Name _____ Date _____ Period _____

UNIT 12: SOLUTIONS, ACIDS AND BASES

7. Solutions, Rates of Reaction, and Equilibrium

Broad Concept: Solids, liquids, and gases dissolve to form solutions. Rates of reaction and chemical equilibrium are dynamic processes that are significant in many systems (biological, ecological, and geological).

7.1 Describe the process by which solutes dissolve in solvents.

7.3 Identify and explain the factors that affect the rate of dissolving, such as, temperature, concentration, surface area, pressure, and mixing.

8. Acids and Bases and Oxidation-Reduction Reactions

Broad Concept: Acids and bases are important in numerous chemical processes that occur around us, from industrial procedures to biological ones, from the laboratory to the environment. Oxidation-reduction reactions occur when one substance transfers electrons to another substance and constitutes a major class of chemical reactions.

8.1 Define the Arrhenius theory of acids and bases in terms of the presence of hydronium and hydroxide ions in water and the Bronsted-Lowry theory of acids and bases in terms of proton donor and acceptor.

8.2 Relate hydrogen ion concentrations to the pH scale, and to acidic, basic, and neutral solutions. Compare and contrast the strength of various common acids and bases such as vinegar, baking soda, soap, and citrus juice.

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Unit 12 Solutions

Online 12.1 pg. 379
Sections 13.1 page 395-orange M.C.
Blue M.C. 12.1 page 401

CHAPTER 13 SOLUTIONS (Ch. 12 in Blue book)

1. (a) How are mixtures classified?

   _____

   _____

   (b) Identify three types of mixtures.

   _____

   _____

2. What is meant by the term soluble?

   _____

   _____

3. What is a solution?

   _____

4. Identify and define two components of a solution.

   _____

   _____

5. Give two examples of common solutions.

   _____

   _____

6. Distinguish between electrolytes and nonelectrolytes and give an example of each.

   _____

   _____

   _____

7. Generally what types of substances are electrolytes?

   _____

   _____

8. What is a suspension?

   _____

   _____

9. How does it differ from a solution?

   _____

   _____

10. What is a colloid?

    _____

    _____

11. Identify its two phases. _____

12. Identify a common colloid that is

    a) an emulsion _____ c) an emulsifying agent_____

    b) a gel _____

13. What is the Tyndall effect?

    _____

    _____

Do Section Review p. 400. #s 1-5

(page 406 blue)
(pg. 384 online)

Answer the Section Review Questions here:

Section 13-2 (12-2)

14. List three ways in which the rate at which sugar is dissolved can be increased.
    1. _____
    2. _____
    3. _____

15. What is solution equilibrium?

    _____

16. The point at which equilibrium is reached for any solute-solvent combination is dependent on what 3 factors?

    _____ _____ _____

    What is the difference between dissolving and recrystallizing?

    _____

17. What is a saturated solution? What visible evidence is there to indicate a solution is at its point of saturation?

    _____

18. What is an unsaturated solution?

    _____

19. What is meant by the solubility of a substance?

    _____

20. List three factors that effect the solubility of a substance?
    1. _____
    2. _____
    3. _____

21. What would be an example of substances that are immiscible?

    _____

22. Gasoline is an excellent solvent to dissolve fats, oils, and grease. Explain why this is a true statement.

    _____

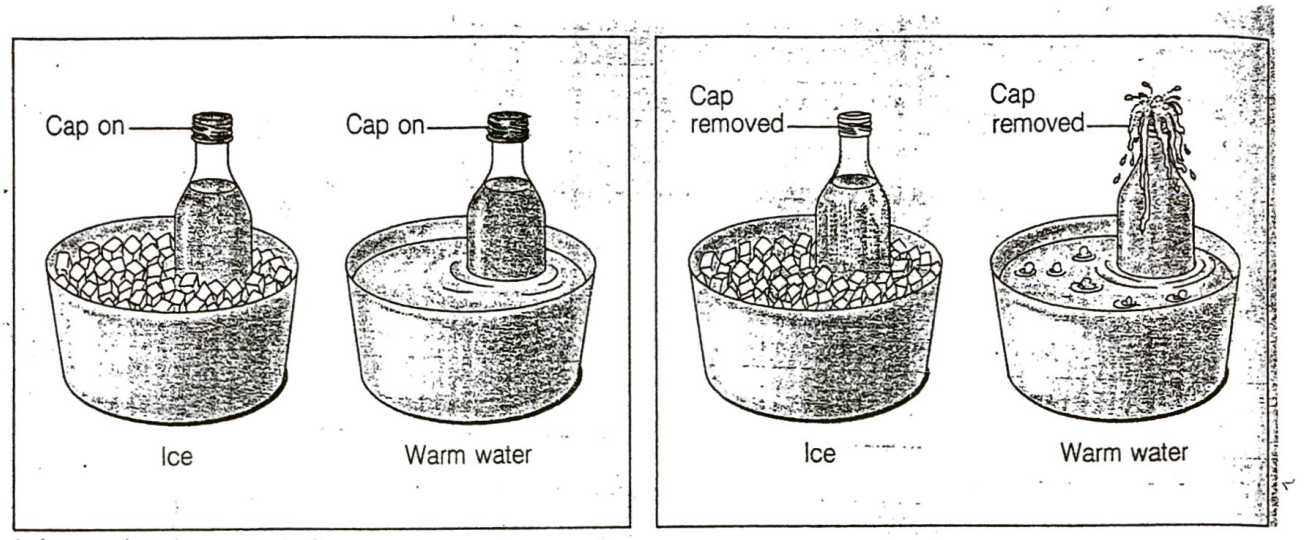
23. Compare the diagram 1 to diagram 2 in terms of temperature, pressure and the solubility of the gas in the sodas.

_____

_____

_____

- Raising the temperature of a gas-in-liquid solution decreases the solubility of the gaseous solute. Thus, the solubility of a gas decreases as the temperature increases.



24. What is the heat of solution? What happens when the heat of solution is positive? When it is negative?

_____

_____

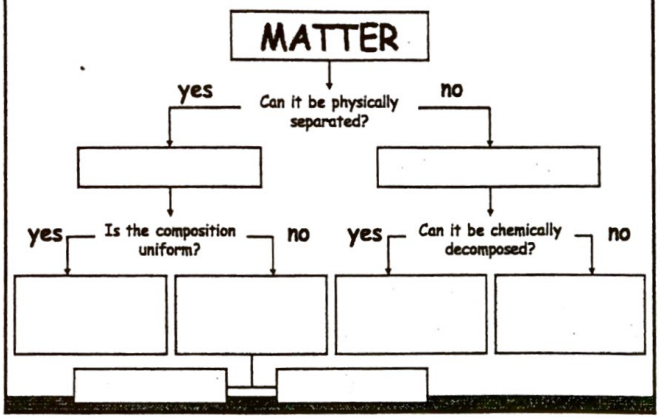
_____

_____

Page 410 Section Review #s 1-5 (page 416 BLUE AC) (online book pg 394)

Go through Notes on the Chemistry Notes page

Matter Flowchart



Solutions

- **I. The Nature of Solutions**

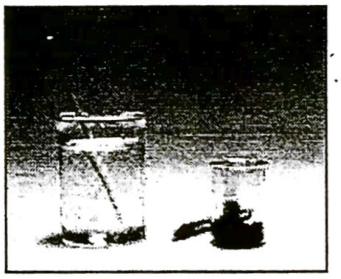
A. Definitions

- **Solution -**

Solute - substance being

Solvent - present in _____ amount

A. Definitions



_____ - $KMnO_4$ _____ - H_2O

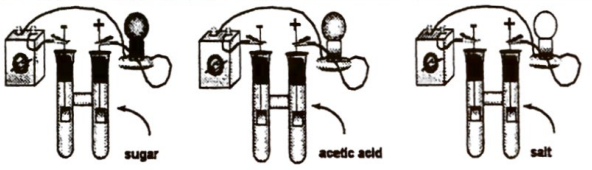
B. Solvation

- _____ – the process of dissolving

solute particles are surrounded by solvent particles

solute particles are separated and pulled into solution

B. Solvation

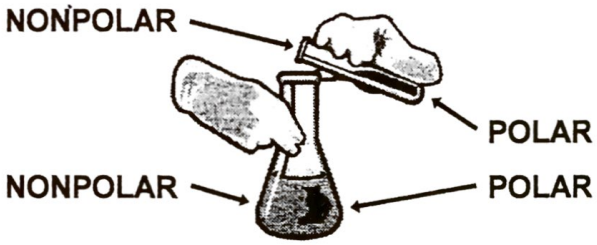


_____	_____	_____
solute exists as **molecules only**	solute exists as **ions and molecules**	solute exists as **ions only**
		DISSOCIATION IONIZATION

View animation online.

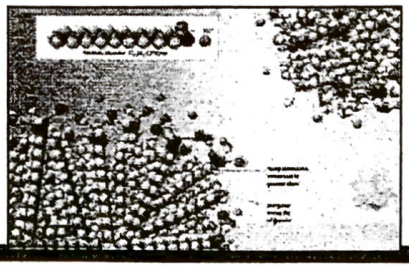
B. Solvation

"_____"



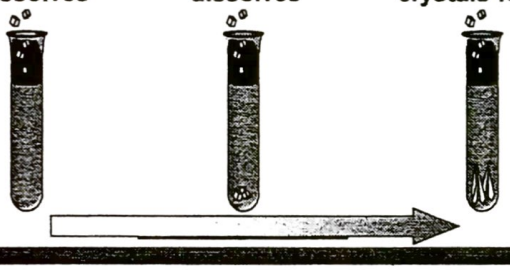
B. Solvation

- _____
  - polar "head" with long nonpolar "tail"
  - dissolves nonpolar grease in polar water



C. Solubility

_____	_____	_____
SOLUTION more solute dissolves	**SOLUTION no more solute dissolves**	**SOLUTION becomes unstable, crystals form**

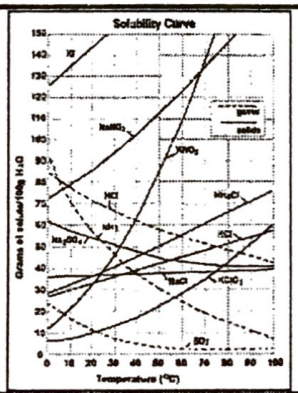


C. Solubility

- _____
  - maximum grams of solute that will dissolve in 100 g of solvent at a given temperature
  - varies with temp
  - based on a saturated solution

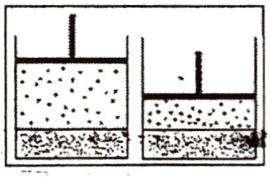
C. Solubility

- _____
  - shows the dependence of solubility on temperature



C. Solubility

- **Solids are more soluble at...**
  - _____ temperatures.
- **Gases are more soluble at...**



- _____ temperatures &
- _____ pressures (Henry's Law).
- EX: nitrogen narcosis, the "bends," soda

Solubility Practice

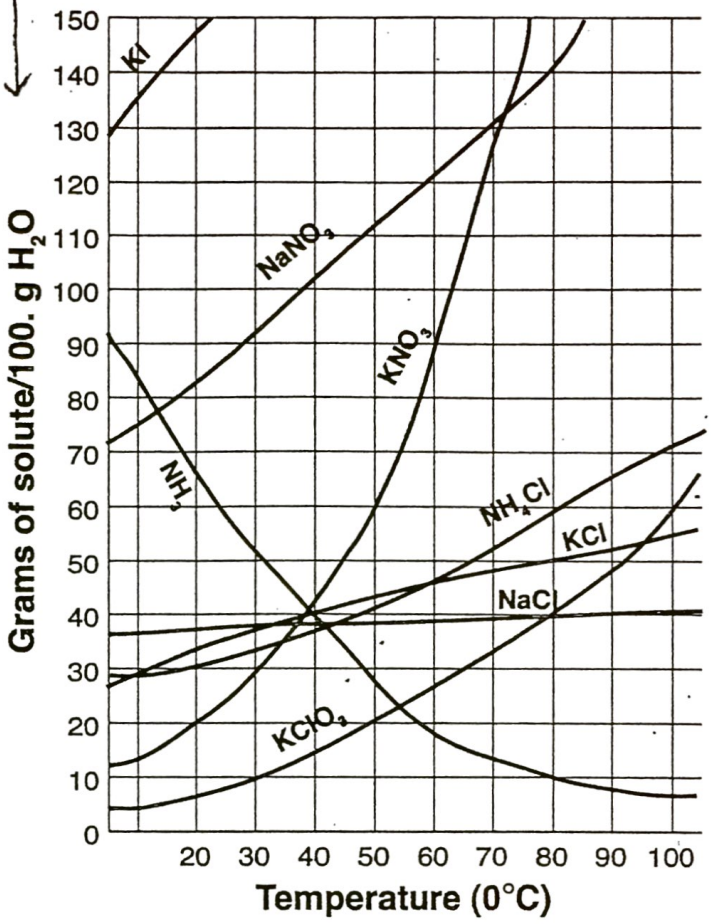
Unit 12 Solutions

SOLUBILITY CURVES

Name _____

Read the titles carefully ★

Answer the following questions based on the solubility curve below.



1. Which salt is least soluble in water at 20° C? _____

2. How many grams of potassium chloride can be dissolved in 200 g of water at 80° C?

   _____

3. At 40° C, how much potassium nitrate can be dissolved in 300 g of water? _____

4. Which salt shows the least change in solubility from 0° – 100° C?

   _____

5. At 30° C, 90 g of sodium nitrate is dissolved in 100 g of water. Is this solution saturated, unsaturated or supersaturated?

   _____

6. A saturated solution of potassium chlorate is formed from one hundred grams of water. If the saturated solution is cooled from 80° C to 50° C, how many grams of precipitate are formed? _____

7. What compound shows a decrease in solubility from 0° to 100° C? _____

8. Which salt is most soluble at 10° C? _____

9. Which salt is least soluble at 50° C? _____

10. Which salt is least soluble at 90° C? _____

SOLUBILITY (POLAR VS. NONPOLAR)

Name _____

Read ★ Generally, "like dissolves like." Polar molecules dissolve other polar molecules and ionic compounds. Nonpolar molecules dissolve other nonpolar molecules. Alcohols, which have characteristics of both, tend to dissolve in both types of solvents, but will not dissolve ionic solids. In column 1 label each solute as polar, nonpolar or ionic.

Check the appropriate columns as to whether the solute is soluble in a polar or nonpolar solvent.

SOLUTES (Polar, Nonpolar or Ionic)	SOLVENTS		
	Water	CCl_4	Alcohol
1. NaCl			
2. I_2			
3. ethanol 			
4. benzene 			
5. Br_2			
6. KNO_3			
7. toluene 			
8. $Ca(OH)_2$			