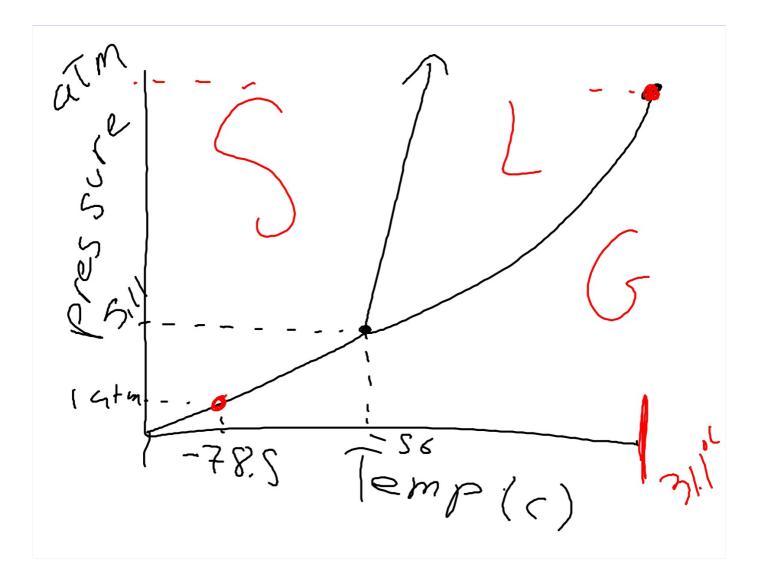
#### Do Now:

Hand in the dry ice lab in your lab notebook if you have not done do already.

In your notes: Make a table with 3 columns and 5 rows.

Check your homework.



Label the first row:

Compound, melting point and boiling point

Lable the columns:

Compound, neon, argon, oxygen and water.

States of matter simulation:

Get a laptop and google: phet

Navigate to the chemistry simulations.

Open the simulation.

States of matter

Part 1: determine the melting and boiling points for all four compounds.

Start with water. We know what the melting and boiling points are, but this gives us a good base line for further invesigation.

Click the solid, liquid an gas states to see ideal states. These are not the phase change temperatures.

#### Part 2:

Click the phase change tab at the top of the page.

Watch the red dot on the phase diagram on the right side as you heat and cool the material inside the container.

Do the same with increasing the pressure.

How are temperature and pressure related?

## Ch 12 quiz:

I will hand back the Ch. 12 quiz when your group's laptop has been returned.

Check IC that the grade on your quiz is the same as the one online.

## Do Now

- Given the following formula, solve for the desired variable: M=mol/V
  - Solve for V. V=?
  - Solve for mol. mol = ?

 $V = \frac{mcl}{4}$  Mol = V = M  $V = \frac{mel}{4}$   $V = \frac{mcl}{4}$   $V = \frac{mcl}{4}$ 

This week - Chapter 16: Solutions

T: Molarity and Solubility curves

W: Solution Stoichiometry

R: Dilutions of solutions

F: Solutions lab

# **Basic Concepts**

- Rate of solubility
- Units for solubility
- Factors that determine mass of solute that will dissolve
- Molar concentration, % mass, & % volume.

## Basic Concepts Main Topics

- 3 colligative properties of solutions
- Differences in vapor pressure, freezing point, & boiling point of solutions vs. pure solvents.
- Computation of molality in solutions.
- Freezing point depression and boiling point elevation as related to molality.

# Vocabulary

- Solution-Homogeneous mixture of a solid, liquid or gas. The majority of this class, we will refer to solutions in their liquid & gas forms.
- Solvent-The substance that something is mixed into.
- Solute-The substance mixed into a solvent.

## Identification

- Mr. B puts a sugar cube into his morning tea and mixes it in.
- Identify the solute and the solvent.



# **Dissolving Solutes**

- This occurs at the surface area between the solute and solvent.
- As salt mixes into water, the ions break up. Think of salt breaking apart in water. Though we cannot see the salt when it is mixed in, if you taste it, you can tell that the salt is still there.

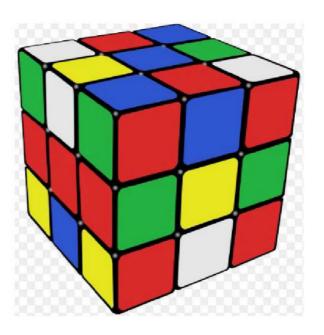
Monday, May 12, 14

# Dissolving Factors

- Agitation-stirring. Moves higher concentrations of solute around mixture.
- Temperature. The warmer the fluid, the faster the molecules are moving. This allows the solvent to move around more quickly, having more contact with the solute.
- Surface area. A teaspoon of granulated sugar has more surface area than a sugar cube.

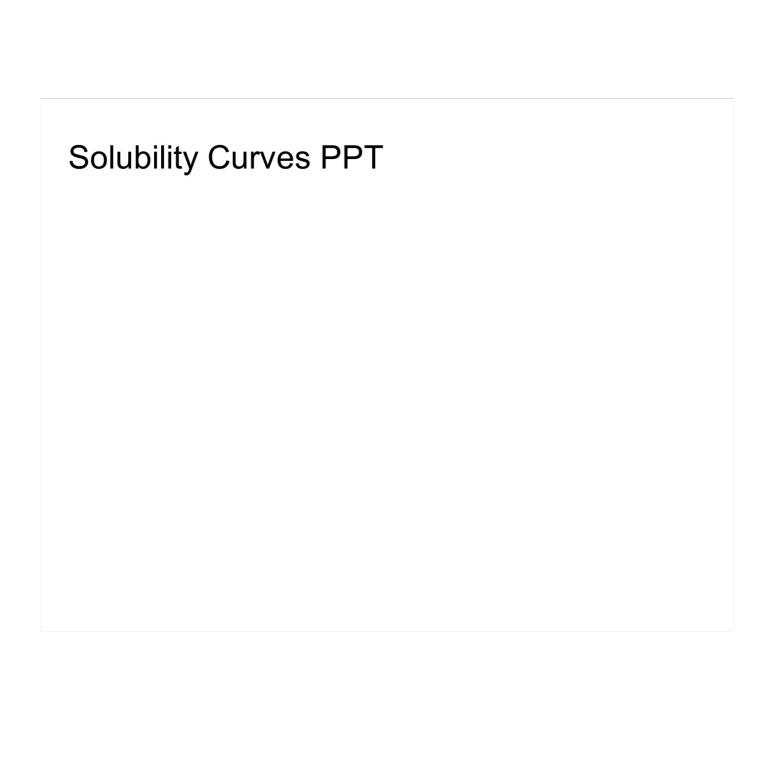
## Surface Area

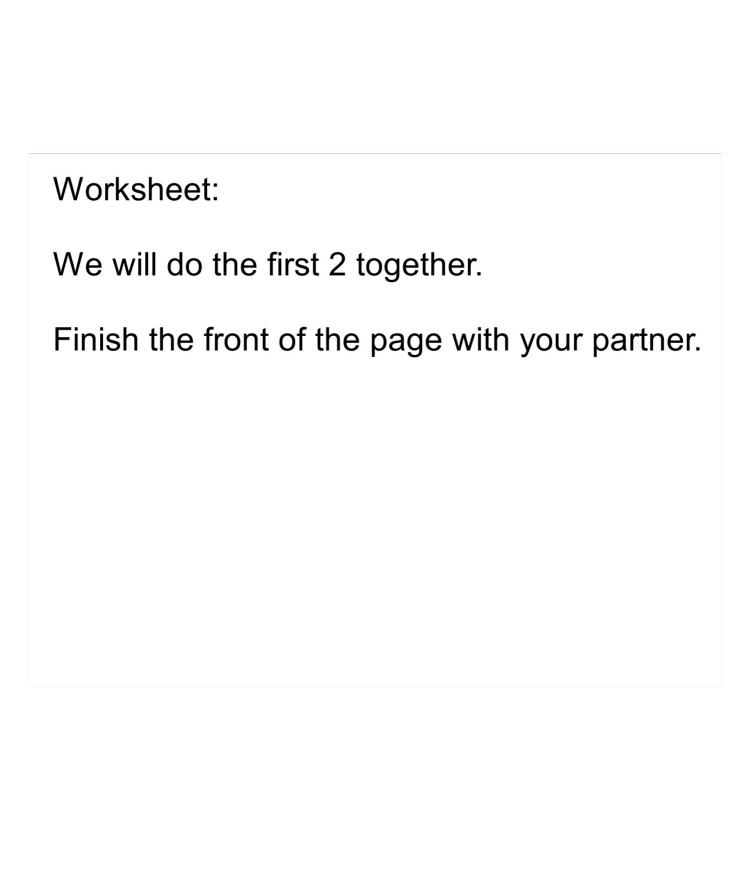
- Take a cube made of smaller cubes. Each small cube is I"x I"
- Find the surface area of the cube as it appears and the total surface area of all 27 individual blocks



# Solubility

- Only so much of a substance can be dissolved into solution. You have probably experienced putting too much sugar into a drink. When you get to the bottom, there is a sludge of sugar that did not dissolve.
- Only a certain amount of solute will dissolve. This is called solubility.





# Molarity

- Molarity (M) is a concentration of a solution. Molarity is measured in moles of solute per volume (liters) of solvent.
- If a solution is labeled 2.1M NaCl, then there are 2.1 moles of NaCl for every liter of solution.
- How many moles of NaCl would be present if there was only 500 ml of 2.1M solution?

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# Measuring Molarity

- The formula is generally written M=mol/V, where V is the volume of liters.
- Most of the time we will have less than I liter of solute. How can we convert from ml to L?

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# How many moles of H2SO4 are necessary to create a 0.8M solution in 300 ml of water?

- Knowns:V=0.3/M=0.8 M
- Unknown: mol=?
- Formula: M=mol/V
- Rearrange formula to isolate the unknown.  $mol-VM=0.3L^{\bullet}O.8M$

= 0,24mol

• Plug and chug.

## Conversion Factors

- We know that one mole of a substance is the molar mass. This number is calculated from the atomic mass.
- Many problems will ask for or provide a mass that must be converted to moles before it can be solved.

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I) What is the molarity of a solution which is formed when 2.58 g of CaCl2 is dissolved in enough water to produce 250 ml of solution.

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Concentration of ions in solution:

Determine the molarity of a compound in solution.

Multiply the molarity of the compound by the number of particles of a particular ion in compound that is dissolved.

4) What is the molar concentration of the aluminum ions and chloride ions present in a solution which is prepared when 6.97 g of AlCl3 is dissolved in 1.25 L of solution?

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Crach Course Solutions overview.

0:00-5:00



#### Worksheet:

Work with your lab partner on the front side of the worksheet.

You will do the first 3 problems on the back for homework tonight.

Do Now:

Check the Homework.

We can go over one or two questions if you would like.

Good Morning!

Please take out the homework.

Please solve the following:

10g of lithuim oxide is added to 375ml of water. What is the molarity of the resulting solution?

10g of lithuim oxide is added to 375ml of water. What is the molarity of the resulting solution?

$$M = \frac{0.3}{0.375L} = 0.8M$$

### Solutions Stioch:

M=mol/V

Convert known to moles
Mole ratio
Convert to unknown units.

Solution Stoichiometry:

We are now pros at stoichiometry.

We can add a twist by talking about solutions in stoich.

The approach is just the same, we just need to convert volumes and concentrations to moles.

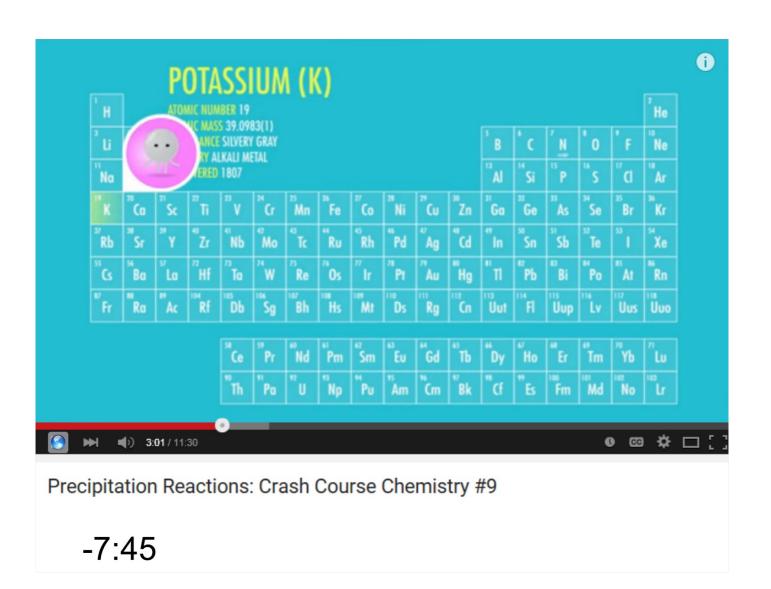
300ml of 0.5m solution of Silver Nitrate (AgNO<sub>3</sub>) is combined in a double replacement reaction with 1L of 0.2M Aluminum Chloride. If Silver Chloride precipitates. What is its mass?

0.15 not Ag/13 3 not Ag/1 - 0.15 not Ag/1 0.15 not Ag/1 X 15Ag 23.19 How many grams of silver chromate (AgCrO<sub>4</sub>) will precipitate when 150 mL of 0.500 M silver nitrate are added to 100 mL of 0.400 M potassium chromate?

0,04 mol KHO3 | mul As (v ) 4 = 0,04 mul (Ag (r ) 4 )

0.04 mol Ag (r Qg 224 & As (r O) 4 )

mol As (r O) 4 )



How many mL of 0.280 M barium nitrate are required to precipitate as barium sulfate if all the sulfate ions from 25.0 mL of 0.350 M aluminum sulfate are totally consumed?

#### Homework:

Molarity and solutions stioch worksheet 6-9.

Molarity/Solution Stoichiometry Worksheet.

Show all work please.

Note: 9 has a 92% yield.

Also, 4 & 5 from the back of last nights worksheet.

Gas laws quiz

I will take questions once all quizzes have been handed back.

Grades are not yet on IC.

**Concentrations and Dilutions:** 

Most chemical solutions are stored in concentrated solutions to maximize space.

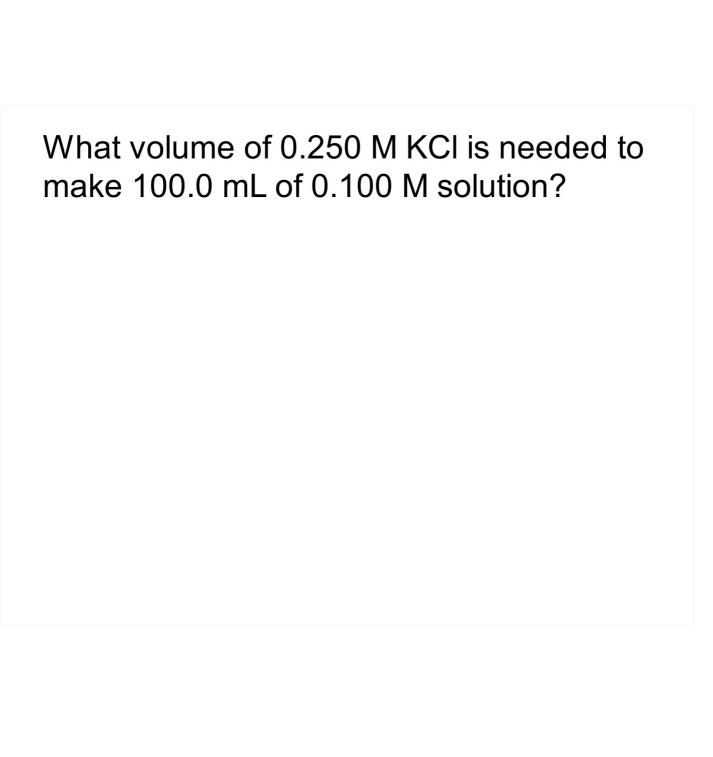
We can dilute concentrated solutions.

Method: McVc=MdVd

The molarity and volume of the conventrate (stock solution) is equal to the molarity and volume of the diluted solution.

This is because they have the same number of moles of solute.

A stock solution of 1.00 M NaCl is available. How many milliliters are needed to make 100.0 mL of 0.750 M



A stock solution of 10.0 M NaOH is prepared. From this solution, you need to make 250.0 mL of 0.375 M solution. How many mL will be required?

You have the rest of the period to begin the homework.

Please ask questions if you have them.

Please take advantage of this time.

Have a great weekend.

