

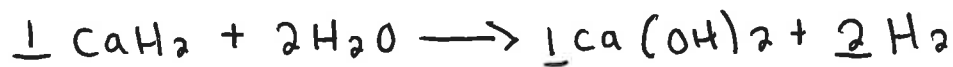
# Practice Assignment - Molarity / Titrations

- 1) What is the molarity of 6.75g NaCl dissolved in water to make a solution with a total volume of 452 mL.
- 2)  $2 \text{ NaOH} + 1 \text{ H}_2\text{SO}_4 \rightarrow 1 \text{ Na}_2\text{SO}_4 + 2 \text{ HOH} + \text{heat}$   
I have 20.0g of NaOH how many grams of HOH do I make?
- 3) 30.0g NaOH is diluted to 550 mL of HOH. What is the molarity of the solution?
- 4) How many moles are in 425.0 mL of .25M NaOH?
- 5) What is the molarity of a solution formed from 6.75g NaCl dissolved in water to make a solution with a total volume of 452?
- 6) I react 550 mL of 5.0M  $\text{H}_2\text{SO}_4$  with 20M NaOH. After neutralizing the solution. How many mL of NaOH did I start with?
- 7) It required 450.0 mL of 5.0M NaOH to neutralize 100.0 mL of an unknown concentration of  $\text{H}_2\text{SO}_4$ . What is the M of the  $\text{H}_2\text{SO}_4$ ?  
 $2 \text{ NaOH} + 1 \text{ H}_2\text{SO}_4 \rightarrow 1 \text{ Na}_2\text{SO}_4 + 2 \text{ HOH} + \text{heat}$
- 8) What is the concentration of .500L solution of HCl which is neutralized by .0250L of a .50M solution of  $\text{Ca}(\text{OH})_2$ ?  
 $2 \text{ HCl} + 1 \text{ Ca}(\text{OH})_2 \rightarrow 1 \text{ CaCl}_2 + 2 \text{ H}_2\text{O}$

9) A 25 mL solution of HCl is completely neutralized by 18 mL of 1.0 M NaOH. What is the concentration of the HCl solution?



10) Given the following reaction. How many mL of 6.3 M  $\text{H}_2\text{O}$  are required to neutralize 72.8 mL of 9.7 M  $\text{CaH}_2$ ?



# Molarity / Titration Answers

$$1) \frac{6.75 \text{ g NaCl}}{452 \text{ mL}} \times \frac{1 \text{ mol NaCl}}{58.4 \text{ g NaCl}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = 0.256 \text{ mol/L}$$

$$2) 20.0 \text{ g NaOH} \times \frac{1 \text{ mol NaOH}}{40 \text{ g NaOH}} \times \frac{2 \text{ mol H}_2\text{O}}{2 \text{ mol NaOH}} \times \frac{18 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 9.00 \text{ g H}_2\text{O}$$

$$3) \frac{30.0 \text{ g NaOH}}{550 \text{ mL NaOH}} \times \frac{1 \text{ mol NaOH}}{40.00 \text{ g NaOH}} \times \frac{1 \text{ mL}}{0.001 \text{ L}} = 1.50 \text{ mol/L NaOH}$$

$$4) 425.0 \text{ mL NaOH} \times \frac{0.001 \text{ NaOH}}{1 \text{ mL NaOH}} \times \frac{0.25 \text{ mol NaOH}}{1 \text{ NaOH}} = 0.106 \text{ mol NaOH}$$

$$5) \frac{6.75 \text{ g NaCl}}{452 \text{ mL}} \times \frac{1 \text{ mol NaCl}}{58.4 \text{ NaCl}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = 0.256 \text{ M}$$

$$6) 550 \text{ mL H}_2\text{SO}_4 \times \frac{0.001 \text{ L H}_2\text{SO}_4}{1 \text{ mL H}_2\text{SO}_4} \times \frac{5.0 \text{ mol H}_2\text{SO}_4}{1 \text{ L H}_2\text{SO}_4} \times \frac{2 \text{ mol NaOH}}{1 \text{ mol H}_2\text{SO}_4}$$

$$\times \frac{1 \text{ L NaOH}}{2.0 \text{ mol NaOH}} \times \frac{1 \text{ mL}}{0.001 \text{ L}} = 2,750 \text{ mL NaOH}$$

$$7) \begin{aligned} &.0250 \text{ L } (0.50 \text{ mol Ca(OH)}_2 = .013 \text{ mol(OH)}_2) \\ &.013 \text{ mol Ca(OH)}_2 \left( \frac{2 \text{ mol HCl}}{1 \text{ mol Ca(OH)}_2} \right) = .026 \\ &\frac{.026 \text{ mol HCl}}{.0500 \text{ L}} = .52 \text{ M HCl} \end{aligned}$$

$$8) \frac{.0250 \text{ L Ca(OH)}_2}{.500 \text{ L HCl}} \times \frac{0.50 \text{ mol Ca(OH)}_2}{1 \text{ L Ca(OH)}_2} \times \frac{2 \text{ mol HCl}}{1 \text{ mol Ca(OH)}_2} = 0.05 \text{ M}$$

## Answers

$$9) 0.018 \text{ L NaOH} \times \frac{1.0 \text{ mol NaOH}}{1 \text{ L NaOH}} \times \frac{1.0 \text{ mol HCl}}{1.0 \text{ mol NaOH}} = 0.018 \text{ mol HCl}$$

$$\frac{0.018 \text{ mol HCl}}{0.025 \text{ L}} = 0.72 \text{ M}$$

$$10) 72.8 \text{ mL CaH}_2 \times \frac{.001 \text{ L}}{1 \text{ mL}} \times \frac{9.7 \text{ moles CaH}_2}{1 \text{ L}} \times \frac{2 \text{ moles H}_2\text{O}}{1 \text{ CaH}_2} \times \frac{1 \text{ L}}{6.3 \text{ moles H}_2\text{O}}$$

$$\times \frac{1 \text{ mL}}{.001 \text{ L}} = 224.0 \text{ mL H}_2\text{O}$$