Name: PILAR 2 Assign: 2

pH Problems

Concentrations: mixing an acid or base into water and calculating the molarity or strength

molarity = number of moles of solute per liter

Equation: $\frac{\text{moles}}{\text{volume (in L)}} = \text{molarity}$ OR $\frac{mol}{V} = M$

1. What is the concentration of 2 moles of HCl in 1 L of water?

$\frac{2 mol}{1 L} = 2M$

2. What is the concentration of 5 moles of HCl in 2.8L of water?

3. What is the concentration of 2.3 moles of HCl in 7500ml of water?

4. What is the concentration of 45g of HCl in 500ml of water?

5. What is the concentration of 250g of NaOH in 2L of water?

Dilution: taking an acid or base and adding water to it to change it to another concentration

Equation: molarity 1 x volume 1 = molarity 2 x volume 2

$M1 \times V1 = M2 \times V2$

6. If I add 25 mL ($V2$) of water to 125 mL ($V1$) of a 0.15 M ($M1$) NaOH solution, what will the molarity of the diluted solution be?

$125mL \times 0.15M = X \times 25mL$

$18.75 = X \cdot 25$

0.75M

7. If I add water to 100 mL of a 0.15 M NaOH solution until the final volume is 150 mL, what will the molarity of the diluted solution be?

8. How much 0.05 M HCl solution can be made by diluting 250 mL of 10 M HCl?

9. I have 345 mL of a 1.5 M NaCl solution. If I boil the water until the volume of the solution is 250 mL, what will the molarity of the solution be?

10. How much water would I need to add to 500 mL of a 2.4 M KCl solution to make a 1.0 M solution?

pH: measure of hydrogen ions (H^+)

less than 7 = acid
7 = neutral
greater than 7 = base

Equation:

$-\log[H^+ \text{ concentration}] = pH$

1. What is the pH of a solution with an H+ concentration of .0045 M?

   $-\log[.0045\ M] = \boxed{2.35}$ acid

2. What is the pH of a solution with a H+ concentration of 3.67×10^{-5} M?

3. Is a solution with a H+ concentration of 7.2×10^{-10} M acidic, basic or neutral?

4. Is a solution with a H+ concentration of 6.7×10^{-4} M acidic, basic or neutral?

5. What is the pH of a solution made of 35g of HCl dissolved in 2L of water?

6. What is the concentration of .6 moles of HCl in 1.3 L of water?

7. What is the concentration of 8 moles of HCl in 4L of water?

8. What is the concentration of 3.5 moles of HCl in 5600ml of water?

9. What is the concentration of 98g of HCl in 1100ml of water?

10. What is the concentration of 105g of KOH in 3L of water?

11. If I add 60 mL of water to 100 mL of a 0.75 M KOH solution, what will the molarity of the diluted solution be?

12. If I add water to 80 mL of a 0.15 M KOH solution until the final volume is 250 mL, what will the molarity of the diluted solution be?

13. How much 0.25 M HCl solution can be made by diluting 1.7L of 12 M HCl?