Thursday – Lab

Friday – Test

*Anyone can take the test one day early, either during class Thursday or after school

---

Purpose: Review today for Friday's Test

#1

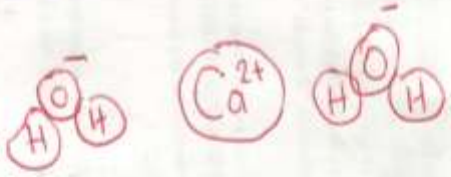
Warmup Write the formula and weight of AMMONIUM NITRATE

$NH_4^+ NO_3^-$

$\left.\begin{matrix} 2\times N \\ 4\times H \\ 3\times O \end{matrix}\right\} = 80.069$ grams/moles

Warmup Redraw this with the water facing the correct direction. Label the "CATION"

DRAWN WRONG



DRAWN RIGHT

the cation

#11 HINT FOR #11

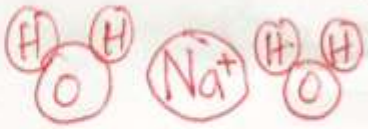
MORE PIECES CAUSES MORE AFFECT

NaBr → 2 pieces → lowers the melting point a bit

CaF_2 → 3 pieces → lowers the boiling point even more

#3

DRAWN WRONG:



DRAWN RIGHT:

Colligative Properties

CAeMis+ry: http://genest.weebly.com

Stop in for help every day at lunch and Tues, Weds., &Thurs after school!

After-hours question? Email me at home: eagenest@madison.k12.wi.us

Name_____

Period_____

1. Fill in the missing blanks to describe each mixture. Remember that the solvent is the thing you have the most of.

the solution is called:	the solute is:	the solvent is:
carbonated water (soda)	CO_2	water
air	oxygen	nitrogen
lemonade	sugar, lemon flavor	water

2. Predict the particles that will form in solution

compound:	Gives these pieces if dissolved
$AlCl_{3(aq)}$	Al^{3+}, Cl^-, Cl^-, Cl^-
$CH_3OH_{(aq)}$	CH_3OH
$Ca(OH)_{2(aq)}$	Ca^{2+} OH^- OH^-

3. When liquids are impure, their freezing points are (lower/higher) than normal.
4. When liquids are impure, their boiling points are (lower/higher) than normal.

substance	boiling point [°C]	melting point [°C]
boron	3675	2079
tungsten	5660	3410
oxygen	-182	-218

5. If tungsten is made into an alloy by adding copper, what would be a possible boiling point for the alloy?
   a. 5500 b. 5660 c. 5700
6. If boron were made into a solution by mixing it with N_2, what would be a possible boiling point for the solution?
   a. 3600 b. 3675 c. 3700

7. You have 3.05 grams (→ moles) of aluminum nitrate and want to make a 5L of solution. What concentration could you make?

The formula	$concentration = \frac{moles\ of\ solute}{volume\ of\ solution}$
The units	$[M] = \frac{[moles]}{[L]}$

$3.05\,g\ Al(NO_3)_3 \times \left(\frac{1\ mol}{213.01\,g}\right) = 0.0143\ mol$

formula: $M = \frac{moles}{L}$ $M = \frac{0.0143\,mol}{5L}$ $M = 0.00286\ \frac{mol}{L}$

8. What is the molarity of the solution produced when 145 g of sodium chloride is dissolved in sufficient water to prepare 2.75 L of solution?

moles ← 145 g

$145\ g\ NaCl \times \left(\frac{1\ mol\ NaCl}{58.44\ g\ NaCl}\right) = 2.48\ mol\ NaCl$

↑ from the periodic table

The formula	$concentration = \frac{moles\ of\ solute}{volume\ of\ solution}$
The units	$[M] = \frac{[moles]}{[L]}$

formula

$M = \frac{moles}{L}$

$M = \frac{2.48\ mol}{2.75\ L}$ $M = 0.902\ \frac{mol}{L}$

9. How many grams of potassium chloride are needed to prepare 0.750 L of 1.50 M KCl?

$M = \frac{moles}{L}$ ← unknown

$Moles = (1.50\ M)(0.750\ L)$

$moles = 1.125\ moles$

rearranges to

$moles = M \cdot L$

$1.125\ mol \times \left(\frac{74.55\ g\ KCl}{1\ mol\ KCl}\right) = 83.9\ grams$

10. To prepare 10.5 L of 2.50 M potassium hydroxide, how many grams of potassium hydroxide must be used?

$M = \frac{mol}{L}$ $mol = M \cdot L$ $moles = (2.50M)(10.5L)$

$moles = 26.25\ moles$

$26.25\ mol \times \left(\frac{56.11\ g\ KOH}{1\ mol\ KOH}\right) = 1473\ grams$

For each pair of quantities mark <, =, or >.

Example:	The temperature in Madison today	>	The temperature on a hot day on Mars
11.	the melting point of pure ice	>	The melting point of salty ice
12.	The boiling point of a 0.100 M solution of NaCl	<	The boiling point of a 0.200 M solution of NaCl
13.	The melting point of a 0.100 M solution of NaCl	>	The melting point of a 0.200 M solution of NaCl

SKIP

Review for the Test

ANSWERS

vv

CλeMis+ry: http://genest.weebly.com

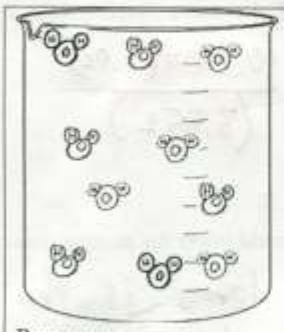
Stop in for help every day at lunch and Tues, Weds., &Thurs after school!

After-hours question? Email me at home: eagenest@madison.k12.wi.us

Name_____

Period_____

1. Draw!

 Pure water	In the beaker on the right draw a Na+ and a Cl- ion. Draw the same number of water molecules as the beaker on the left and what direction each would face.	 An aqueous solution of $NaCl_{(aq)}$

2. If 4.55M hydrochloric acid is diluted from 36.0mL to 90.0mL, what is the new concentration?

$M_1V_1 = M_2V_2$ $\quad \frac{M_1V_1}{V_2} = M_2$ $\quad \frac{(4.55\,M)(36.0\,mL)}{(90.0\,mL)} = M_2$

$1.82\,M = M_2$

3. What is the molarity if 0.65 moles $CaCl_2$ in 750 mL of solution are mixed?

$M = \frac{\text{moles solute}}{\text{Liters solution}}$ $\quad M = \frac{0.65\,mol}{0.750\,L}$ $\quad M = 0.87\,\frac{mol}{L}$

4. In NaBr bromide is the (cation / anion) and sodium is the (cation / anion)

substance	boiling point [°C]	melting point [°C]
boron	3675	2079
tungsten	5660	3410
oxygen	-182	-218

5. If oxygen is mixed with another gas, what would be a possible ~~melting~~ BOILING point for the mixture?

a. -184°C b. -182°C c. -180°C

6. If tungsten were made into a solution by mixing it with iron what would be a possible ~~boiling~~ point for the solution?

d. 5650 e. 5660 f. 5670

7. If you took 455 mL of 0.110M solution and diluted it to 790. mL, what would the new concentration be?

$M_1V_1 = M_2V_2$ $\quad \frac{M_1V_1}{V_2} = M_2$ $\quad \frac{(0.110M)(455mL)}{(790mL)} = M_2$ $\quad 0.063M = M_2$

8. If you took 3.55L of unknown strength solution and diluted it to 5.0L that had a concentration of 0.250M, what was the original concentration?

$M_1V_1 = M_2V_2$ $\quad M_1 = \frac{M_2V_2}{V_1}$ $\quad M_1 = \frac{(0.250M)(5.0L)}{(3.55L)}$

$M_1 =$

9. If you dumped one mole each of the following compounds, which would lower the melting point of frozen snow the most?
   a. KNO_3 two particles
   b. $Al(NO_3)_3$ four particles ← answer: this lowers it the most

10. In $FeCO_{3(s)}$ iron is the (cation / anion) and CO_3 is the (cation / anion)

11. The following are all water based solutions. Rank the solutions from coldest freezing point (1) to highest freezing point (5)
   a. 2 $0.5M\ KNO_{3(aq)}$ two particles of solute
   b. 1 $0.5M\ Al(NO_3)_{3(aq)}$ four solute particles
   c. 5 pure water none
   d. 2 $0.5M\ NaBr_{(aq)}$ two solute particles
   e. 4 $0.5M\ CH_3OH_{(aq)}$ one solute particle

   tie

12. How many grams of ammonium chloride are contained in 300. mL of a 0.875 M solution?

$M = \frac{mol}{L}$ $\quad mol = M \times L$ $\quad mol = (0.875M)(0.300L) = 0.263 moles$ ← 0.300 L

convert: $0.263 mol \left(\frac{53.5g}{1 mol}\right) = 14.1g$ → 24.3

13. How many moles of nitrate ions are in 50.0 mL of a 1.9850 M magnesium nitrate solution?

→ 0.0500 L

$M = \frac{mol}{L}$ $\quad mol = M \times L$ $\quad mol = (1.9850M)(0.0500L)$

$mol = 0.09925 moles\ Mg(NO_3)_2$

answer: 0.1985 mol NO_3

Determine the molarity of the following solutions. Show your work and remember that the unit on your answer must be in moles/Liter = M.

14. What is the molarity if 3.00 moles of $C_6H_{12}O_6$ dissolved to make 2.0 liters of solution?

$M = \frac{moles}{L}$ $\quad M = \frac{(3.00 mol)}{(2.0L)}$ $\quad M = 1.5M$