Molarity Review Problems

1) What is the molarity of a solution in which 0.45 grams of sodium nitrate are dissolved in 265 mL of solution.

2) How many grams of beryllium chloride are needed to make 125 mL of a 0.050 M solution?

Dilutions Worksheet

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?

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?

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

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?

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?

Titrations Practice Worksheet

Find the requested quantities in the following problems:

1) If it takes 54 mL of 0.1 M NaOH to neutralize 125 mL of an HCl solution, what is the concentration of the HCl?

2) If it takes 25 mL of 0.05 M HCl to neutralize 345 mL of NaOH solution, what is the concentration of the NaOH solution?

3) Explain the difference between an endpoint and equivalence point in a titration.

Molarity Review Problems- Solutions

1) What is the molarity of a solution in which 0.45 grams of sodium nitrate ($NaNO_3$) are dissolved in 265 mL of solution.

Molarity = mass in grams x 1 mole = .45g x 1 mole
Volume in liters x molar mass .265 L x 85.00g

0.020 M

2) How many grams of beryllium chloride ($BeCl_2$) are needed to make 125 mL of a 0.050 M solution?

Molarity = mass in grams x 1 mole 0.050M = X x 1 mole
Volume in liters x molar mass .125L x 79.91g

0.50 grams

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?

$$M_1V_1 = M_2V_2$$
$$(0.15\ M)(125\ mL) = x\ (150\ mL)$$
$$x = 0.125\ M$$

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?

$$M_1V_1 = M_2V_2$$
$$(0.15\ M)(100\ mL) = x\ (150\ mL)$$
$$x = 0.100\ M$$

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

$$M_1V_1 = M_2V_2$$
$$(10\ M)(250\ mL) = (0.05\ M)\ x$$
$$x = 50{,}000\ mL$$

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?

$$M_1V_1 = M_2V_2$$
$$(1.5\ M)(345\ mL) = x\ (250\ mL)$$
$$x = 2.07\ M$$

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?

$M_1V_1 = M_2V_2$
(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.

Titrations Practice Worksheet- Solutions

1) If it takes 54 mL of 0.1 M NaOH to neutralize 125 mL of an HCl solution, what is the concentration of the HCl?

2) If it takes 25 mL of 0.05 M HCl to neutralize 345 mL of NaOH solution, what is the concentration of the NaOH solution?

For questions 1 and 2, the units for your final answer should be "M", or "molar", because you're trying to find the molarity of the acid or base solution. To solve these problems, use $M_1V_1 = M_2V_2$.

1) 0.043 M HCl
2) 0.0036 M NaOH

3) Explain the difference between an endpoint and equivalence point in a titration.

3) Endpoint: When you actually stop doing the titration (usually, this is determined by a color change in an indicator or an indication of pH=7.0 on an electronic pH probe)
Equivalence point: When the solution is exactly neutralized. It's important to keep in mind that the equivalence point and the endpoint are not exactly the same because indicators don't change color at exactly 7.0000 pH and pH probes aren't infinitely accurate. Generally, you can measure the effectiveness of a titration by the closeness of the endpoint to the equivalence point.