

Dilutions ... $M_1V_1 = M_2V_2$

1. To what final volume must 250. mL of a 5.00 M HCl solution be diluted to create a 2.00 M solution?

M_2 V_2 M_1 V_1

$\frac{M_1 V_1}{M_2} = V_2$

$\frac{5.00 \text{ M} \times 250. \text{ mL}}{2.00 \text{ M}} = 625 \text{ mL}$

2. What initial volume of full-strength (18.0 M) H_2SO_4 was used to create 2.00 L of 0.100 M sulfuric acid?

M_2 V_2 M_1 V_1

$V_1 = \frac{M_2 V_2}{M_1}$

$\frac{0.100 \text{ M} \times 2.00 \text{ L}}{18.0 \text{ M}} = 0.0111 \text{ L}$

3. You are doing a lab that requires 250.0 mL of 1.50 M acetic acid. The only acetic acid available is 17.5 M. What volume of acid must you use?

M_1 V_1 M_2 V_2

$V_1 = \frac{M_2 V_2}{M_1}$

$\frac{1.50 \text{ M} \times 250.0 \text{ mL}}{17.5 \text{ M}} = 21.4 \text{ mL}$

4. To what volume will you have to dilute 30.0 mL of a 12.0 M HCl solution to make a 0.350 M HCl solution?

M_1 V_1 M_2 V_2

$V_2 = \frac{M_1 V_1}{M_2}$

$\frac{12.0 \text{ M} \times 30.0 \text{ mL}}{0.350 \text{ M}} = 1030 \text{ mL}$

5. How many milliliters of 16.0 M sulfuric acid must be used to prepare 1.50 L of a 0.0100 M acid solution?

M_1 V_1 M_2 V_2

$V_1 = \frac{M_2 V_2}{M_1}$

$\frac{0.0100 \text{ M} \times 1.50 \text{ L}}{16.0 \text{ M}} = 0.938 \text{ mL}$

6. What volume of 12.0 M HCl must be taken to prepare 0.750 L of 0.250 M HCl?

0.0156 L

$$V_1 = \frac{V_2 M_2}{M_1} = \frac{0.250 \text{ M} \times 0.750 \text{ L}}{12.0 \text{ M}}$$

7. If 850 mL of a 5.00 M solution of $\text{Cu}(\text{NO}_3)_2$ is diluted to a volume of 1.80 L by adding water, what is the molarity of the resulting diluted solution?

2.4 M

$$M_2 = \frac{V_1 M_1}{V_2}$$

$$M_2 = \frac{850 \text{ mL} \times 5.00 \text{ M}}{1.80 \text{ L} \times 1000 \text{ mL/L}}$$

8. How would you prepare 100. mL of 0.600 M MgSO_4 from a stock solution of 3.00 M MgSO_4 ?

20.0 mL

$$V_1 = \frac{V_2 M_2}{M_1}$$

$$V_1 = \frac{0.600 \text{ M} \times 100. \text{ mL}}{3.00 \text{ M}}$$

- Take 20.0 mL of 3.00 M MgSO_4
- Add 80.0 mL of H_2O
- Now have 100. mL of 0.600 M MgSO_4