Molarity Problems 1 Answer Key

1) **How many moles of Na^+ ions are there in 22.0 mL of 0.150 M Na_2CO_3 solution**?

M=moles/Liter mol=ML = (.150M)(.0220 L) = .0033 mol Na_2CO_3

.0033 mol Na_2CO_3 x (2 mol Na/ mol Na_2CO_3) = .0066 mol Na^+ ions

2) **What is the molar concentration of potassium permanganate in a solution prepared by dissolving 47.4 g of $KMnO_4$ in water and then making up the solution to 2.50 L?**

47.4 g $KMnO_4$ x (mol/ 157.58g) = .301 mol $KMnO_4$

.301 mol/2.50 L= .120 M

3) **How many grams of $KMnO_4$ would be required to prepare 200mL of a 0.178M solution?**

mol= ML → mol = .2 x .178= (.0356 mol $KMnO_4$ x 157.58g/mol) = 5.61 g $KMnO_4$

4) **How many mL of a 0.130 M solution of $CaCl_2$ contains 2.00g of $CaCl_2$?**

2.00g $CaCl_2$ x (mol/110.97g) = .018 mol $CaCl_2$

L= mol/M=.018/.130= .138L = 138 mL

5) **How many grams of sodium chloride should be put into a 50.0 mL volumetric flask to give 0.15 M solution when the flask is filled to the score mark with water?**

M=mol/L ---→ mol= ML= (.05) (.15) =.0075 mol NaCl

.0075 mol NaCl x 58.43g/mol= .438 g NaCl

6) **What is the maximum weight of 2.00 L of 1.00 M of $CaCl_2$ with 3.00 L of 0.500 M Na_3PO_4?**

3 $CaCl_2$ + 2 Na_3PO_4 -----→ $Ca_3(PO_4)_2$ + 6 NaCl

Mole= 1.00 M x 2.00 L = 2.00 mol

1.0 mol/L x 200L x (1 $Ca_3(PO_4)_2$/ 3 $CaCl_2$) = .6667 mol $Ca_3(PO_4)_2$ limiting reagent

.500 mol/L x 3.00 L Na_3PO_4 x (1 $Ca_3(PO_4)_2$/ 2 Na_3PO_4) = .75 mol $Ca_3(PO_4)_2$

.6607 mol $Ca_3(PO_4)_2$ x 310.07g/mol = 206.71g $Ca_3(PO_4)_2$