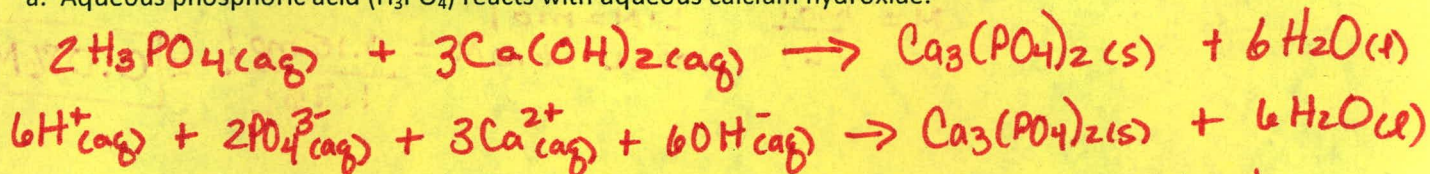


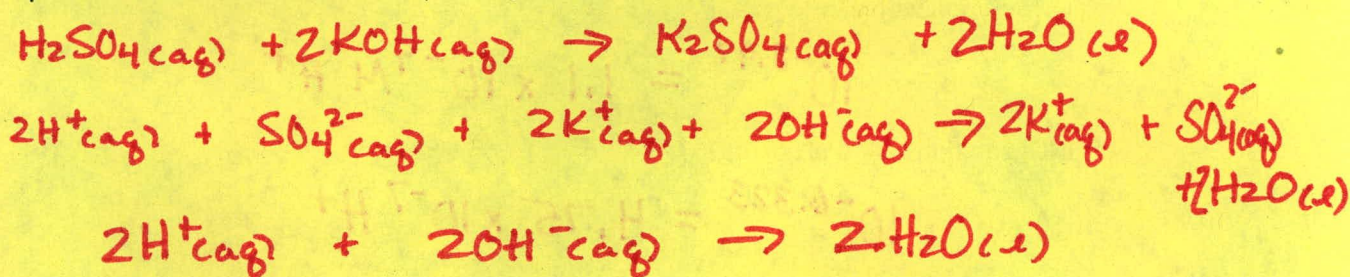
Review Worksheet
Acids/Bases

1. Write molecular, complete ionic and net ionic equations for the following neutralization reactions.
a. Aqueous phosphoric acid (H_3PO_4) reacts with aqueous calcium hydroxide.



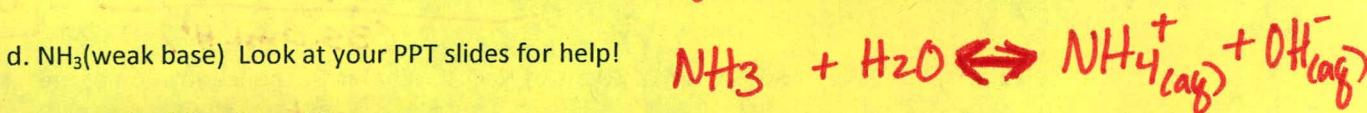
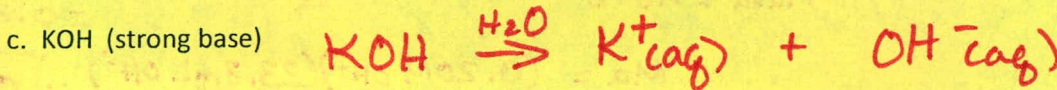
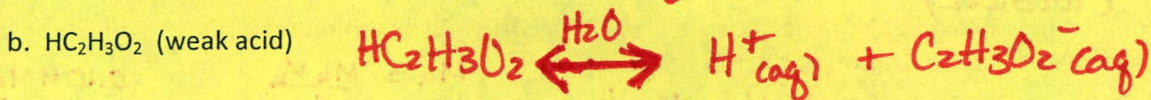
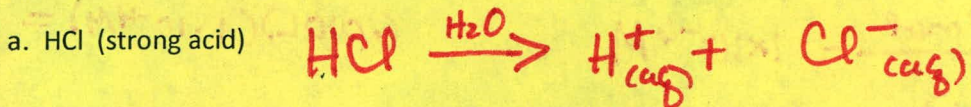
Net will be the same as complete ionic since the salt is insoluble and will precipitate out.
What is the final pH for this reaction? 7

- b. Aqueous sulfuric acid reacts with aqueous potassium hydroxide.



What is the final pH for this reaction? 7

2. Write equations to show the dissociation/ionization for the following in aqueous solution.



3. Complete the following table.

Acid	Base	Conjugate Acid	Conjugate Base	Equation
HNO_2	H_2O	H_3O^+	NO_2^-	$HNO_2 + H_2O \rightarrow NO_2^- + H_3O^+$
H_2O	F^-	HF	OH^-	$H_2O + F^- \rightarrow HF + OH^-$
HCN	NH_3	NH_4^+	CN^-	$NH_3 + HCN \rightarrow NH_4^+ + CN^-$
$HClO_3$	OH^-	H_2O	ClO_3^-	$HClO_3 + OH^- \rightarrow H_2O + ClO_3^-$
HSO_4^-	PO_4^{3-}	HPO_4^{2-}	SO_4^{2-}	$HSO_4^- + PO_4^{3-} \rightarrow HPO_4^{2-} + SO_4^{2-}$
H_2O	S^{2-}	HS^-	OH^-	$S^{2-} + H_2O \rightarrow OH^- + HS^-$
HCO_2H	OH^-	H_2O	CO_2H^-	$HCO_2H + OH^- \rightarrow H_2O + CO_2H^-$

4. Calculate the pH for the following and indicate if the solution is acidic, basic or neutral.

a. 0.25M HCl

$\text{pH} = 0.60$
ACID

b. $1.45 \times 10^{-3} \text{M H}_2\text{SO}_4$

$\text{pH} = 2.538$
ACID

c. $3.6 \times 10^{-2} \text{M NaOH}$

$\text{pOH} = 1.44$
 $\text{pH} = 12.56$
BASE

d. $8.334 \times 10^{-4} \text{HNO}_3$

$\text{pH} = 3.0791$
ACID

5. What is the pH of a solution made by diluting 25 mL of 6.0 M HCl until the final volume of the solution is 1.75 L?

$M = \frac{\text{mol}}{\text{L}}$ $L \cdot M = \text{mol}$
 $.025 \text{L} \cdot 6.0 \text{M} = \frac{0.15 \text{mol}}{1.75 \text{L}} = \boxed{0.086 \text{M}}$

6. What is the $[\text{H}^+]$ for the following:

a. An HCl solution with a pH of 3.45?

$[\text{H}^+] = 10^{-\text{pH}} = 10^{-3.45} = 3.5 \times 10^{-4} \text{M H}^+$

b. A NaOH solution with a pH of 8.97?

$10^{-8.97} = 1.1 \times 10^{-9} \text{M H}^+$

c. An HNO_3 solution with a pH of 6.323?

$10^{-6.323} = 4.75 \times 10^{-7} \text{H}^+$

7. An acidic solution has a pH of 4. If I dilute 10 mL of this solution to a final volume of 1000 mL, what is the pH of the resulting solution?

$[\text{H}^+] = 10^{-4} = 1 \times 10^{-4} \text{M}$
 $M = \frac{\text{mol}}{\text{L}}$
 $M \cdot L = \text{mol}$
 $(0.010 \text{L})(1 \cdot 10^{-4} \text{M}) = 1 \times 10^{-6} \text{mol}$
 $\frac{1 \times 10^{-6} \text{mol}}{1.000 \text{L (1000 mL)}} = 1 \times 10^{-6} \text{M}$

8. You titrate a 35.0 mL sample of HCl with 0.10 M $\text{Mg}(\text{OH})_2$. The titration requires 23.8 mL of the base. Calculate the concentration of the HCl solution.

$M_a V_a = M_b V_b$ $M_a = \frac{M_b V_b}{V_a}$ $0.10 \text{M Mg}(\text{OH})_2 = 0.20 \text{M OH}^-$

$M_a = \frac{(0.20 \text{M OH}^-)(23.8 \text{mL OH}^-)}{(35.0 \text{mL H}^+)} = \boxed{0.14 \text{M HCl}}$

9. You titrate 25.50 mL of 0.35 M H_2SO_4 with 18.60 mL of NaOH. What is the concentration of the NaOH?

$M_b = \frac{M_a V_a}{V_b}$ $M_a = 0.35 \text{M H}_2\text{SO}_4 \times \frac{2 \text{H}^+}{1 \text{H}_2\text{SO}_4} = 0.70 \text{M H}^+$

$M_b = \frac{(0.70 \text{M H}^+)(25.50 \text{mL})}{18.60 \text{mL}} = \boxed{0.96 \text{M NaOH}}$

10. What is meant when an acid is described as strong or weak?

Strong indicates molecules of acid will all ionize to form H^+ and an anion.

Weak means that only a few of the acid molecules will ionize to form H^+ and an anion.