**Chemistry B Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 **Period\_\_\_\_\_\_\_\_\_**

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### Dilutions: Definition and Calculations

To dilute a solution means to add more solvent without the addition of more solute. Of course, the resulting solution is thoroughly mixed so as to ensure that all parts of the solution are identical.

The fact that the solute amount stays constant allows us to use the following formula.

First, write:

**M1V1 = M2V2**

The volumes need not be converted to liters. Any old volume measurement is fine, just so long as the same one is used on each side.

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### Practice Problems

1. A stock solution of 1.00 M NaCl is available. How many milliliters are needed to make 100.0 mL of 0.750 M

2. What volume of 0.250 M KCl is needed to make 100.0 mL of 0.100 M solution?

3. Concentrated H2SO4 is 18.0 M. What volume is needed to make 2.00 L of 1.00 M solution?

4. Concentrated HCl is 12.0 M. What volume is needed to make 2.00 L of 1.00 M solution?

5. A 0.500 M solution is to be diluted to 500.0 mL of a 0.150 M solution. How many mL of the 0.500 M solution are required?

6. A stock solution of 10.0 M NaOH is prepared. From this solution, you need to make 250.0 mL of 0.375 M solution. How many mL will be required?

7. 2.00 L of 0.800 M NaNO3 must be prepared from a solution known to be 1.50 M in concentration. How many mL are required?

**Dilutions**

1) If you add 25 mL of water to 125 mL of a 0.15 M NaOH solution, what will the Molarity of the diluted solution be?

2) If you 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?

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

4) You have 345 mL of a 1.5 M NaCl solution. If you boil the water until the volume of the solution is 250 mL, what will the Molarity of the solution be?

5) How much water would you need to add to 500 mL of a 2.4 M KCl solution to make a 1.0 M solution?

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**Dilutions Worksheet - Solutions**

1) 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?

**M1V1 = M2V2**

**(0.15 M)(125 mL) = x (150 mL)**

**x = 0.125 M**

2) 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?

**M1V1 = M2V2**

**(0.15 M)(100 mL) = x (150 mL)**

**x = 0.100 M**

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

**M1V1 = M2V2**

**(10 M)(250 mL) = (0.05 M) x**

**x = 50,000 mL**

4) 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?

**M1V1 = M2V2**

**(1.5 M)(345 mL) = x (250 mL)**

**x = 2.07 M**

5) 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?

**M1V1 = M2V2**

**(2.4 M)(500 mL) = (1.0 M) x**

**x = 1200 mL**

 **1200 mL will be the final volume of the solution. However, since there’s already 500 mL of solution present, you only need to add 700 mL of water to get 1200 mL as your final volume. The answer: 700 mL.**