

Dilutions (*Molarity by Dilution*)

Name _____

Acids and other solutions are usually acquired from chemical supply houses in concentrated form (*up to 18 M*) and are diluted to the desired concentration by adding distilled water. Through the process of dilution, you only add water (the solvent) and not more moles of the solute, the moles of solute before dilution = moles of solute after the dilution. The M_1 and V_1 are the molarity and the volume before the dilution and the M_2 and V_2 are the molarity and volume after the dilution. The molarity has to be in M, and volume can be in any unit (L or mL, etc.) as long as both V_1 and V_2 match units.

$$M_1V_1 = M_2V_2$$

Solve the problems below. Show all your work and include units on your work and the final answer. Answers should be expressed to the correct number of significant figures.

1. How much concentrated 18 M sulfuric acid is needed to prepare 250 mL of a 6.0 M solution?
2. How much concentrated 12 M hydrochloric acid is needed to prepare 100. mL of a 2.0 molar solution?
3. To what volume should 25 mL of 15 M nitric acid be diluted to prepare a 3.0 M solution?
4. To how much water should 50. mL of 12 M hydrochloric acid be added to produce a 4.0 M solution?
5. To how much water should 100. mL of 18 M sulfuric acid be added to prepare a 1.5 M solution?

6. If I add 25 mL of water to 125 mL of a 0.15 M NaOH solution, what will the molarity of the diluted solution be?

7. If I add water to 100 mL of a 0.15 M NaOH solution until the final volume is 150 mL, what will the molarity of the diluted solution be?

8. How much 0.05 M HCl solution can be made by diluting 250 mL of 10 M HCl?

9. I have 345 mL of a 1.5 M NaCl solution. If I boil the water until the volume of the solution is 250 mL, what will the molarity of the solution be?

10. 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?