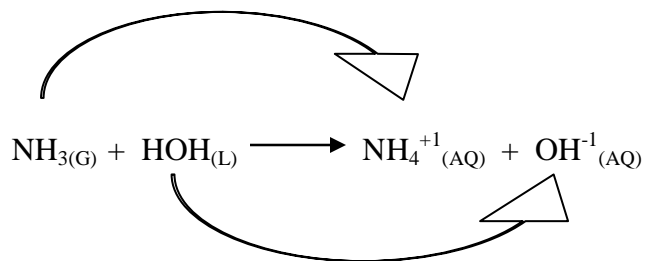
Ammonia accepts a H+1 ion, therefore it's a base. Water donates this H+1 ion, so it's an acid.

20. Acid rain is causing problems in the soil, plants don't grow as well with acidic soils. What solid compound can farmers put onto their ground to help neutralize some of that acid?
Anything solid that would be a base in solution, say, magnesium hydroxide. You would need to put on enough, but it would be easy to use too much. Don't just do this at home (silly).

21. Make up one problem for acid base titration, and solve it. And it better be a good one, with units too!