Name : _____ Date : _____

Worksheet: Molarity

1. Which solution is more concentrated? Solution “A” contains 50.0 g of $CaCO_3$ in 500.0 mL of solution. Solution “B” contains 6.0 moles of H_2SO_4 in 4.0 L of solution.

2. To make a 4.00 M solution, how many moles of solute will be needed if 12.0 liters of solution are required?

3. How many moles of sucrose are dissolved in 250 mL solution if the solution concentration is 0.150 M?

4. How many grams of potassium nitrate are required to prepare 0.250 L of a 0.700 M solution?

5. 15.8 g of KCl is dissolved in 225 mL of water. Calculate the molarity.

6. Calculate the mass of KCl required to prepare 250 mL of 0.250 M solution.

7. Calculate the volume of 0.30 M KCl solution that contains 6.00 g of KCl.

8. What is the molarity of a solution made when 52 grams of potassium sulfate are diluted to a volume of 4100 mL?

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Answers

1. Which solution is more concentrated? Solution "A" contains 50.0 g of $CaCO_3$ in 500.0 mL of solution. Solution "B" contains 6.0 moles of H_2SO_4 in 4.0 L of solution.

   Moles of $CaCO_3$ = 50 g $CaCO_3$ x 1 mol $CaCO_3$/100 g $CaCO_3$ = 0.5 mol

   Molality of $CaCO_3$ = 0.5 mol of $CaCO_3$/500.0 x 10^{-3} L = 1 M

   Molality of H_2SO_4 = 6.0 mol/4 L = 1.5 M

   B is more concentrated than A.

2. To make a 4.00 M solution, how many moles of solute will be needed if 12.0 liters of solution are required?

   Molarity = Moles of solute/Volume => Moles of solute = 4.00 M x 12 L = 48 mol

3. How many moles of sucrose are dissolved in 250 mL solution if the solution concentration is 0.150 M?

   Molarity = Moles of solute/Volume => Moles of solute = 0.150 M x 250 x 10^{-3} L = 0.038 mol

4. How many grams of potassium nitrate are required to prepare 0.250 L of a 0.700 M solution?

   Molarity = Moles of solute/Volume => Moles of KNO_3 = 0.700 M x 0.250 L = 0.175 mol

   Amount of KNO_3 = 0.175 mol x 101 g/mol = 17.7 g

5. 15.8 g of KCl is dissolved in 225 mL of water. Calculate the molarity.

   Molarity = (15.8 g x 1 mol/74.6 g)/0.225 L = 0.941 M

6. Calculate the mass of KCl required to prepare 250 mL of 0.250 M solution.

   Molarity = 0.25 L x 0.250 M/1 L x 74.6 g/ 1 mol = 4.66 g

7. Calculate the volume of 0.30 M KCl solution that contains 6.00 g of KCl.

   Molarity = 6 g x 1 mol/74.6 g x 1 L/0.3 mol = 0.27 L

8. What is the molarity of a solution made when 52 grams of potassium sulfate are diluted to a volume of 4100 mL?

   52 g K_2SO_4 x 1 mole K_2SO_4/ 174 g K_2SO_4 = 0.299 mole K_2SO_4

   Molarity = 0.299 mole K_2SO_4/ 4.100 L K_2SO_4 = 0.073 M