

NAME What! 2nd to Last Test PERIOD Now DATE \_\_\_\_\_

Solution Unit Review --COMPLETE MATCHING WITHIN EACH SECTION--PART I

<u>E</u>	1	when more solute is added, this is raised	<del>a.</del> solubility curve
<u>A</u>	2	a graph which shows the comparison of solute solubility over a range of temperatures	<del>b.</del> solute
<u>F</u>	3	homogeneous material that cannot be separated with a filter and is transparent if it is a liquid	<del>c.</del> transparent
<u>I</u>	4	the material that goes through the filter and lands in the container below the filter and funnel	<del>d.</del> heterogeneous
<u>B</u>	5	material that is dissolved to make a solution; occurs in the smaller amount within the solution	<del>e.</del> Concentration (Molarity)
<u>C</u>	6	The quality of being "see through"-- a substance which does not scatter light	<del>f.</del> solution
<u>G</u>	7	type of solution made when all the solute that can be dissolved at a given temperature has been dissolved	<del>g.</del> saturated
<u>H</u>	8	Amount that can dissolve at different temperatures	<del>h.</del> solubility
<u>D</u>	9	describes a substance that is made of different materials which can be distinguished	<del>i.</del> filtrate

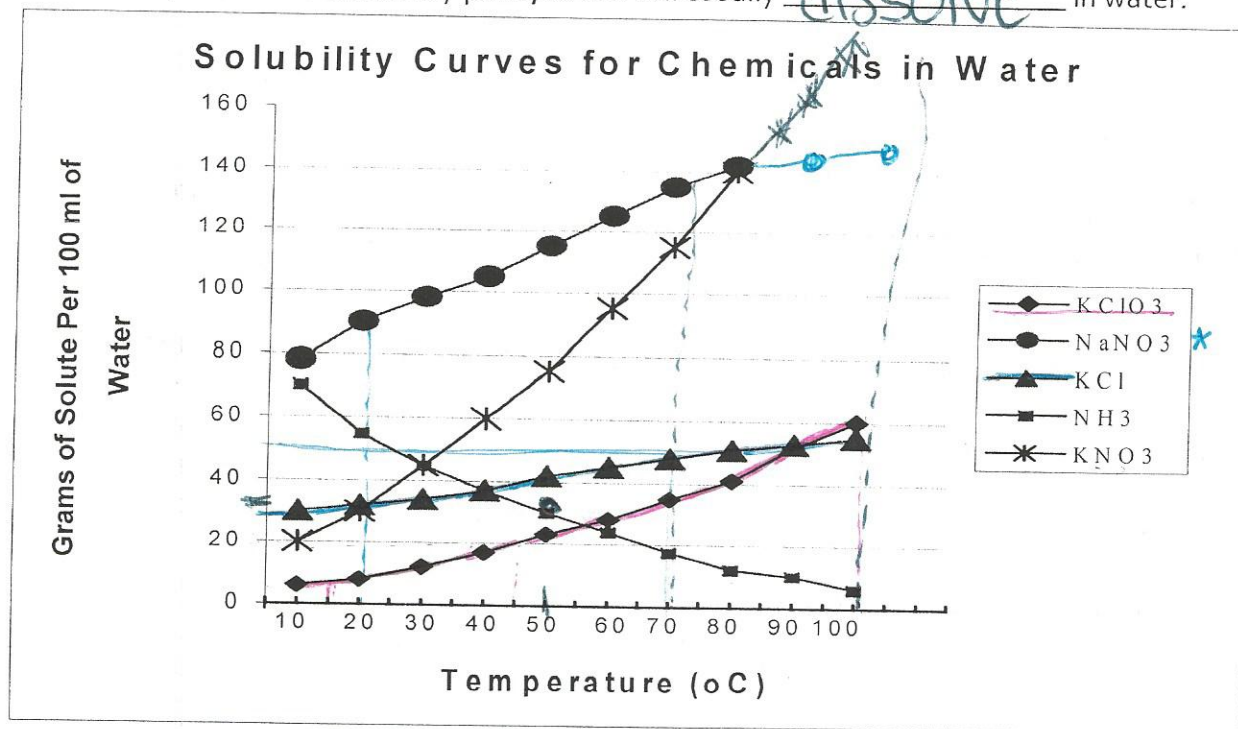
PART II

<u>M</u>	10	Water is known as the "universal solvent" since it dissolves more solutes than any other known substance due to its	<del>j.</del> suspension
<u>J</u>	11	has very large particles which settle and scatter light	<del>k.</del> solvent
<u>K</u>	12	occurs in the larger amount in a solution; dissolves other materials	<del>l.</del> supersaturated
<u>N</u>	13	separating a liquid from a mixture by a phase change	<del>m.</del> polar covalent structure
<u>O</u>	14	separating an insoluble solid from a mixture based on particle size going through	<del>n.</del> evaporation
<u>L</u>	15	this is made when more solute is dissolved than is normal for the given temperature and may start to crystallize	<del>o.</del> filtration

PART III

<u>U</u>	16	the relationship between solubility of a gas and temperature (that solubility of a gas increases when temperature decreases)	<del>p.</del> pressure
<u>S</u>	17	this term means that a substance is the same throughout	<del>q.</del> distillation
<u>Q</u>	18	using differences in boiling points to separate two liquids	<del>r.</del> mixture
<u>T</u>	19	what is made when more solute CAN be dissolved at a given temperature	<del>s.</del> homogeneous
<u>P</u>	20	Raising this will increase solubility of gases, but does NOT change the solubility of solids	<del>t.</del> unsaturated
<u>R</u>	21	made with a combination of 2 or more materials that can be separated with various physical processes	<del>u.</del> inverse

- Name 2 MIXTURES which are homogeneous. Koolaid, Glue, Lotion
- Name 2 MIXTURES which are heterogeneous. oil w/ water, trail mix, veg. soup
- Name 3 factors that change the speed that sugar dissolves (What would you do to your cup of coffee to make the sugar dissolve) temperature, agitation, small particle size
- A chocolate ice cream shake is not a solution. List 3 properties of solutions to tell why not.  
a. OMIT b. \_\_\_\_\_ c. \_\_\_\_\_
- If 18-karat gold (An alloy) is made of 75% gold and 25% copper, the solute is the Gold the solvent is the copper.
- Draw a water molecule and indicate the polarity (are the O or the H slightly positive/negative?)  
$$\begin{array}{c} \delta- \\ \text{O} \\ \delta+ \quad \delta+ \\ \text{H} \quad \text{H} \end{array}$$
- Since like dissolves like, which substance is also polar: permanent marker or ammonia (CIRCLE)
- Ionic compounds are extremely polar, so they will usually dissolve in water.



Use this graph to answer questions 6 through 14 below

- To make an **unsaturated** solution of KClO<sub>3</sub> at 45 °C, you could add 20 grams KClO<sub>3</sub>.
- To make an **saturated** solution of KClO<sub>3</sub> at 15 °C, you could add ~5 grams KClO<sub>3</sub>.
- To make a **supersaturated** solution of KClO<sub>3</sub> at 10 °C, you could add more than 5 grams KClO<sub>3</sub>.
- Which substance is most soluble at 20 °C? NaNO<sub>3</sub> at 70 °C? NaNO<sub>3</sub> at 100 °C? KNO<sub>3</sub>
- At approximately what temperature will 30 g of KCl dissolve in the water? 10°C 50 g? 70°C
- What is the MAXIMUM amount of KCl that will dissolve in the water at 70 degrees? ~50g
- Which substance above is a gas? NH<sub>3</sub> How can you tell? Negative slope. Inverse relationship temp/solubility
- How does a saturated solution of a solid change as temperature increases? becomes unsaturated
- At 55 °C, 30 g of KClO<sub>3</sub> is added to the water. The KClO<sub>3</sub> will \_\_\_\_\_.  
a. all dissolve      b. dissolve a little      c. not dissolve at all  
20g out of 30 will dissolve



# Know the following formulas by heart

Remember MOLARITY has 3 set of variables Dilution has 4 sets of variables!

**Molarity (M) =  $\frac{\text{moles of solute}}{\text{Liters of solution}}$**

Use when  
2 #'s Given

**$M_1V_1 = M_2V_2$  Dilution Equation**

Use when 3#  
Given

Match the following

To convert from moles to grams, multiply by the molar mass  
To convert from grams to moles, divide by the molar mass

To convert from mL to L, divide by 1000

Using the above equation for MOLARITY, solve the following:

REMEMBER TO CONVERT ml TO LITERS . and grams to MOLES! .

.33 M 1.

Calculate the molarity of 0.50 mol of  $\text{MgCl}_2$  in 1.5 L of solution

$$M = \frac{.5}{1.5}$$

1.3 M 2.

What is the concentration of 1.0 mol of KCl in 750 mL of solution

.750 L

$$M = \frac{1}{.750}$$

2.5 L 3.

Find the volume in liters needed to make a .1 M solution if you have .25 moles

$$.1 = \frac{.25}{x}$$

.05 M 4.

Find the molarity of 5.95 grams of NaCl in 2.00 L of solution

$$\frac{.101 \text{ mol}}{2 \text{ L}}$$

$$.1x = .25$$

.626 M 5.

Calculate the concentration of 400.0 grams of  $\text{CuSO}_4$  in 4.00 L of solution

$$\frac{2.50 \text{ mol}}{4.0 \text{ L}}$$

$$\frac{5.95 \text{ g NaCl}}{58.5 \text{ g}} \times 1 \text{ mol}$$

$$\frac{400 \text{ g}}{159.6 \text{ g}} \times 1 \text{ mol} = 3$$

<u>E</u> Measures amount of substance	a) gram
<u>F</u> Measures amount of substance per volume in varying units	b) millileter
<u>C</u> Measures larger volume	c) liter
<u>B</u> Measure smaller volumes	d) kilogram
<u>A</u> Measures small amout of mass	e) mole
<u>D</u> Equals 1000 g	f) dilution
<u>G</u> Measures Concentration	g) molarity
<u>F</u> Means to Decrease concentration by adding more solvent	h) concentration

Using the Dilution equation  $M_1V_1 = M_2V_2$ , complete the following table (can use ml or L - same both sides)

Problem	Stock Solution		Dilute Solution		SHOW ALL
Code	Concentration	Volume	Concentration	Volume	CALCULATIONS BELOW!
A	3.00 M HCl	16.6 ml	0.100 M HCl	500.0 mL	$3x = .1(500)$
B	0.450 M NaCl	50.0 mL	.075M	300.0 mL	$.450(50) = x(300)$
C	6.00 M HNO <sub>3</sub>	120.0 mL	1.00 M HNO <sub>3</sub>	720 ml	$6(120) = 1x$
D	.33 M	3.0 L	0.500 M NaCl	2.00 L	$x(3) = .5(2)$
E	1.00 M KI	30 L	.887 M	33.8 mL	$1(30) = x(33.8)$
F	18 M H <sub>2</sub> SO <sub>4</sub>	2.00 mL	0.200 M H <sub>2</sub> SO <sub>4</sub>	180 ml	$18(2) = .2x$

1. Fifty (50.0) milliliters of 2.00 M ammonium acetate are placed in a beaker and 200.0 mL of distilled water are added. What is the total volume (hint: add) and the new concentration of the more dilute solution?

$$50(2.0) = x(250)$$

$$.4M$$

2. Eleanor must prepare 300.0 mL of a 0.750 M NaBr solution using a 2.0 M NaBr stock solution. How many milliliters of a stock solution should she begin with?

$$2x = .75(300)$$

$$112.5ml$$

3. Jason is working as a lab aide for the AP chemistry teacher, and needs to prepare a dilute solution of 800 ml of 0.200 M NaCl. If he starts with 50 ml, what is the molarity of the stock (starting) solution?

$$x(50) = .2(800)$$

$$3.2M$$

4. To perform the acid base titration, Aurora needs 0.10 M HCl. If she has 25 ml of 1.0M HCl, how much of the dilute solution will she be able she prepare?

$$1(25) = .10x$$

$$250ml$$

5. In order to penetrate the alien shield, Captain Piccard needs to prepare a strong solution of nitric acid (HNO<sub>3</sub>). He has 9.00M HCl, but only 200 ml. . . . To effectively penetrate the shield, he must place at least 100 ml in 5 different places, so he needs 500 ml TOTAL. What concentration of HCl will the final dilution be? 3.6M If he needs to have 3.00M HCl, will the final dilution be strong enough? yes

$$9(200) = x(500)$$

Captain Piccard saves the day!





# SOLUBILITY OF COMPOUNDS TABLE

	Anions						
	Acetate $C_2H_3O_2^-$	Carbonate $CO_3^{2-}$	Chloride $Cl^-$	Hydroxide $OH^-$	Iodide $I^-$	Nitrate $NO_3^-$	Sulfate $SO_4^{2-}$
Aluminum $Al^{3+}$	S	I	S	I	S	S	S
Ammonium $NH_4^+$	S	S	S	S	S	S	S
Barium $Ba^{2+}$	S	I	S	S	S	S	I
Copper (II) $Cu^{2+}$	S	I	S	I	I	S	S
Lead (II) $Pb^{2+}$	S	I	S	I	I	S	I
Silver $Ag^+$	I	I	I	I	I	S	I
Sodium $Na^+$	S	S	S	S	S	S	S
Zinc $Zn^{2+}$	S	I	S	I	S	S	S

S - soluble      I - insoluble

## SOLUBILITY OF COMPOUNDS VOCABULARY ... Match the following:

E Electrolyte

A Insoluble Compound

F Exception

B ALWAYS SOLUBLE

C PREDICTING PRODUCTS

D Soluble Compound

~~A~~ A covalent or insoluble ionic compound which will not dissolve in aqueous solution

~~B~~ an ion such as  $NH_4^+$  and  $NO_3^-$  which always combines to form soluble compounds

~~C~~ Examining a chemical reaction and predicting how substances will combine to form new substances.

~~D~~ An ionic compound which will dissolve in aqueous solution

~~E~~ Soluble, ionic substance which can conduct electricity in solution

~~F~~ Does not follow the usual rule

USE THE SOLUBILITY TABLE ABOVE OR FROM THE STAAR CHART TO DETERMINE WHICH OF THE FOLLOWING SUBSTANCES ARE SOLUBLE (write S) AND WHICH ARE INSOLUBLE (Write I).

FORMULA	S/I	WRITE NAME	NAME	S/I	WRITE FORMULA
$Ba(NO_3)_2$	S	Ex: Barium Nitrate	Aluminum Chloride	S	$AlCl_3$
$NH_4SO_4$	S	Ammonium Sulfate	Lead II Sulfate	I	$PbSO_4$
$AgNO_3$	S	Silver Nitrate	Zinc Carbonate	I	$ZnCO_3$
$PbBr_2$			Copper II Acetate	S	$Cu(C_2H_3O_2)_2$
$AgCl$	I	Silver Chloride	Sodium Sulfate	S	$Na_2SO_4$
$Ba(OH)_2$	S	Barium Hydroxide	Lead II Iodide	I	$PbI_2$
$Pb(NO_3)_2$	S	Lead II Nitrate	Barium Chloride	S	$BaCl_2$
$Ag_2SO_4$	I	Silver Sulfate	Ammonium Hydroxide	S	$NH_4OH$

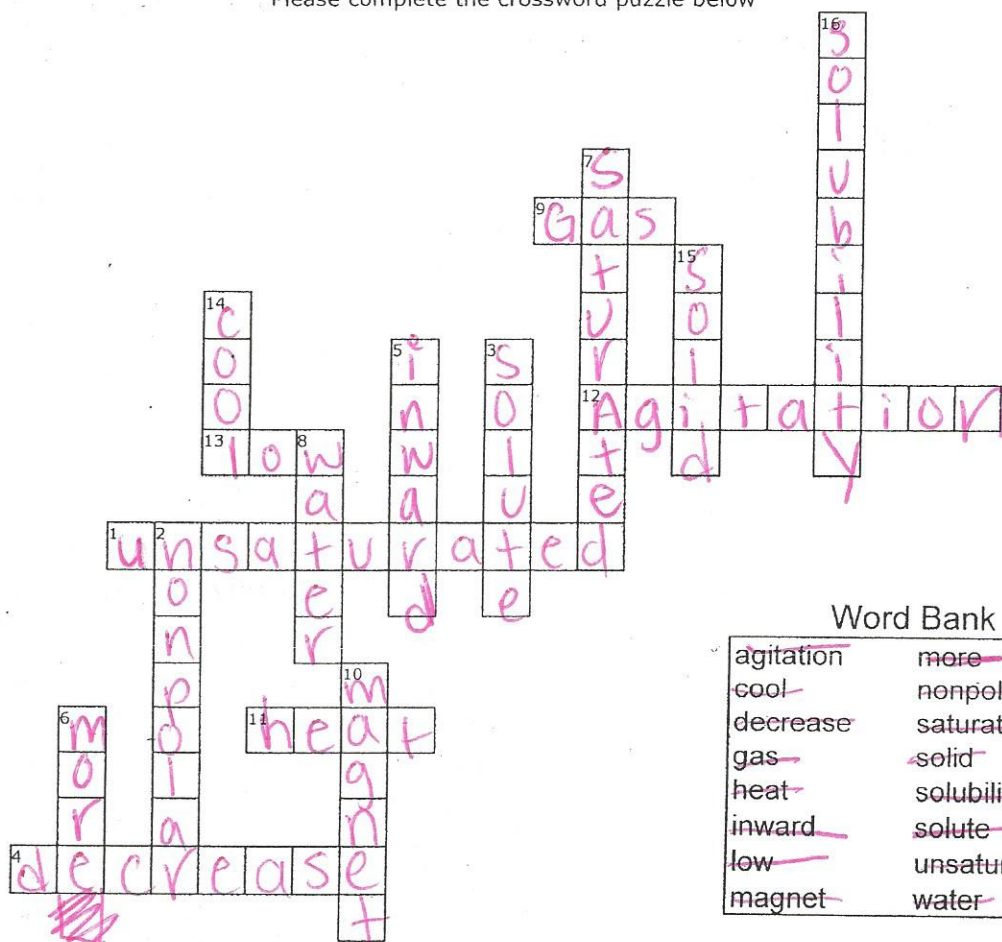
\* Not on chart!

S

Name: \_\_\_\_\_  
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## Chapter 15

Please complete the crossword puzzle below



### Word Bank

agitation	more
cool	nonpolar
decrease	saturated
gas	solid
heat	solubility
inward	solute
low	unsaturated
magnet	water

### Across:

1. A \_\_\_\_\_ solution will dissolve more solute.
4. When salt is added to the roads, will the freezing point increase or decrease?
9. Increasing the temperature will decrease the solubility of a \_\_\_\_\_ solute.
11. Specific heat capacity is how much \_\_\_\_\_ a substance can hold.
12. \_\_\_\_\_ like stirring or shaking increase the rate of solution.
13. A \_\_\_\_\_ number does not hold much heat.

Huh?

### Down:

2. Oil is a \_\_\_\_\_ compound.
3. The \_\_\_\_\_ is the smaller amount being dissolved.
5. Surface tension is a measure of the \_\_\_\_\_ pull by particles in the interior.
6. Increased pressure force \_\_\_\_\_ solute to stay in the solution. s \_\_\_\_\_ solute to stay in the solution.
7. A \_\_\_\_\_ solution will not dissolve any more solute.
8. \_\_\_\_\_ is the universal solvent
10. Polar compounds act like a \_\_\_\_\_.
14. There is more oxygen for fish in \_\_\_\_\_ water.
15. Increasing the temperature will increase the solubility of a \_\_\_\_\_ solute.
16. \_\_\_\_\_ is the amount of solute that can be dissolved in a solvent.

? What?