South Pasadena • AP Chemistry

Name _____
Period ___ Date __/__/__

5 • Reactions in Aqueous Solution

M O L A R I T Y

Notes:

Concentration can be measured in terms of molarity (M).

$$\text{Molarity} = \frac{\text{moles of solute}}{\text{Liters of solution}} \quad \textit{also}$$

moles of solute = (Molarity) × (Liters of solution)

Dilution problems can be solved with the formula: **V·M = V·M**

Molarity can be used as a conversion factor to convert **moles** to **Liters** of solutions.

Solution Concentration

60. If 6.73 g of Na_2CO_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 $KMnO_4$?

64. What volume of 0.123 m NaOH, in milliliters, contains 25.0 g of NaOH?

Dilution Problems

66. If 4.00 mL of 0.0250 M $CuSO_4$ 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 $(NH_4)_2SO_4$
    b) 0.056 M HNO_3
    c) 0.123 M Na_2CO_3
    d) 0.00124 M $KClO_4$

Stoichiometry of Reactions in Solution

72. What volume of 0.125 M HNO_3, in milliliters, is required to react completely with 1.30 g of $Ba(OH)_2$?

$$2\ HNO_3(aq) + Ba(OH)_2(s) \rightarrow Ba(NO_3)_2(aq) + 2\ H_2O(l)$$

76. In the photographic developing process, silver bromide is dissolved by adding sodium thiosulfate:

$$AgBr(s) + 2\ Na_2S_2O_3(aq) \rightarrow Na_3Ag(S_2O_3)_2(aq) + NaBr(aq)$$

If you want to dissolve 0.250 g of AgBr, what volume of 0.0138 M $Na_2S_2O_3$, in milliliters, should be used?

Titrations

82. What volume of 0.812 M HCl, in milliliters, is required to titrate 1.33 g of NaOH to the equivalence point?

$$NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l)$$

84. What volume of 0.955 M HCl, in milliliters, is needed to titrate 2.152 g of Na_2CO_3 to the equivalence point?

$$Na_2CO_3(aq) + 2\ HCl(aq) \rightarrow 2\ NaCl(aq) + CO_2(g) + H_2O(l)$$

Lecture Experiment

Objective: Prepare a solution of a certain molarity and check to see if the amount of solute obtained from a sample that is poured out, matches the theoretical value of the solute.

Information:

Solute is _____ Solvent is _____

Mass of Solute _____ ± .01 grams M.W. of Solute _____

Volume of Solution _____

Sketch a diagram of the volumetric flask and what is inside:

Calculated # of moles of Solute = _____

Calculated Molarity of Solution = _____

Volume of Solution poured out into Container: _____

Theoretical Calculated Value of the mass of solute contained in the volume poured out:

_____

Mass of flask with evaporated salt: _____ ± .01 grams

Mass of dry empty Erlenmeyer flask: _____ ± .01 grams

Calculated mass of Salt (solute) _____ ± .02 grams

% Error = $\left|\frac{\quad}{\quad}\right| \times 100 =$