HONORS CHEMISTRY UNIT 12 NOTES: SOLUTIONS

Solution

Solute

Solvent

Aqueous solutions

Types of solutions

|  |  |  |  |
| --- | --- | --- | --- |
| Example | State of solution | Original state of solute | Original state of solvent |
| Air, natural gas |  |  |  |
| Antifreeze in water |  |  |  |
| Brass |  |  |  |
| Carbonated water |  |  |  |
| Seawater, sugar water |  |  |  |

SOLUBILITY

Solubility of ionic substances:



Properties of water and the properties of salt

SOLUBILITY RULES

Using the solubility rules to determine if the following are soluble in water

NaCl

CaCO3

KNO3

PbCl2

MgO

NH4Br

Sr(OH)2

BaSO4

Ni2CrO4

K3PO4

Solubility of Polar substances



How do you tell what is polar?

Substances Insoluble in water



Why will they not dissolve?

SOLUTION COMPOSITION: AN INTRODUCTION

Saturated

Unsaturated

Supersaturated

A test of saturation….

FACTORS AFFECTING THE RATE OF DISSOLUTION

Surface area

Stirring

Temperature

SOLUTION COMPOSITION: MASS PERCENT

What is mass percent?

What are the components of a solution?: A quick review

Sample problem 1: Calculate the mass percent of sodium chloride if 19.0 g of sodium chloride is dissolved in enough water to make 175 g of solution.

Sample problem 2: Calculate the mass percent of sodium chloride if 19.0 g of sodium chloride is dissolved in 175 g of water.

Sample problem 3: Calculate the number of grams of sugar that must be dissolved in 825 g of solution in order to prepare a 20.0% by mass sugar solution

Sample problem 4: Calculate the number of grams of sugar that must be dissolved in 825 g of water in order to prepare a 20.0% by mass sugar solution

Sample problem 5: Calculate the number of grams of solution that is required to dissolve 10.0 g of phenol to prepare a 2.00% by mass phenol solution.

Sample problem 6: Calculate the number of grams of water that is required to dissolve 10.0 g of phenol to prepare a 2.00% by mass phenol solution.

SOLUTION COMPOSITION: MOLARITY

What is molarity?

Sample problem 7: Calculate the molarity of an aqueous sodium chloride solution containing 284 g of NaCl in 2.20 L of solution

Sample problem 8: Calculate the molarity of an aqueous sodium sulfate solution containing 35.0 g of sodium sulfate in 450. mL of solution.

Sample problem 9: Calculate the number of grams of sodium chloride necessary to prepare 230. mL of a 2.00 M NaCl solution. How would you prepare this solution?

Sample problem 10: Calculate the number of liters of a 6.00 M sodium hydroxide solution required to dissolve 410. g of sodium hydroxide

Molarity of ions:

Sample problem 10: What is the molarity of Na ions in a solution that is 2.50 M NaCl?

Sample problem 11: What is the molarity of Na ions in a solution that is 2.50 M Na2SO4?

Ionic solutions: What is really going on?

Diluting Solutions: What do you do?

Sample problem 12: What volume of 18 M sulfuric acid must be used to prepare 1.5 L of a 0.19 M sulfuric acid solution? How would you go about making this solution?

Sample problem 13: You only have 12 M HCl available. How would you make 1.50 L of a 2.0 M HCl solution?

STOICHIOMETRY OF SOLUTION REACTIONS

What do you need?

Sample problem 14: How many grams of silver chloride will precipitate out of solution when 35.5 mL of a 0.500 M AgNO3 is combined with excess sodium chloride solution?

AgNO3(aq) + NaCl(aq) → AgCl(s) + NaNO3(aq)

Sample problem 15: How many mL of a 1.25 M Na2SO4 are required to produce 15.0 g of the precipitate BaSO4?

Na2SO4(aq) + BaCl2(aq) → BaSO4(s) + 2NaCl(aq)

Sample problem 16: When aqueous solutions of sodium sulfate and lead(II) nitrate are mixed, lead (II) sulfate precipitates. Calculate the mass of PbSO4 formed when 1.25 L of 0.0500 M Pb(NO3)2 and 2.00 L of 0.0250 M Na2SO4 are mixed. Also, identify the limiting and excess reactant.

THE PROPERTIES OF SOLUTIONS: FREEZING POINT AND BOILING POINT

Colligative properties and the effects of freezing point and boiling point.

Electrolytic and Nonelectrolytic Solutions