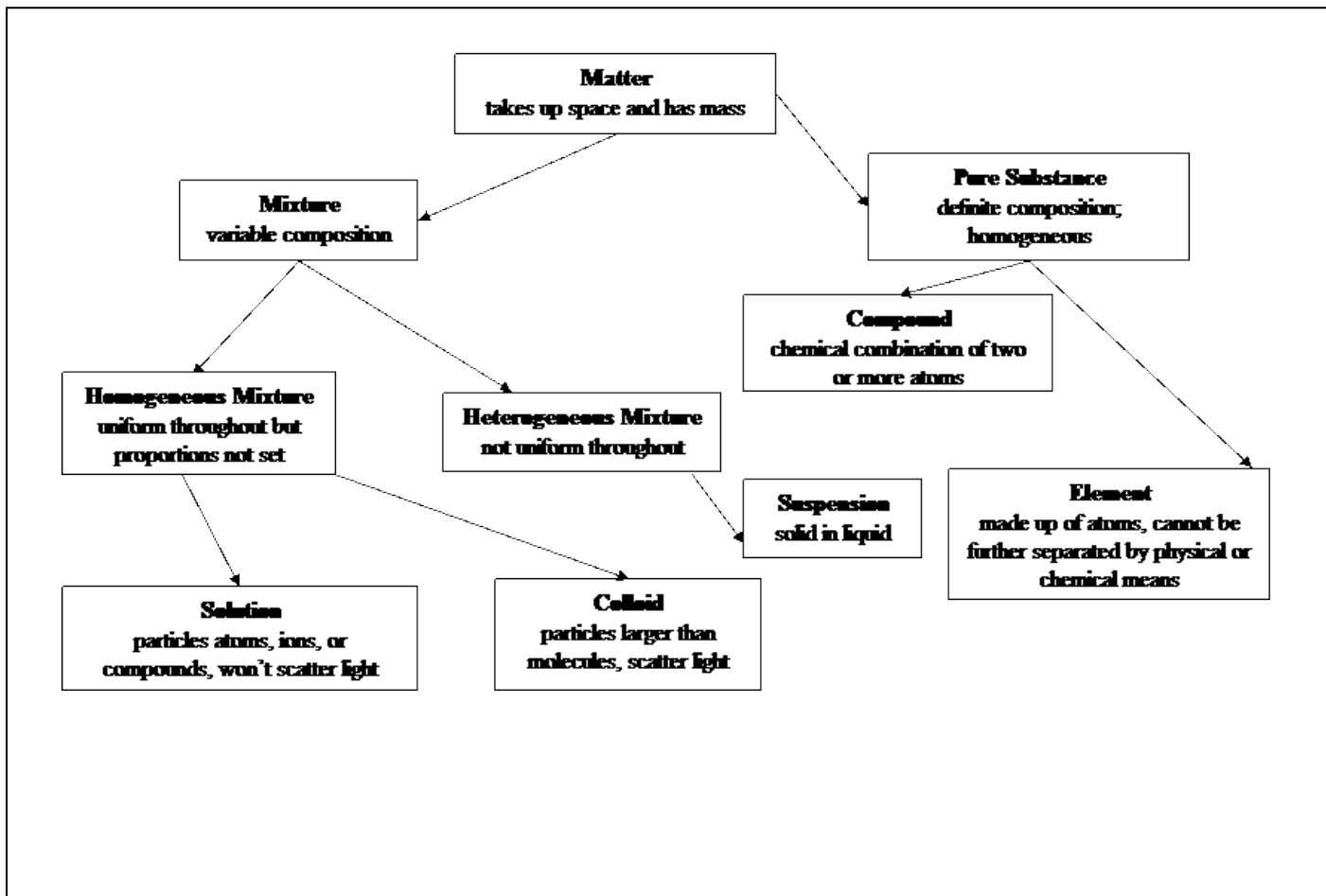


Unit 8 – Solutions Notes

1. Introduction – Matter

Matter Flowchart with Important Definitions



Mixtures – combination of two or more pure substances in which each pure substance retains its individual chemical properties

Separation Techniques for Mixtures

- Substances in a mixture are physically combined and can be physically separated

4 Techniques

Filtration	
Distillation	
Crystallization	
Chromatography	

Types of Mixtures

a) Mixtures can be classified as _____ or _____

b) Properties of Mixtures:

Property	Solutions	Colloids	Suspensions
Definition			
Examples			
Particle Size			
Settles Out			
Separates by Filtering			
Scatters Light (Tyndall effect)			
Type of Mixture			

2. Solutions:

a) Solute:

b) Solvent:

c) Solution:

d) Examples:

e) Solutions are classified according to solvent type. List examples for the following:

Solvent → Solute ↓	Gas	Liquid	Solid
Gas			
Liquid			
Solid			

f) An alloy is

g) An amalgam is

h) Soluble vs. insoluble:

i) Miscible vs. immiscible:

3. Water – The Universal Solvent

a) Explain the statement above.

b) What are some properties of water that make it a good solvent?

4. Solutions as Electrolytes

a) What is an electrolyte?

b) What types of solutions make good electrolytes?

c) What type of solutions are nonelectrolytes?

5. The Solution Process

a) Define:

Solvation

Dissociation

Hydration

b) What is an inter-particle force?

c) How do IPF's impact the solution process?

d) Explain how the following factors might affect the rate of solution:

Increasing surface area

Increasing temperature

Increasing concentration

Using a catalyst

6. Solubility

a) Define solubility:

b) Explain the expression "like dissolves like" and how does it determine solubility?

c) Explain how each of the following factors affects solubility:

1. The nature of the solute and solvent

2. Pressure

State Henry's Law

What is effervescence?

3. Temperature

For gaseous solutes

For solid or liquid solutes

d) Heats of Solution

What is it?

Positive or negative?

When is energy absorbed and released during solvation?

e) What is a **solubility curve**?

Try it!

1. Which substance has the highest solubility at 80°C?
2. How much KCl is in 100 g of water at 50°C?
3. If a solution contains 100 g of NaNO₃ at 20°C, is the solution saturated, unsaturated, or supersaturated?

7. **Solution equilibrium** is reached when the rate of _____ is equal to the rate of _____.

Solution equilibrium depends on _____ and _____.

a) What is a **saturated** solution?

b) What is an **unsaturated** solution?

c) What is a **supersaturated** solution?

8. **Solution Concentration**

Concentration is a measure of the amount of _____ in the amount of _____ or _____.

a) Qualitative measures of concentration:

1. **Dilute**

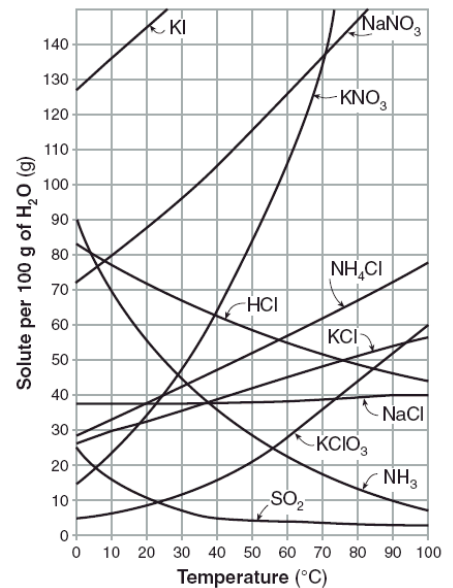
2. **Concentrated**

b) Quantitative measures of concentration:

1. **Molarity** (M) =

Example 1: What is the molarity of a solution containing 5.85 g KI in 125 mL solution?

Example 2: How many moles of H₂SO₄ are present in 500. mL of a 0.150 M solution?



Example 3: What volume of a 3.00 M solution of NaCl contains 146.3 g solute?

2. **Mass Percent Concentration** =

Calculate the mass percent concentration for each of the following:

a) 142 g H₂O₂ in 331 g H₂O

b) 199 g NiBr₂ in 500. g H₂O

c) 92.3 g KF in 1.00 kg H₂O

d) 12.3 g C₄H₄O in 100. g H₂O

e) 156 g C₁₂H₂₂O₁₁ in 300. g H₂O

9. **Diluting Solutions**

a) What is the formula?

Try it!

1. What volume of 2.00M CaCl₂ would you use to make 0.5L of 0.300M CaCl₂?

10. **Colligative Properties of Solutions:**

a) What is a **colligative property**?

List the four colligative properties.

- 1.
- 2.
- 3.
- 4.

Remember:

- b) Explain why adding a nonvolatile solute to a solvent will **lower the solvent's vapor pressure**.

- c) Explain why adding a nonvolatile solute to a solvent will **lower the solvent's normal freezing point**.

- d) Explain why adding a nonvolatile solute to a solvent will **raise the solvent's normal boiling point**.

- e) Compare the effects of nonvolatile electrolytes with the effects of nonvolatile nonelectrolytes on the freezing and boiling points of solvents. Explain why this occurs.

- f) What is **osmotic pressure**?