

## Answer on Question #62985 - Chemistry - General Chemistry

Question:

You wish to make a 0.404 M hydrochloric acid solution from a stock solution of 6.00 M hydrochloric acid. How much concentrated acid must you add to obtain a total volume of 50.0 mL of the dilute solution?

Solution:

I propose two ways – one more formal, another one is more like “rule of a thumb”. You choose what is more appropriate.

- 1) Find how much acid should be in the final solution and then find the volume of initial solution containing that amount of acid:

0.404 M solution means that 1 L of solution contains 0.404 moles of acid. Then 50.0 mL (0.0500 L) of such solution contains  $(0.0500 \text{ L}/1\text{L}) * 0.404 \text{ mol} = 0.0202 \text{ moles}$ .

Find amount of stock solution containing 0.0202 moles of acid:

1 L of 6.00M solution contains 6.00 moles of acid. Then 0.0202 moles is in  $(0.0202 \text{ moles}/6.00 \text{ moles}) * 1\text{L} = 0.0034 \text{ L} = \mathbf{3.4 \text{ mL}}$ .

- 2) There is simple rule of diluting – ratio of volumes of initial (0) and final (1) solution is opposite to the ratio of molar concentrations:  $V_0/V_1 = M_1/M_0$ . From here  $V_0 = V_1 * M_1/M_0$ . Units do not matter; important is to have the same units in initial and final systems.

Calculate:  $V_0 = 50.0 \text{ mL} * (0.404\text{M}/6.00\text{M}) = \mathbf{3.4 \text{ mL}}$

**Answer:**

To obtain a total volume of 50.0 mL of the dilute solution you have to take **3.4 ml** of stock solution.