Acids and Bases Review　　　　Name: Answer key　Per:

Molarity

1. What is the concentration of a solution with 2.3 moles of solute in 1,350 mL of solvent? concentration = molarity = M = mol/L

$$\frac{2.3\ mol}{1.350\ L} = \boxed{1.7\ M}$$

2. What is the molarity of solution of 10.5 g of NaOH in 2.45L of water?

$$10.5g\ NaOH \times \frac{1\ mol\ NaOH}{39.99\ g\ NaOH} = \frac{.2625\ mol}{2.45\ L} = \boxed{0.107\ M\ NaOH}$$

pH and pOH calculations

3. The pH of a solution is 3. What is the pOH?

$14 - 3 = \boxed{11}$

4. The pOH of a solution is 4.5, what is the pH?

$14 - 4.5 = \boxed{9.5}$

5. The concentration of hydronium is 4.5 x 10⁻⁴, what is the pH? $pH = -log[H^+]$

$-log[4.5 \times 10^{-4}] = \boxed{3.35}$

6. The concentration of hydrogen ion is 1.3 x 10⁻⁷, what is the pH?

$-log[1.3 \times 10^{-7}] = \boxed{6.89}$

7. If the concentration of hydroxide ion is 2.3 x 10⁻¹¹, what is the pH of the solution?

$-log[2.3 \times 10^{-11}] = 10.64$　　$14 - 10.64 = \boxed{3.36}$

8. If the concentration of hydrogen ion is 4.7 x 10⁻⁴, what is the pOH of the solution?

$-log[4.7 \times 10^{-4}] = 3.33$　　$14 - 3.33 = \boxed{10.67}$

9. If the pH is 11.2, what is the concentration?

$antilog(-11.2) = \boxed{6.3 \times 10^{-12}\ M}$

10. If the pH is 4.5, what is the concentration?

$antilog(-4.5) = \boxed{3.2 \times 10^{-5}\ M}$

General acids and bases

11. A strong acid and a strong base always produce what two things?

water　and　a　salt

12. HCl + CH₃COO- ↔ CH₃COOH + Cl-
Is the acid Arrhenius, Bronsted-Lowry or both? does not produce H₃O⁺

13. What is the conjugate acid? CH₃COOH

14. HNO₃ + KOH ↔ H₂O + KNO₃
Is the acid Arrhenius, Bronsted-Lowry or both? does not produce H₃O⁺

15. What is the conjugate acid? H₂O

Equivalence point

16. For each situation, identify if the equivalence point is neutral, acidic or basic/alkaline.
    a. Strong acid/strong base　neutral
    b. Weak acid/strong base　basic
    c. Weak base/strong acid　acidic

Titration calculations

17. 25.0 mL of 0.05M $Ba(OH)_2$ neutralized 40.0 mL of nitric acid (HNO_3). Determine the concentration of the acid.

$$Ba(OH)_2 + 2HNO_3 \longleftrightarrow Ba(NO_3)_2 + 2H_2O$$

$.025L\ Ba(OH)_2 \times \dfrac{.05mol\ Ba(OH)_2}{1\ L} \times \dfrac{2\ mol\ HNO_3}{1\ mol\ Ba(OH)_2} = \dfrac{.0025\ mol\ HNO_3}{.04\ L}$

$$\boxed{.0625\,M}$$

18. 5.75 mL of 1.2M NaOH neutralized 26.7 mL of HCl. Determine the concentration of the acid.

$$NaOH + HCl \longleftrightarrow NaCl + H_2O$$

$.00575L \times \dfrac{1.2\ mol\ NaOH}{1\ L} \times \dfrac{1\ mol\ HCl}{1\ mol\ NaOH} = \dfrac{.0069\ mol\ HCl}{.0267\ L\ HCl}$

$$\boxed{.258\,M\ HCl}$$