Dilutions WS

Name: Key

$$M_1V_1 = M_2V_2$$

(1) If you dilute 175 mL of a 1.6 M solution of LiCl to 1000. mL, determine the new concentration of the solution.

$M_1 = 1.6\,M$
$V_1 = 175\,mL$
$M_2 =$
$V_2 = 1000\,mL$

$M_1V_1 = M_2V_2$

$\frac{M_1V_1}{V_2} = M_2 = \frac{(1.6\,M)(175\,mL)}{(1000\,mL)} = 0.28\,M$

(2) How many milliliters of 5.0 M copper(II) sulfate solution ~~must be added~~ to 160 mL of ~~water~~ total volume to achieve a 0.30 M copper(II) sulfate solution?

$M_1 = 5.0\,M$
$V_1 = ?$
$M_2 = 0.3\,M$
$V_2 = 160\,mL$

$M_1V_1 = M_2V_2$

$V_1 = \frac{M_2V_2}{M_1} = \frac{(0.3\,M)(160\,mL)}{5.0\,M} = 9.6\,mL$

(3) If 250 mL of 0.10 M lithium acetate solution is diluted to a volume of 750 mL, what will the concentration of this solution be?

$M_1 = 0.10\,M$
$V_1 = 250\,mL$
$M_2 =$
$V_2 = 750\,mL$

$M_1V_1 = M_2V_2$

$\frac{M_1V_1}{V_2} = M_2 = \frac{(0.10\,M)(250\,mL)}{(750\,mL)} = 0.033\,M$

(4) 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? *Hint: First calculate the total volume of the solution, then determine the volume of water that you need to add.*

$M_1 = 2.4\,M$
$V_1 = 500\,mL$
$M_2 = 1.0\,M$
$V_2 = ?$

$M_1V_1 = M_2V_2$

$\frac{M_1V_1}{M_2} = V_2 = \frac{(2.4\,M)(500\,mL)}{(1.0\,M)} = 1200\,mL$ total volume

total volume $- V_1$ = Volume of water $= 700\,mL\ H_2O$

(5) 250. mL of water is added to 150. mL of 1.25 M sucrose solution. What is the concentration of the new solution?

$M_1 = 1.25\,M$
$V_1 = 150\,mL$
$M_2 = ?$
$V_2 = 250\,mL + 150\,mL$
$= 400\,mL$

$M_1V_1 = M_2V_2$

$\frac{M_1V_1}{V_2} = M_2 = \frac{(1.25\,M)(150\,mL)}{400\,mL}$

$= 0.469\,M$