

Name : _____ Date : _____

Molarity and Dilution

1. 28 g of KCl is dissolved in 225 mL of water. Calculate the molarity.
2. Calculate the mass of KCl required to prepare 125 mL of 0.450 M solution.
3. Calculate the volume of a 0.40 M KCl solution containing 8.00 g of KCl.
4. How many moles of NaCl are in 350.0 mL of a 0.400 M solution?
5. How many liters of a 0.300 M KCl solution contain 0.350 moles?
6. You need to make 300 mL of a 0.40 M sodium chloride solution. The only available solution is 1.0 M. Determine how to make the needed dilution.
7. You have to make 500 mL of 0.50 M BaCl_2 . You have 2.0 M barium chloride solution available. Determine how to make the needed dilution.

Molarity and Dilution

Answers

1. 28 g of KCl is dissolved in 225 mL of water. Calculate the molarity.

$$\text{Molarity} = (28 \text{ g} \times 1 \text{ mol}/74.5 \text{ g})/0.225 \text{ L} = 1.67 \text{ M}$$

2. Calculate the mass of KCl required to prepare 125 mL of 0.450 M solution.

$$\text{Mass} = 0.450 \text{ M} \times 0.125 \text{ L} \times 74.5 \text{ g/mol} = 4.20 \text{ g}$$

3. Calculate the volume of a 0.40 M KCl solution containing 8.00 g of KCl.

$$\text{Volume} = (8.00 \text{ g} \times 1 \text{ mol}/74.5 \text{ g})/0.40 \text{ M} = 0.27 \text{ L}$$

4. How many moles of NaCl are in 350.0 mL of a 0.400 M solution?

$$\text{Moles of NaCl} = 0.400 \text{ M} \times 0.350 \text{ L} = 0.140 \text{ M}$$

5. How many liters of a 0.300 M KCl solution contain 0.350 moles?

$$\text{Volume} = 0.350 \text{ moles}/0.300 \text{ M} = 1.17 \text{ L}$$

6. You need to make 300 mL of a 0.40 M sodium chloride solution. The only available solution is 1.0 M. Determine how to make the needed dilution.

$$M_1V_1 = M_2V_2$$

$$1.0 \text{ M} \times V_1 = 0.40 \text{ M} \times 300 \text{ mL}$$

$$\Rightarrow V_1 = (0.40 \text{ M} \times 300 \text{ mL})/1.0 \text{ M}$$

$$\Rightarrow V_1 = 120 \text{ mL}$$

$$\text{Volume to be added} = 300 - 120 = 180 \text{ mL}$$

You can achieve the desired solution by adding 180 mL of water to 1.0 M, 120 mL NaCl solution.

7. You have to make 500 mL of 0.50 M BaCl₂. You have 2.0 M barium chloride solution available. Determine how to make the needed dilution.

$$M_1V_1 = M_2V_2$$

$$2.0 \text{ M} \times V_1 = 0.50 \text{ M} \times 500 \text{ mL}$$

$$\Rightarrow V_1 = (0.50 \text{ M} \times 500 \text{ mL})/2.0 \text{ M}$$

$$\Rightarrow V_1 = 125 \text{ mL}$$

$$\text{Volume to be added} = 500 - 125 = 375 \text{ mL}$$

You can achieve the desired solution by adding 375 mL of water to 2.0 M, 125 mL BaCl₂ solution.