

CHEMISTRY NOTES

Unit 15 - Solutions

A solution is a _____ mixture.

The particles in a solution are very _____ and can be passed through

_____.

Define the following terms:

Solute –

Solvent –

Solvation –

The solvent is the component present in the _____ amount.

Complete the chart below:

Mixture	Solute	Solvent
Salt Water		
Air		
Sweet Tea		
14-karat Gold		

Dissociation is the _____ of compounds into their component ions.

{**HINT:** Split the compound into the metal and nonmetal. Give each ion its charge from the periodic table. Only separate polyatomic ions from their partners. Do NOT break polyatomic ions up from themselves. Any subscripts present in the original formula become a coefficient for the ions }

Predict the ions formed when the following compounds dissociate:

Compound →	Cation	Anion
MgCl₂ →	Mg ²⁺	2 Cl ⁻
Ag₃(PO₄) →	3 Ag ⁺	(PO ₄) ⁻³
MgO →		
NaF →		
AlCl₃ →		
Ba(OH)₂ →		
H₂SO₄ →		

Electrolytes, Nonelectrolytes, and Weak Electrolytes:

A(n) _____ is any substance which conducts

electricity when in an _____ state or molten state.

Complete the following chart:

Substance	Degree of Dissociation	Amount of Ions Produced	Example
Electrolyte			
Nonelectrolyte			
Weak Electrolyte			

Why do nonelectrolytes fail to conduct electricity?

Lab – Factors Impacting Solvation

- Objective: to investigate factors that affect solution formation
- Materials Used: Beakers Sugar Cubes Ring Stand
- Thermometer Stirring Rod Mortar and Pestle Watch/Clock

***Clean up lab area when done

This lab will be divided into three different parts:

- **Part I- Agitation:**
 1. Fill each beaker 3/4 full of water
 2. Place one cube of sugar in each beaker
 3. Use a stirring rod to stir one of the solutions; leave the second solution alone
 4. Determine the amount of time that it takes for the sugar to dissolve in each beaker
- **Part II- Crushing/Increase of Surface Area:**
 5. Use the mortar and pestle to crush one sugar cube
 6. Fill one beaker 3/4 full of tap water
 7. Place the crushed cube in the beaker
 8. Determine how long it takes for the sugar to dissolve.
- **Part III- Temperature:**
 9. Fill one beaker 3/4 full of warm water obtained from your teacher’s directions.
 10. Place a sugar cube in the heated beakers
 11. Determine how long it takes for the cube to dissolve.

****COPY THIS CHART ONTO A SEPARATE SHEET OF PAPER TO TURN INTO YOUR TEACHER****

Factor	Time to Dissolve (in seconds)
Control	
Agitation	
Crushing/Surface Area	
Temperature	

Post – Lab Questions (Turn in your answers with the chart above to your teacher):

1. Construct a bar graph that shows how long it took for each sugar cube to dissolve
2. What is the purpose in agitating the solution?
3. How does increasing the surface area of the solute increase the rate of solvation?
4. Why does a warmer solution dissolve the solute quicker?
5. Which factor allowed for the quickest dissolving of the solute?

Solubility, Saturated & Unsaturated Solutions:

Solubility-

Solubility is measured in _____ per 100 g of solvent and is dependent upon _____.

Saturated Solution –

Unsaturated Solution –

****SEE WORKSHEET AND SOLUBILITY DATA ON EOC DOCUMENTS SHEET****

Use your EOC documents sheet to answer the following questions:

- 1) What is the most soluble substance at 10°C? _____
- 2) What is the solubility of NaNO₃ at 40°C? _____
- 3) A solution contains 25 g of NaCl dissolved in 100 g of H₂O at 30°C. Is it saturated or unsaturated?
- 4) A saturated solution of NH₄Cl is cooled from 70°C to 30°C. How much solute precipitates out? _____

The rule for solubility is _____ **DISSOLVES** _____, which means that **polar** substances will dissolve only _____ substances and **nonpolar** substances will **dissolve** only **nonpolar** substances.

Why does oil not dissolve in water?

Determine which of the following substances will dissolve in each other:

Substance	Polar	Nonpolar
Water	✓	
O ₂		✓
CH ₄		✓
NaOCl	✓	
NaCl	✓	
CCl ₄		✓

Molarity (M):

Molarity is the number of moles of solute per liters of solution.

(1 L = 1000 mL)

M = _____

1. Calculate the molarity of a solution that contains 6 moles of NaOH in 1 L of solution
2. Calculate the molarity of a solution that contains 15 g NaCl in 0.75 L of solution
3. What is the molarity of a solution that contains 35 g of HCl in 6 L of solution?
4. If 125 g of C₁₂H₂₂O₁₁ is put in 500 mL, what is the molarity of the solution?
5. How many grams of solute are present in 1.5 L of 0.20 M Na₂SO₄?

Colligative Properties:

When a solute is added to a solvent, the boiling point of the solvent is

_____ and the freezing point is _____.

Why is salt added to the roadways in the winter time?