

## Concentrations and Dilutions

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### Review Material

1. The basic unit of volume in the metric system is the \_\_\_\_\_.
2. What does the prefix *micro-* mean? \_\_\_\_\_
3. What is the abbreviation for the meter in the metric system? \_\_\_\_\_
4. The basic unit of weight in the metric system is the \_\_\_\_\_.
5. What does the prefix *centi-* mean? \_\_\_\_\_
6. What is the temperature of boiling water in the metric system? \_\_\_\_\_
7. What does the prefix *kilo-* mean? \_\_\_\_\_
8. Which adjustment knob is used with the high power objective? \_\_\_\_\_
9. What is the total magnification when using the 10x objective? \_\_\_\_\_
10. Which parts of a microscope regulate the amount of light?  
\_\_\_\_\_ & \_\_\_\_\_
11. Which adjustment knob is used with the 5x objective? \_\_\_\_\_
12. A total magnification of 400x requires the use of the 10x ocular lens with which objective? \_\_\_\_\_

### New Material

1. Define the following terms:

Solution \_\_\_\_\_

Solute \_\_\_\_\_

Solvent \_\_\_\_\_

2. What is Avogadro's number? \_\_\_\_\_
3. Define the term molarity. \_\_\_\_\_

7. Calculate the molarity of 25.0 grams of KBr in 750.0 mL
8. Calculate the molarity of 80 grams of glucose ( $C_6H_{12}O_6$ ) in 1.0 liters of solution
9. Calculate the molarity of 75 grams of  $MgCl_2$  in 500 mL of solution
10. How many grams of  $KMnO_4$  would you need to make 500 mL of a 0.2 M solution?
11. What is the molarity of 500 mL of solution containing 10 grams of acetic acid ( $CH_3COOH$ )?
12. I diluted 1L of 2M solution so that the resulting molarity was 0.5M. What was my final volume?
13. I diluted a solution of 10mL to a final volume of 1L. The final concentration was 0.05M.  
What was the original concentration?
14. How many grams of HCl do I need to produce 58.5g of NaCl?  
Here is the equation for the reaction:  
 $HCl + NaOH \rightarrow NaCl + H_2O$
15. The concentration of salts in the body fluids averages 0.9%. Solutions of this concentration are often used in intravenous drips. How many grams of sodium chloride must you add to a liter of water to prepare a saline solution of 0.9% concentration?

### Concentrations and Dilutions

#### Review Material

1. The basic unit of volume in the metric system is the Liter.
2. What does the prefix *micro-* mean? one one millionth or  $10^{-6}$
3. What is the abbreviation for the meter in the metric system? m
4. The basic unit of weight in the metric system is the g.
5. What does the prefix *centi-* mean?  $10^{-2}$
6. What is the temperature of boiling water in the metric system?  $100^{\circ}\text{C}$
7. What does the prefix *kilo-* mean?  $10^3$
8. Which adjustment knob is used with the high power objective? \_\_\_\_\_
9. What is the total magnification when using the 10x objective? \_\_\_\_\_
10. Which parts of a microscope regulate the amount of light?  
\_\_\_\_\_ & \_\_\_\_\_
11. Which adjustment knob is used with the 5x objective? \_\_\_\_\_
12. A total magnification of 400x requires the use of the 10x ocular lens with which objective? \_\_\_\_\_

#### New Material

1. Define the following terms:

Solution a mixture of 2 or more pure substances

Solute minor component in a solution

Solvent major component in a solution

2. What is Avogadro's number? ~~+~~  $6.02 \times 10^{23}$

3. Define the term molarity. moles of solute per L solution

7. Calculate the molarity of 25.0 grams of KBr in 750.0 mL

$$25.0 \text{ g} \times \frac{1 \text{ mol}}{119 \text{ g}} \times \frac{1}{0.750 \text{ L}} = \frac{\text{mol}}{\text{L}}$$

KBr  
39.1  
79.9  

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119.0

8. Calculate the molarity of 80 grams of glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) in 1.0 liters of solution

$$80 \text{ g} \times \frac{1 \text{ mol}}{180 \text{ g}} \times \frac{1}{1 \text{ L}} =$$

9. Calculate the molarity of 75 grams of MgCl<sub>2</sub> in 500 mL of solution

$$75 \text{ g} \times \frac{1 \text{ mol}}{95.21 \text{ g}} \times \frac{1}{.5 \text{ L}} =$$

24.31  
35.45  
35.45  

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95.21

10. How many grams of KMnO<sub>4</sub> would you need to make 500 mL of a 0.2 M solution?

$$.2 \frac{\text{mol}}{\text{L}} \times .5 \text{ L} \times \frac{157.04 \text{ g}}{1 \text{ mol}} =$$

39.1  
54.94  
64  

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157.04

C<sub>2</sub>H<sub>4</sub>O<sub>2</sub>

11. What is the molarity of 500 mL of solution containing 10 grams of acetic acid (CH<sub>3</sub>COOH)?

$$10 \text{ g} \times \frac{1 \text{ mol}}{60.06 \text{ g}} \times \frac{1}{.5 \text{ L}} =$$

24.02  
32  
4.04  

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60.06

12. I diluted 1L of 2M solution so that the resulting molarity was 0.5M. What was my final volume?

$$m_1 V_1 = m_2 V_2$$

$$2(1) = 0.5(V_2)$$

$$V_2 = \frac{2}{0.5} = 4$$

4 L

13. I diluted a solution of 10mL to a final volume of 1L. The final concentration was 0.05M. What was the original concentration?

$$\frac{1000 \text{ mL}}{10 \text{ mL}}$$

$$m_1 V_1 = m_2 V_2$$

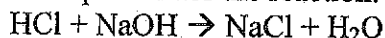
$$m_1(10) = 0.05(1000)$$

$$m_1 = \frac{50}{10} = 5$$

5 M

14. How many grams of HCl do I need to produce 58.5g of NaCl?

Here is the equation for the reaction:



$$\text{NaCl} = 22.99 + 35.45 = 58.44 \text{ g/mol}$$

$$\text{HCl} = 36.46 \text{ g/mol}$$

$$58.5 \text{ g NaCl} \times \frac{1 \text{ mol NaCl}}{58.44 \text{ g NaCl}} \times \frac{1 \text{ mol HCl}}{1 \text{ mol NaCl}} \times 36.46 \text{ g HCl} = 36.5 \text{ g HCl}$$

15. The concentration of salts in the body fluids averages 0.9%. Solutions of this concentration are often used in intravenous drips. How many grams of sodium chloride must you add to a liter of water to prepare a saline solution of 0.9% concentration?

$$1 \text{ L} = 1000 \text{ mL H}_2\text{O} \times 1 \text{ g} = 1000 \text{ g H}_2\text{O} \times \frac{0.9 \text{ g NaCl}}{100 \text{ g H}_2\text{O}} = 9 \text{ g NaCl}$$

assume 0.9% (w/w)