



(#4-2c)
Dilution

DILUTION:

$$\text{MOLARITY}_1 * \text{VOLUME}_1 = \text{MOLARITY}_2 * \text{VOLUME}_2 \quad (M_1 V_1 = M_2 V_2)$$

1 = before 2 = after

• NOTE:

- Make sure you are consistent with the units used in your equation.
- V_2 = equals total volume. Starting volume plus added volume.

PRACTICE PROBLEMS:

1. 6.0 M STOCK SOLUTION OF HCl. Your experiment calls for 750mL of 2.0M HCl. How much 6.0 M HCl is need in this dilution?

$$\begin{aligned} M_1 V_1 &= M_2 V_2 \\ 6 \times 2 &= 2 \cdot 750 \\ X &= 250 \text{ L} \end{aligned}$$

2. In an acid spill, 15.0L of Concentrated Sulfuric acid (16.0M) needs to be diluted. If all this acid is diluted down to 2.0 M. What is the ending volume?

$$\begin{aligned} M_1 V_1 &= M_2 V_2 \\ 16 \cdot 15 \text{ L} &= 2 \cdot X \\ X &= 120 \text{ L} \end{aligned}$$

3. 10.00 mL of 2.0M NaCl is added to 1.0 liter of H₂O. What is the new concentration?

$$\begin{aligned} M_1 V_1 &= M_2 V_2 & V_2 &= V_1 + \text{add} \\ 2 \cdot 10 &= X \cdot 1010 & 10 + 1000 & \\ X &= 0.019 \text{ M} & &= 1010 \text{ mL} \end{aligned}$$

4. A solution is diluted down from 100.0 mL to 1.0L and the ending concentration is 0.1M. What is the original concentration? $\sim 0.1 \text{ L}$

$$\begin{aligned} M_1 V_1 &= M_2 V_2 \\ X \cdot 100 &= 0.1 \cdot 1.0 \\ X &= 1 \text{ M} \end{aligned}$$

5. How much water is added to a solution that is 50.0 mL of 5.0M if it needs to be diluted down to 2.0 M.

$$\begin{aligned} M_1 V_1 &= M_2 V_2 \\ 5 \cdot 0.5 \text{ L} &= 2 \cdot X \end{aligned}$$

$$X = 0.125$$

total volume
50 mL
125 mL
add
75 mL