

Key

**Solutions Worksheet**

On the line at the left, write the letter of the definition that best matches each term.

1. solution f  
 2. solute c  
 3. solvent g  
 4. soluble a  
 5. alloy e  
 6. aqueous solution b  
 7. electrolyte d
- a. capable of being dissolved  
 b. solution with water as the solvent  
 c. substance that is dissolved in a solution  
 d. substance that dissolves in water to form a solution that conducts an electric current  
 e. solid solution containing two or more metals  
 f. homogeneous mixture of two or more substances in a single physical state

Answer each of the following questions in the space provided.

8. Describe the properties of a solution  
same throughout - homogeneous etc.  
made of solute/solvent  
 9. Give two examples of solutions in nature and explain why each is important.  
humidity in air  
salt in ocean water  
etc.  
 10. Describe how a chemist can accurately prepare a solution of precise molarity.  
Use balance to find grams of solute  
Accurately find volume of water or solvent

concentration  
 molarity  
 molality  
 concentration  
 saturated  
 unsaturated  
 supersaturated

10. Molarity is the concentration of a solution expressed as the number of moles of solute dissolved in each liter of solution.

11. A Saturated solution contains as much solute as can possibly be dissolved under existing conditions of temperature and pressure

12. The amount of solute in a given amount of solvent or solution is the concentration solution.

13. A solution that contains more solute particles than are needed to form a saturated solution is supersaturated

14. The molality of a solution is the number of moles of solute dissolved in each kilogram of solvent.

15. A solution that has less than the maximum amount of solute that can be dissolved is called a(n) unsaturated solution.

Solve each of the following problems as directed. Show all your work.

16. What is the molarity of the solution formed by mixing 0.20 mol of sodium hydroxide with enough water to make 150 ml of solution?

$$M = \frac{0.2}{0.15} = 1.3M$$

17. How much potassium bromide, in grams, should be added to water to prepare 0.50 L of solution with a molarity of 0.125 M?

$$0.5L \times \frac{0.125 \text{ mol}}{1L} \times \frac{119g}{1 \text{ mol}} = 7.4g \text{ KBr}$$

18. What is the molarity of a solution of chlorine and water is 0.0362 m. This solution contains 3500 g of water. How much chlorine in grams was used to prepare this solution?

$$3,500g \times \frac{1kg}{1000g} \times \frac{0.0362 \text{ mol}}{1kg} \times \frac{70.9g \text{ Cl}_2}{1 \text{ mol}} = 8.98g \text{ Cl}_2$$

19. What is the molarity of the solution produced when 145 g of sodium chloride is dissolved in sufficient water to prepare 2.75 L of solution?

$$145g \times \frac{1 \text{ mol}}{58.5g} = 2.45 \text{ mol} = \frac{2.45 \text{ mol}}{2.75L} = 0.901M$$

20. To produce 3.00 L of a 1.90 M solution of sodium hydroxide, how many grams of sodium hydroxide must be dissolved?

$$3L \times \frac{1.9 \text{ mol}}{1L} \times \frac{40g}{1 \text{ mol}} = 228g$$

21. How much concentrated 18 M sulfuric acid is needed to prepare 250 mL of a 6.0 M solution?

$$M_1 V_1 = M_2 V_2 \quad 18V = 6(250) \quad V = 83 \text{ mL}$$

22. How much concentrated 12 M hydrochloric acid is needed to prepare 100.0 mL of a 2.0 M solution?

$$M_1 V_1 = M_2 V_2 \quad 12V = 2(100) \quad V = 17 \text{ mL}$$

23. To what volume should 25 mL of 15 M nitric acid be diluted to prepare a 3.0 M solution?

$$M_1 V_1 = M_2 V_2 \quad (25)(15) = 3(V_2) \quad V_2 = 125 \text{ mL}$$

$$15.2g \text{ CaCl}_2 \times \frac{1 \text{ mol}}{111.68g} = 0.136 \text{ mol} = \frac{0.136 \text{ mol}}{0.345kg} = 0.395m$$

24. What is the molality of a solution produced using 15.2 g of calcium chloride and 345 g of methanol (CH<sub>3</sub>OH)?

$$25g \times \frac{0.523 \text{ mol}}{1kg} \times \frac{166g}{1 \text{ mol}} = 173g$$

25. In order to prepare a 0.523 m aqueous solution of potassium iodide, how many grams of potassium iodide must be added to 2.00 kg of water?