

Dilution Notes

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Dilution Notes

What you are doing when you are diluting a solution is adding in solvent without changing the amount of solute in the solution.

As you know, multiplying the Molarity of the solution time the Volume of the solution (in Liters) will give you the number of moles of the solute. So when when you dilute a concentrated solution (that has a Molarity, M_c and volume V_c) with solvent, you create a dilute solution (that has a Molarity, M_d and a volume V_d). The actual number of moles of solute has not changed from concentrated conditions to dilute conditions. So the following equation can be used:

$$M_c V_c = M_d V_d$$

So the actual equations you are going to use in you problems are:

$$M_c = M_d \left(\frac{V_d}{V_c} \right)$$

$$M_d = M_c \left(\frac{V_c}{V_d} \right)$$

$$V_c = V_d \left(\frac{M_d}{M_c} \right)$$

$$V_d = V_c \left(\frac{M_c}{M_d} \right)$$

Here is an example of a problem, How many liters of a concentrated sodium chloride solution do I have if the molarity of the concentrated solution was 3.12M and after dilution, the dilute solution conditions are 4.21L and a 0.827M?

$$V_c = ?$$

$$M_c = 3.12M$$

$$V_c = V_d \left(\frac{M_d}{M_c} \right)$$

$$V_d = 4.21L$$

$$= (4.21L) \left(\frac{0.827M}{3.12M} \right)$$

$$M_d = 0.827M$$

$$V_c = 1.115L$$

$$V_c = 1.12L$$