Making Dilution Worksheet

1. You need to make 10.0 L of 1.2 M KNO_3. What molarity would the potassium nitrate solution need to be if you used only 2.5 L of it?

2. Using a 4.0 M solution of $MgSO_4$, determine how to make 300 mL of a 1.7 M dilution.

3. If you dilute 174 mL of a 1.6 M solution of LiCl to 1.0 L, determine the new concentration of the solution.

4. One liter of a solution is prepared by dissolving 125.6 g of NaF in it. If you took 180 mL of that solution and diluted it to 500 mL, determine the molarity of the resulting solution.

5. Exactly 16.0 mL of solution A is diluted to 300 mL, resulting in a new solution B with a 0.50 M concentration. If the solution was made with NaCl, determine the number of grams of NaCl needed to make 1.00 L of the original solution A.

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Answers

1. You need to make 10.0 L of 1.2 M KNO_3. What molarity would the potassium nitrate solution need to be if you used only 2.5 L of it?

$M_1V_1 = M_2V_2$

$\Rightarrow 1.2\ M \times 10.0\ L = M_2 \times 2.5\ L$

$\Rightarrow M_2 = (1.2\ M \times 10.0\ L)/2.5\ L = 4.8\ M$

2. Using a 4.0 M solution of $MgSO_4$, determine how to make 300 mL of a 1.7 M dilution.

$M_1V_1 = M_2V_2$

$\Rightarrow 4\ M \times V_1 = 1.7\ M \times 300\ mL$

$\Rightarrow V_1 = (1.7\ M \times 300\ mL)/4\ M = 128\ mL$

Volume of water to be added = 300 – 128 = 172 mL

3. If you dilute 174 mL of a 1.6 M solution of LiCl to 1.0 L, determine the new concentration of the solution.

$M_1V_1 = M_2V_2$

$\Rightarrow 1.6\ M \times 0.174\ L = M_2 \times 1.0\ L$

$\Rightarrow M_2 = (1.6\ M \times 0.174\ L)/1.0\ L = 0.28\ M$

4. One liter of a solution is prepared by dissolving 125.6 g of NaF in it. If you took 180 mL of that solution and diluted it to 500 mL, determine the molarity of the resulting solution.

Moles of NaF (M_1) = 126 g x 1 mol/42 g = 3 mol

Molarity (M_1) = 3 mol/1 L = 3 M

$M_1V_1 = M_2V_2$

$\Rightarrow 3\ M \times 180\ mL = M_2 \times 500\ mL$

$\Rightarrow M_2 = (3\ M \times 180\ mL)/500\ mL = 1.08\ M$

5. Exactly 16.0 mL of solution A is diluted to 300 mL, resulting in a new solution B with a 0.50 M concentration. If the solution was made with NaCl, determine the number of grams of NaCl needed to make 1.00 L of the original solution A.

$M_1V_1 = M_2V_2$

$\Rightarrow M_1 \times 16\ mL = 0.5\ M \times 300\ mL$

$\Rightarrow M_1 = (0.5\ M \times 300\ mL)/16\ mL = 9.38\ M$

Moles of NaCl = 9.38 M x 1.00 L = 9.38 mol

Amount of NaCl = 9.38 mol x 58.5 g/mol = 548.4 g