Review #1

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

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

Name_____

Period_____

Checklist for this Friday's test:

By the time we finish this unit, you should be able to:

Relate the molar concentration (molarity) of a solution to the number of moles and volume of the solution.

Beginning with a balanced equation and the volume and molarity of a reactant or product, predict the moles of another reactant or product in the reaction.

Describe endothermic and exothermic reaction in terms of
- energy bar graphs and system flow diagrams (LOLOL)
- Balanced equations with a quantitative energy term
- □H notation

Solve stoichiometry story problems. Know the conversion factors for these:
- volume of a gas
- volume of a solution, or
- energy of reaction

And use these to determine stoichiometric relationships in a chemical reaction story problem

Vocabulary
- Concentration
- Molarity
- Molarity
- Endo-, exothermic
- Enthalpy

Review Concepts:
- Solutions: a homogeneous mixture of a solute dissolved in a solvent; dissolving process
- Energy storage and transfer mechanisms in a molecular system; Energy constants

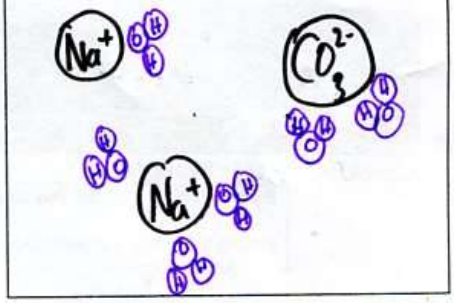
1. Which of these ratios are 'ONE'? In the box below each if the factor is true write True! if the factor is incorrect rewrite it so it isn't.

$\frac{1\ year}{365.25\ days}$	$\frac{22.4\ moles\ Ar\ gas}{1\ mole\ Ar}$	$\frac{6\ players}{2\ baseball\ teams}$	$\frac{1\ inch}{12\ feet}$	$\frac{1\ gram\ copper}{6.02x1023\ atoms\ of\ copper}$ *
true!	$\frac{22.4\ L\ Ar}{1\ mol\ Ar}$	$\frac{9\ players}{1\ team}$ also $\frac{18\ players}{2\ teams}$	$\frac{12\ inches}{1\ foot}$	$\frac{63.55\ grams}{6.02x10^{23}\ atoms\ Cu}$

*more than one right answer for most of these.

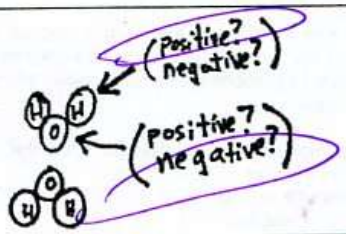
2. This is a <u>solid</u> chunk of sodium carbonate.
   - In the box draw an <u>aqueous</u> chunk of the same substance.
   - Include eight water molecules.
   - Make sure the waters are pointing in the right direction!

important: makes exactly three ions
important: opposites attract for direction of H_2O turning



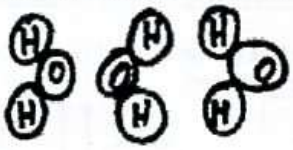
3.

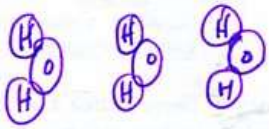
4. Which end of H_2O has which electrical charge? <u>Circle</u> a correct choice in each parenthetical pair.



5. If two objects are electrically both positive, those objects will (repel / attract).
6. Opposite charges (attract / repel).

7. Things are facing in the wrong directions here. Think about 'opposites attract' and draw things facing correctly in the box.





8. From memory, what is the formula of each

carbonic acid H_2CO_3

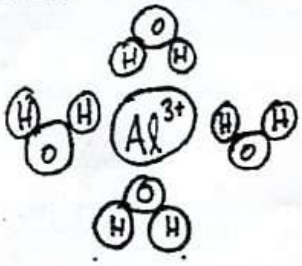
phosphoric acid H_3PO_4

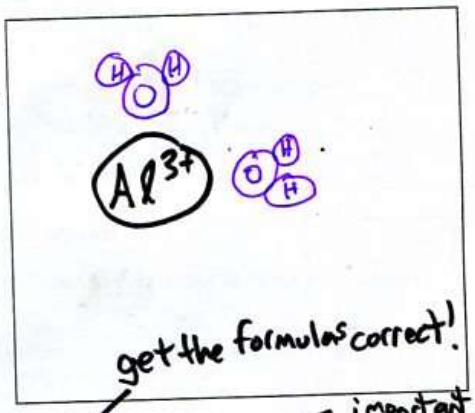
9. Natural gas contains 97% methane (CH_4), 1.5% ethane (C_2H_6), 1% CO_2, and 0.5% nitrogen gases.

solvent methane

solute(s): ethane, CO_2, nitrogen

10. Things are facing in the wrong directions here. Think about 'opposites attract' and draw things facing correctly in the box.





11. Suppose an excess of aluminum was allowed to react with 45 mL of aqueous 0.39M hydrochloric acid to produce aluminum chloride and hydrogen gas. Assume the acid is the limiting reactant.

important. this not $AlCl$, it is $AlCl_3$

a. Write a balanced equation.

$2Al + 6HCl \rightarrow 3H_2 + 2AlCl_3$

b. If all of the acid reacts, how many moles of aluminum should react?

more than one way to solve

$$0.045\ L\ HCl \times \frac{.39\ mol\ HCl}{1\ L} \times \frac{2\ mol\ Al}{6\ mol\ HCl} = 5.85 \times 10^{-3}\ mol\ Al$$

c. If all of the acid reacts, how many grams of aluminum chloride will form?

$$0.045\ L\ HCl \times \frac{.39\ mol\ HCl}{1\ L\ HCl} \times \frac{2\ mol\ AlCl_3}{6\ mol\ HCl} \times \frac{133.33\ grams\ AlCl_3}{1\ mol\ AlCl_3} = 0.78\ grams\ AlCl_3$$

d. If all of the acid reacts, how many liters, at STP, of hydrogen should form?

$$0.045\ L\ HCl \times \frac{.39\ mol\ HCl}{1\ L\ HCl} \times \frac{3\ mol\ H_2}{6\ mol\ HCl} \times \frac{22.4\ L\ H_2}{1\ mol\ H_2} = 0.20\ liters\ H_2$$

***Directions:** Turn the following into balanced equations by filling in the blanks with the correct coefficients, formulas of ions or solids, and names.*

	Cation	Anion		Formula	Name
12.	Ba^{2+} +	$2I^-$	→	BaI_2	barium iodide
13.	$2Fe^{3+}$ +	$3S^{2-}$	→	Fe_2S_3	iron (III) sulfide

14. You need to find the limiting reactant at some point to solve this one: Determine the volume in liters of carbon dioxide that should be produced in the reaction between 98.0. g of carbon and 500. liters of O_2. (Similar to the scissors sheet)

15. What is the formula for finding volume if you're given moles and concentration?

$$Volume = \frac{moles}{concentration}$$

(#14) BARN SHEET

Find the limiting reactant

$$98.0\text{ g C} \times \left(\frac{1\text{ mol C}}{12.01\text{ g C}}\right) \times \left(\frac{1\text{ mol } CO_2}{1\text{ mol C}}\right) \times \left(\frac{22.4\text{ L } CO_2}{1\text{ mol } CO_2}\right) = 180\text{ L}_{CO_2}$$

So... Limiting reactant is CARBON!

$$500.\text{ L } O_2 \times \left(\frac{1\text{ mol } O_2}{22.4\text{ L } O_2}\right) \left(\frac{1\text{ mol } CO_2}{1\text{ mol } O_2}\right) \left(\frac{22.4\text{ L } CO_2}{1\text{ mol } CO_2}\right) = 500\text{ L}$$

BY THE WAY, A BALANCED REACTION MUST BE MADE BEFORE DOING THE ABOVE STEPS

$$1C + 1O_2 \rightarrow 1CO_2$$

Answer: 180 liters CO_2 form at S.T.P.

Review #2

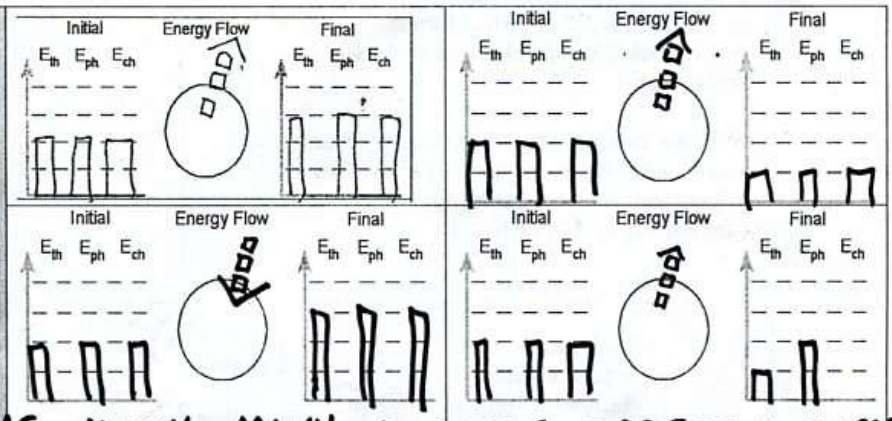
Chemistry: http://genesr.weebly.com

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

Name KEY

Period

1. We know this energy diagram is wrong. Show three different ways that **a single change** could make it correct.



THIS HAS MANY, MANY POSSIBLE CORRECT ANSWERS.

2. $2\ C_{10}H_{22}(g) + 31\ O_2(g) \rightarrow 20\ CO_2(g) + 22\ H_2O(g) + 13483kJ$

For the reaction above, which of these ratios are 'ONE'? In the box below each if the factor is true write True! if the factor is incorrect rewrite it so it isn't.

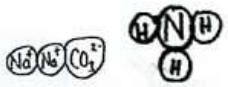
$\frac{2\ C_{10}H_{22}}{22.4\ L\ C_{10}H_{22}}$	$\frac{22.4\ moles\ O_2\ gas}{1\ liter\ O_2}$	$\frac{31\ mol\ O_2}{32\ grams}$	$\frac{1\ mol\ H2O}{31\ mol\ O_2}$	$\frac{13485\ kJ}{1\ mol\ O_2}$
$\frac{1\ mole}{22.4 L\ C_{10}H_{22}}$	$\frac{22.4\ L}{1\ mole}$	$\frac{1\ mol\ O_2}{32\ grams}$	$\frac{22\ mol\ H_2O}{31\ mol\ O_2}$	$\frac{13485\ kJ}{31\ mol\ O_2}$

3. Suppose 2.00 L of nitrogen gas and 5.00 L of hydrogen gas are mixed and reacted to form ammonia (NH_3). Calculate the grams of ammonia produced when this reaction runs to completion.

4. How many molecules are in 22.4 liters of steam?

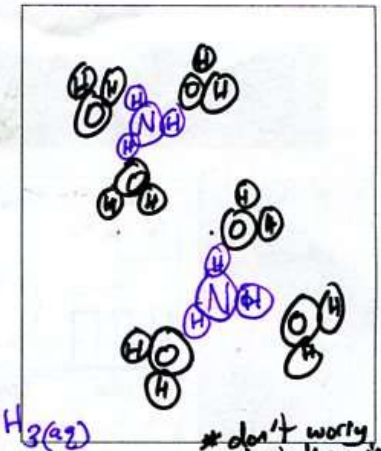
If at STP, a gas will be 1 Liter = 22.4 moles

5. What is the molarity of solution made by dissolving 0.740 moles of NH_4Br in enough water to make 840. mL of solution?



6. What type of substance is each?
Na_2CO_3 is (ionic / molecular)
NH_3 is (ionic / molecular)
a) In the box, draw what two molecules of NH_3 would look like dissolved in some water molecules.

b) Draw two equations, including charges and phase subscripts, for each of these two substances above dissolving.
(for example, $A_{(L)} \rightarrow B_{(aq)}$)

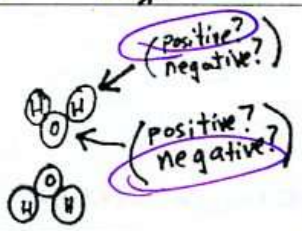


$Na_2CO_{3(s)} \rightarrow 2\,Na^+_{(aq)} + CO_{3(aq)}^{2-}$

$NH_{3(g)} \rightarrow NH_{3(aq)}$

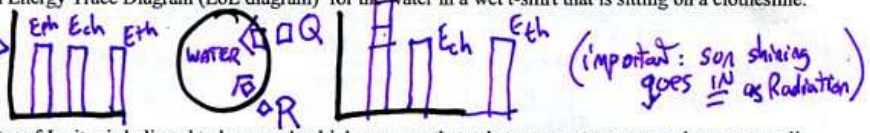
* don't worry about knowing that pure NH_3 is gas at STP

7. Which end of H_2O has which electrical charge? Circle a correct choice in each parenthetical pair.



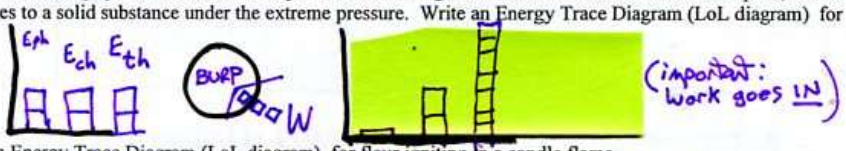
8. Write an Energy Trace Diagram (LoL diagram) for the water in a wet t-shirt that is sitting on a clothesline.

One possible solution:



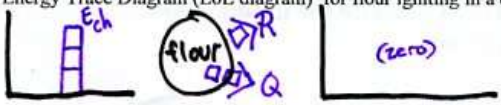
(important: sun shining goes IN as Radiation)

9. The center of Jupiter is believed to have such a high pressure that substances get compressed to very small volumes and change phase. Consider a burp from a cow being taken down to near the middle of Jupiter, where it changes to a solid substance under the extreme pressure. Write an Energy Trace Diagram (LoL diagram) for this.



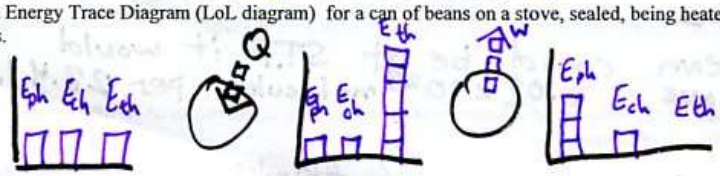
(important: work goes IN)

10. Write an Energy Trace Diagram (LoL diagram) for flour igniting in a candle flame.



this is just one possible solution
(important: Ech goes down)

11. Write an Energy Trace Diagram (LoL diagram) for a can of beans on a stove, sealed, being heated until it explodes.



12. Write an Energy Trace Diagram (LoL diagram) for a stick of dynamite going off.

These have many possible correct solutions.
the main point is knowing what Q, W, R, Eph, Eth, Ech, mean AND OBEYING LAW of Cons. of Energy

#3

$$2\,L\,N_2\left(\frac{1\ mol\ N_2}{22.4\ L\ N_2}\right)\left(\frac{2\ mol\ NH_3}{1\ mol\ N_2}\right)\left(\frac{17\ g\ NH_3}{1\ mol\ NH_3}\right) = 3.04\ g\ NH_3$$

$$5\,L\,H_2\left(\frac{1\ mol\ H_2}{22.4\ L\ H_2}\right)\times\left(\frac{2\ mol\ NH_3}{3\ mol\ H_2}\right)\left(\frac{17\ g\ NH_3}{1\ mol\ NH_3}\right) = 2.52$$

2.52 g NH_3 answer