

Name: \_\_\_\_\_

**KEY**

Date: \_\_\_\_\_

Hour: \_\_\_\_\_

**AP CHEMISTRY REVIEW: ACID-BASE REACTIONS.****Logarithms:** Solve the following problems by re-arranging the expression on the line.

1.  $10^x = 233$   $x = \log 233$   $x = 2.3674$

2.  $\log x = 1.9395$   $x = 10^{1.9395}$   $x = 87$

**pH Calculations:** Solve the following problems. Show all your work!

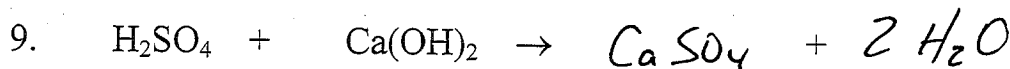
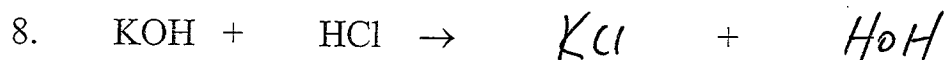
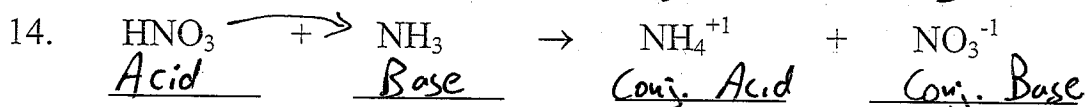
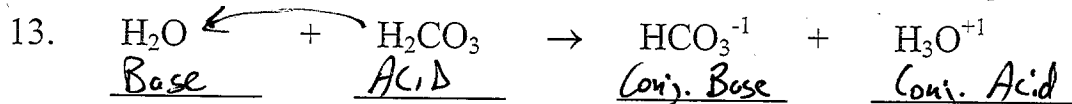
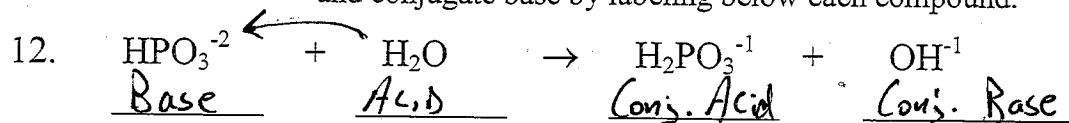
3.  $[H^+] = 1.0 \times 10^{-10} M$ ;  $pH = 10$   $-\log(1.0 \times 10^{-10}) = 10$

4.  $[H^+] = 3.22 \times 10^{-5} M$ ;  $[OH^-] = 3.11 \times 10^{-10} M$   $\frac{10^{-14}}{3.22 \times 10^{-5}} =$

5.  $pH = 2.55$ ;  $[H^+] = 2.82 \times 10^{-3} M$   $10^{-2.55} = 0.00282 M$

6.  $pH = 5.89$ ;  $pOH = 8.11$   $14 - 5.89 = 8.11$

7.  $pOH = 4.22$ ;  $[H^+] = 1.66 \times 10^{-10} M$   $14 - 4.22 = 9.78$   $10^{-9.78} = 1.66 \times 10^{-10} M$

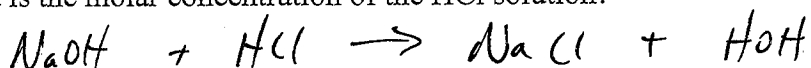
**Neutralization Reactions:** Complete and balance the following neutralization reactions.**Acid-Base Reactions:** In each of the reactions below, identify the acid, base, conjugate acid, and conjugate base by labeling below each compound.

**Titration Problems:** Solve the following problems. Show all your work.

15. 10 mL of 1M HCl are titrated with 0.25M NaOH. How many milliliters of NaOH are needed to titrate the acid?

\* Base is 4x weaker concentration (1M  $\rightarrow$  0.25M)  
 So 4x MORE volume will be needed. 40 mL

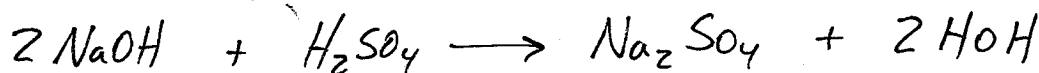
16. Megan titrates 15 mL of HCl with 8 mL of a solution of 0.125M NaOH. What is the molar concentration of the HCl solution?



$$0.125\text{M NaOH} = \frac{x}{0.008\text{ L}} \quad x = 0.001 \text{ moles NaOH}$$

$$[\text{HCl}] = \frac{0.001 \text{ mol}}{0.015 \text{ L}} = \boxed{0.067\text{M}}$$

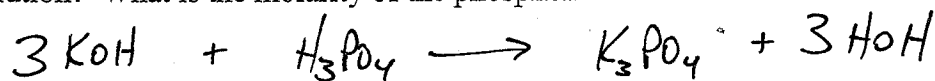
17. Jacob performs a titration on a 10 mL sample of  $\text{H}_2\text{SO}_4$ . If he adds 23.3 mL of a 0.50M NaOH solution, what is the molar concentration of the  $\text{H}_2\text{SO}_4$ ?



$$0.50\text{M NaOH} = \frac{x}{0.0233\text{ L}} \quad x = 0.0117 \text{ moles NaOH} \times \frac{1 \text{ mol H}_2\text{SO}_4}{2 \text{ mol NaOH}} = 0.00583 \text{ mol}$$

$$[\text{H}_2\text{SO}_4] = \frac{0.00583 \text{ mol}}{0.010 \text{ L}} = \boxed{0.583\text{M}}$$

18. A buret is filled with a solution of 1.0M KOH and used to titrate a 15 mL sample of  $\text{H}_3\text{PO}_4$ . The initial reading is 11.0 mL and the final reading is 33.8 mL at the endpoint of the titration. What is the concentration of hydrogen ions in the acid solution? What is the molarity of the phosphoric acid?



$$V = 33.8 \text{ mL} - 11.0 \text{ mL} = 22.8 \text{ mL KOH}$$

$$1.0\text{M KOH} = \frac{x}{0.0228 \text{ L}} \quad x = 0.0228 \text{ mol} \times \frac{1 \text{ H}_3\text{PO}_4}{3 \text{ KOH}} = 0.0076 \text{ mol H}_3\text{PO}_4$$

$$[\text{H}^+] = \frac{0.0228 \text{ mol}}{0.015 \text{ L}} = \boxed{1.52\text{M}}$$

$$[\text{H}_3\text{PO}_4] = \frac{0.0076 \text{ mol}}{0.015 \text{ L}} = \boxed{0.51\text{M}}$$