Name Answer Key Hour ____

Ch. 19 Review

Honors Chemistry

1. What do each of the following indicators do and what are the used for?
   a. Blue litmus paper

   b. Red litmus paper

   c. Phenolphthalein

2. Using the Bronsted-Lowry definition, define the parts of the following Reaction:

   $H_2PO_4^-(aq) + H_2O(l) \rightleftharpoons HPO_4^{2-}(aq) + H_3O^+(aq)$

   Acid Base CB CA

3. With regard to strength and weakness of acids and bases, compare "⇌" and "→" with each other.

   STRONG: → WEAK: ⇌

4. What are the reactants and products of the self ionization of water?

   $H_2O \rightleftharpoons H^+ + OH^-$

5. List the properties of acids

6. List the properties of bases

7. What is rule #1 for naming acids? Give 2 examples. -ide ending

8. What is rule #2 for naming acids? Give 2 examples. -ite ending

9. What is rule #3 for naming acids? Give 2 examples. -ate ending

10. How is pH calculated? If 1.5-*M* acid ionizes at 25%, what is the H^+ concentration and pH?

    $-\log(H^+)$ $H^+ = 1.5 \times .25 = .375$ pH = .43

11. How is pOH calculated? If 2.5-*M* base ionizes at 43%, what is the OH^- concentration and pH?

    $-\log(OH^-)$ $OH^- = 2.5 \times .43 = 1.075$ pOH = 0

    pH = 14

12. Compare diluted and concentrated solutions using the terms solvent and solute.

Dilute: High Solvent, low solute Concentrated: Low solvent, High solute

13. What are acids and bases according to Arrhenius?

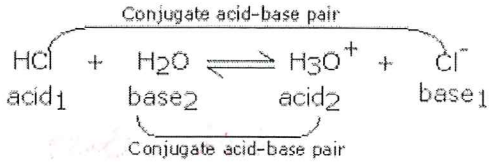
Acid: H^+ ion in "aq" Base: OH^- ions in "aq"

14. What are the 3 types of Arrhenius acids? Give an example of each.

1.) Monoprotic 2.) Diprotic 3.) Triprotic

15. What are the products of any neutralization reaction? Salt + Water

16. Using the following image to explain conjugate acid-base pairs.



$HCl \rightarrow Cl^-$ | $H_2O \rightarrow H_3O^+$

Acid → CB | Base → CA

17. What is the difference between a strong acid and a weak acid?

STRONG: 100 % ionization

WEAK: @ equilibrium

18. What is produced when metals react with strong acids? Write an equation showing what happens.

$Mg_{(s)} + 2HCl_{(aq)} \rightarrow H_{2(g)} + MgCl_{2(aq)}$

19. Define the following:

a. Amphoteric

b. Anhydride

c. Buffer

d. Buffer Capacity

e. Hydronium

f. Degree of Ionization

g. Titration

h. End Point

i. Equivalence Point

j. Hydrogen-ion concentration

k. Hydroxide-ion concentration

20. Explain how a conjugate base prevents acids from being strong acids.

The conjugate base attracts the ionized H^+, keeping it at equilibrium.

21. Rank the following compounds in order of increasing H+ concentration:

3 1.0-M Weak Acid, 4 1.0-M Strong Acid, 2 1.0-M Weak Base, 1 1.0-M Strong Base

22. Match each solution with its correct description: *(draw lines connecting them)*

a. Dilute, weak acid	1. 18-*M* H_2SO_4 C
b. Dilute, strong base	2. 0.5-*M* NaOH B
c. Concentrated, strong acid	3. 15-*M* NH_3 E
d. Dilute, strong acid	4. 0.1-*M* $HC_2H_3O_2$ A
e. Concentrated, weak base	5. 0.1-*M* HCl D

Dilute: Low Molarity

Concentrated: High Molarity

23. Describe why a buffer might be used in buffered aspirin.

It prevents the aspirin from changing pH + denaturing

24. Explain in detail how a titration is performed.

25. Explain in detail how a titration helps you determine the Molarity of an unknown base.

It gives you the volume of the unknown base, allowing you to calculate the molarity after determing the number of moles present.

26. What volume of 2.13-*M* $Ba(OH)_2$ *(in mL)* is needed to neutralize 305-mL of 1.9-*M* H_2SO_4? You must first write a balanced equation. $H_2SO_4 + Ba(OH)_2 \rightarrow BaSO_4 + 2\,HOH$

$$1.9\ \frac{mol}{L} \times .305\text{-L} = .5795\ mol\ H_2SO_4 \left| \frac{1\ mol\ Ba(OH)_2}{1\ mol\ H_2SO_4} \right. = \frac{.5795\ mol\ Ba(OH)_2}{2.13\text{-M}} = \boxed{272.1\text{-mL}}$$

27. If 163-mL of 1.95-*M* $Ca(OH)_2$ is neutralized by 207-mL of HCl, what is Molarity of the HCl? You must first write a balanced equation. $2HCl + Ca(OH)_2 \rightarrow CaCl_2 + 2HOH$

$$1.95\ \frac{mol}{L} \times .163\text{-L} = .318\ mol\ Ca(OH)_2 \left| \frac{2\ mol\ HCl}{1\ mol\ Ca(OH)_2} \right. = \frac{.636\ mol\ HCl}{.207} = \boxed{3.1\text{-M}}$$

28. If 46-mL of 1.3-*M* NaOH is required to titrate H_3PO_4 to the equivalence point. How many moles of H_3PO_4 are needed to reach the equivalence point? You must first write a balanced equation.

$H_3PO_4 + 3NaOH \rightarrow Na_3PO_4 + 3HOH$

$$1.3\ \frac{mol}{L} \times .046\text{-L} = .0598\ mol\ NaOH \left| \frac{1\ mol\ H_3PO_4}{3\ mol\ NaOH} \right. = \boxed{.02\ mol\ H_3PO_4}$$

pH	$[H_3O^{1+}]$	pOH	$[OH^{1-}]$	ACID or BASE?
3.78	1.66×10^{-4}	10.22	6.03×10^{-11}	A
3.41	3.89×10^{-4} M	10.59	2.57×10^{-11}	A
8.81	1.55×10^{-9}	5.19	6.64×10^{-6}	B
8.69	2.04×10^{-9}	5.31	4.88×10^{-6} M	B
8.46	3.47×10^{-9}	5.54	2.88×10^{-6}	B
12.1	8.45×10^{-13} M	1.90	1.26×10^{-2}	B
11.86	1.38×10^{-12}	2.14	7.24×10^{-3}	B
3.40	3.98×10^{-4}	10.6	2.31×10^{-11} M	A
10.91	1.23×10^{-11}	3.09	8.13×10^{-4}	B
5.13	7.49×10^{-6} M	8.87	1.35×10^{-9}	A
4.06	8.71×10^{-5}	9.94	1.15×10^{-10}	A
6.41	3.89×10^{-7}	7.59	2.57×10^{-8} M	A
4.16	6.92×10^{-5}	9.84	1.45×10^{-10}	A
0.98	1.06×10^{-1} M	13.0	1.00×10^{-13}	A
10.18	6.61×10^{-11}	3.82	1.51×10^{-4}	B
7.93	1.17×10^{-8}	6.07	8.53×10^{-7} M	B
7.05	8.91×10^{-8}	6.95	1.12×10^{-7}	~ B
9.33	4.73×10^{-10} M	4.67	2.14×10^{-5}	B
12.67	2.14×10^{-13}	1.33	4.68×10^{-2}	B
12.0	1.0×10^{-12}	2.01	9.87×10^{-3} M	B
11.68	2.09×10^{-12}	2.32	4.79×10^{-3}	B
7.04	9.22×10^{-8} M	6.96	1.10×10^{-7}	~ B
1.76	1.74×10^{-2}	12.24	5.75×10^{-13}	A
2.70	2.00×10^{-3}	11.3	5.39×10^{-12} M	A