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Milwaukee HS • AP Chemistry

Name \_\_\_\_\_  
Period \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

### 5 • Reactions in Aqueous Solution

**Notes:**  
Concentration can be measured in terms of molarity  $M$ .  
Molarity =  $\frac{\text{moles of solute}}{\text{Liters of solution}}$  often  $M$   
moles of solute = (Molarity)  $\times$  (Liters of solution)

Dilution problems can be solved with the formula:  $V_1M_1 = V_2M_2$   
Molarity can be used as a conversion factor to convert moles to Liters of solutions.

**Solution Concentration**  
60. If 0.75 g of  $\text{Na}_2\text{CO}_3$  is dissolved in enough water to make 250 mL of solution, what is the molarity of the sodium carbonate?

62. What is the mass, in grams, of solute in 250 mL of a 0.0125 M solution of  $\text{KMnO}_4$ ?

64. What volume of 0.125 M  $\text{NaOH}$  in milliliters contains 2.10 g of  $\text{NaOH}$ ?

**Dilution Problems**  
66. If 4.00 mL of 0.250 M  $\text{CaCl}_2$  is diluted to 10.0 mL with pure water, what is the molarity of copper(II) sulfate in the diluted solution?

**Ion Concentrations**  
70. For each solution, identify the ions that exist in aqueous solution, & specify the concentration of each.  
a) 0.25 M  $\text{NH}_4\text{NO}_3$   
b) 0.50 M  $\text{HNO}_3$   
c) 0.25 M  $\text{Na}_2\text{CO}_3$   
d) 0.60 M  $\text{KClO}_4$

**Stoichiometry of Reactions in Solution**  
72. What volume of 0.125 M  $\text{HNO}_3$  in milliliters is required to react completely with 1.30 g of  $\text{Ba(OH)}_2$ ?  
 $2 \text{HNO}_3(aq) + \text{Ba(OH)}_2(aq) \rightarrow \text{Ba(NO}_3)_2(aq) + 2 \text{H}_2\text{O}(l)$

76. In the photographic developing process, silver bromide dissolved by adding sodium thiosulfate:  
 $\text{AgBr}(s) + 2 \text{Na}_2\text{S}_2\text{O}_3(aq) \rightarrow \text{Na}_4\text{Ag}_2\text{S}_2\text{O}_6(aq) + 2 \text{NaBr}(aq)$   
If you want to dissolve 0.250 g of  $\text{AgBr}$ , what volume of 0.100 M  $\text{Na}_2\text{S}_2\text{O}_3$  in milliliters should be used?

**Titration**  
82. What volume of 0.812 M  $\text{HCl}$  in milliliters is required to titrate 1.33 g of  $\text{NaOH}$  to the equivalence point?  
 $\text{NaOH}(aq) + \text{HCl}(aq) \rightarrow \text{NaCl}(aq) + \text{H}_2\text{O}(l)$

84. What volume of 0.955 M  $\text{HCl}$  in milliliters is needed to titrate 2.15 g of  $\text{Na}_2\text{CO}_3$  to the equivalence point?  
 $\text{Na}_2\text{CO}_3(aq) + 2 \text{HCl}(aq) \rightarrow 2 \text{NaCl}(aq) + \text{CO}_2(g) + \text{H}_2\text{O}(l)$

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**Reactions In Aqueous Solutions Worksheet Answers**