Name: KEY

Dilution Problems

Remember that moles = moles, so $M_1V_1 = M_2V_2$.

1. A solution of 1.00 M NaCl is available. How many milliliters of this solution are needed to make a total of 100.0 mL of 0.750 M NaCl solution. $\frac{(1.00\text{ M NaCl})(V_1)}{1.00\text{ M}} = \frac{(.750\text{ M NaCl})(100.0\text{ mL})}{1.00\text{ M}} = 75\text{ mL}$ 75.0 mL

2. What volume of 0.250 M KCl is needed to make 100.0 mL of 0.100 M KCl solution? $(.250\text{ M})(V_1) = (100\text{ mL})(.100\text{ M})$ $V_1 = 40.0\text{ mL}$

3. Concentrated H_2SO_4 is 18.0 M. What volume of 18 M solution is needed to make 2.00 L of 1.00 M H_2SO_4 solution? $(18\text{ M})(V_1) = (2\text{ L})(1.00\text{ M})$ $V_1 = 0.111\text{ L}$

4. Concentrated HCl is 12.0 M. What volume of 12 M solution is needed to make 2.00 L of 1.00 M HCl solution? $(12\text{ M})(V_1) = (2\text{ L})(1.00\text{ M})$ $V_1 = 0.167\text{ L}$

5. A solution of 10.0 M NaOH is prepared. From this solution, you need to make 250.0 mL of 0.375 M NaOH solution. How many mL will be required? $(10.0\text{ M})(V_1) = (250\text{ mL})(.375\text{ M})$ $V_1 = 9.38\text{ mL}$

6. A solution of 6.00 M KOH is prepared. From this solution, you need to make 250.0 mL of 0.875 M solution. How many mL will be required? $(6.00\text{ M})(V_1) = (250\text{ mL})(.875\text{ M})$ $V_1 = 36.5\text{ mL}$

7. 2.00 L of 0.800 M $NaNO_3$ must be prepared from a solution which 1.50 M in concentration. How many mL of the 1.50 M are required? $(2.00\text{ L})(.800\text{ M}) = (1.50\text{ M})(V_2)$ $V_2 = 1.07\text{ L}$

8. 2.00 L of 0.800 M KNO_3 must be prepared from a solution which 1.50 M in concentration. How many mL of the 1.50 M are required? $(2.00\text{ L})(.800\text{ M}) = (1.50\text{ M})(V_2)$ $V_2 = 1.07\text{ L}$

9. A 0.500 M solution is to be diluted to 500.0 mL with the new concentration to be 0.150 M. How many mL of the 0.500 M solution are required? $(.150\text{ M})(500.0\text{ mL}) = (V_2)(.500\text{ M})$ $V_2 = 150\text{ mL}$

These two are a bit more difficult. Hint - calculate the total moles present and the total volume the moles are dissolved in.

10. Calculate the final concentration if 2.00 L of 3.00 M NaCl and 4.00 L of 1.50 M NaCl are mixed.

$\frac{2.00\text{ L}}{1} \times \frac{3.00\text{ mol}}{1\text{ L}} = 6\text{ mol NaCl}$ $\frac{4.00\text{ L}}{1} \times \frac{1.5\text{ mol}}{1\text{ L}} = 6\text{ mol NaCl}$ $\frac{12\text{ mol NaCl}}{6\text{ L}} = 2\text{ mol/L}$ or 2.00 M NaCl

11. Calculate the final concentration if 2.00 L of 3.00 M NaCl, 4.00 L of 1.50 M NaCl and 4.00 L of water are mixed.

$\frac{2.0\text{ L}}{1} \times \frac{3.0\text{ mol}}{1\text{ L}} = 6\text{ mol}$

$\frac{4.0\text{ L}}{1} \times \frac{1.5\text{ mol}}{1\text{ L}} = 6\text{ mol}$

$\frac{12\text{ mol NaCl}}{10\text{ L}} = 1.20\text{ M NaCl}$