1. What is the concentration expressed in in parts per million of a solution containing 20.0 grams $C_6H_{12}O_6$ in 80.0 grams H_2O?

   (1) 2.50×10^5 ppm   (3) 4.00×10^6 ppm

   (2) 2.00×10^5 ppm   (4) 5.00×10^6 ppm

2. What is the concentration expressed in in parts per million of a solution containing 15.0 grams KNO_3 in 65.0 grams H_2O?

   (1) 1.88×10^5 ppm   (3) 2.31×10^5 ppm

   (2) 2.00×10^5 ppm   (4) 5.33×10^6 ppm

3. What is the concentration expressed in in parts per million of a solution containing 5.0 grams NH_4Cl in 95.0 grams H_2O?

   (1) 5.0×10^4 ppm   (3) 5.3×10^4 ppm

   (2) 2.0×10^7 ppm   (4) 1.9×10^7 ppm

4. What is the concentration expressed in in parts per million of a solution containing 30.0 grams $NaNO_3$ in 70.0 grams H_2O?

   (1) 2.33×10^6 ppm   (3) 3.00×10^5 ppm

   (2) 4.29×10^5 ppm   (4) 3.33×10^6 ppm

5. How many grams of KOH are needed to be dissolved in water to make 2000.0 grams of a 10.0 ppm solution?

   (1) 2.00 g   (3) 2.0×10^{-2} g

   (2) 2.0×10^{-1} g   (4) 2.0×10^{-3} g

6. How many grams of KNO_3 are needed to be dissolved in water to make 500.0 grams of a 20.0 ppm solution?

   (1) 1.00×10^{-1} g   (3) 1.00×10^{-3} g

   (2) 1.00×10^{-2} g   (4) 1.00×10^{-4} g

7. How many grams of $C_6H_{12}O_6$ are needed to be dissolved in water to make 100. grams of a 250. ppm solution?

   (1) 4.00×10^{5} g   (3) 4.00×10^{-1} g

   (2) 2.50×10^{4} g   (4) 2.50×10^{-2} g

8. How many grams of NaCl are needed to be dissolved in water to make 1.0 gram of a 100.0 ppm solution?

   (1) 1.0×10^{-4} g   (3) 1.0×10^{-2} g

   (2) 1.0×10^{-3} g   (4) 1.0×10^{-1} g

9. What is the concentration expressed in in percent by mass of a solution containing 20.0 grams $C_6H_{12}O_6$ in 80.0 grams H_2O?

   (1) 2.50 %   (3) 20.0 %

   (2) 2.00 %   (4) 50.0 %

10. What is the concentration expressed in in percent by mass of a solution containing 15.0 grams KNO_3 in 65.0 grams H_2O?

   (1) 18 %   (3) 23.1%

   (2) 20 %   (4) 53.3 %

MOLARITY (M)

$$\text{Molarity} = \frac{\text{moles of solute}}{\text{liter of solution}}$$

Solve the problems below.

1. What is the molarity of a solution in which 58 g of NaCl are dissolved in 1.0 L of solution?

2. What is the molarity of a solution in which 10.0 g of $AgNO_3$ is dissolved in 500. mL of solution?

3. How many grams of KNO_3 should be used to prepare 2.00 L of a 0.500 M solution?

4. To what volume should 5.0 g of KCl be diluted in order to prepare a 0.25 M solution?

5. How many grams of $CuSO_4 \cdot 5H_2O$ are needed to prepare 100. mL of a 0.10 M solution?

Molarity and PPM

1. What is the molarity of a solution that contains 187 g of sodium hydrogen carbonate in 459 mL of water?

2. What is the molarity of a solution that contains 426 g of Calcium Hydroxide dissolved in 848 mL of water?

3. What is the amount of sulfuric acid needed to form 350 mL of a 16.9 M solution?

4. What is the amount of phosphoric acid needed to form 650 mL of a 12.1 M solution?

5. What is the ppm concentration of 36 g of lead in a 125g sample of drinking water?

6. What is the ppm concentration of a 356 g sample of river water that contains 57 g of mercury?

7. What is the ppm concentration of carbon dioxide if in a 150 g sample of air, there are 50g of carbon dioxide?

8. What is the amount of atropine found in 200g of water if there are 69.8ppm?

9. What is the amount of sulfur found in 379g of gasoline if there are 8348 ppm?

Molality (m)

$$\text{Molality} = \frac{\text{moles of solute}}{\text{Kg of solvent}}$$

Solve the problems below.

1. What is the molality of a solution in which 3.0 moles of NaCl is dissolved in 1.5 Kg of water?

   _____

2. What is the molality of a solution in which 25 g of NaCl is dissolved in 2.0 Kg of water?

   _____

3. What is the molality of a solution in which 15 g of I_2 is dissolved in 500. g of alcohol?

   _____

4. How many grams of I_2 should be added to 750 g of CCl_4 to prepare a 0.020 m solution?

   _____

5. How much water should be added to 5.00 g of KCl to prepare a 0.500 m solution?

   _____

Colligative Properties Worksheet

1) If I add 45 grams of sodium chloride to 500 grams of water, what will the melting and boiling points be of the resulting solution?

2) Which solution will have a higher boiling point: A solution containing 105 grams of sucrose ($C_{12}H_{22}O_{11}$) in 500 grams of water or a solution containing 35 grams of sodium chloride in 500 grams of water?

3) 5 grams of salt (NaCl) is added to 170 mL of water. What are the new freezing and boiling points?

4) What is the change in freezing point of a solution containing 132 g $C_{12}H_{22}O_{11}$ and 250 g of H_2O?

5) What is the boiling point of a solution containing 52 g $MgSO_4$ and 334 g H_2O?