

Chemistry Unit 2 Packet 3 Essential Questions

- 1) How can we express chemical reactions in written/symbol form?
- 2) How can we express chemicals in written/symbol form?

Chemistry Unit 2 Packet 3 Learning Goals

LEARNING GOAL	DATE INTRODUCED	RATE HOW WELL YOU UNDERSTAND LEARNING GOAL				
LG 2.12: Identify the components of a chemical equation.	8/31	5	4	3	2	1
LG 2.13: Develop methods to understand how a Bunsen burner works.	9/1	5	4	3	2	1
LG 2.14: Understand the CER (claim, evidence, reasoning) format.	9/1	5	4	3	2	1
LG 2.15: Write element formulas.	9/2 or 9/3	5	4	3	2	1
LG 2.16: Understand the chemical relevance of everyday household objects.	9/2 or 9/3	5	4	3	2	1
LG 2.17: Write chemical formulas from names and names from chemical formulas.	9/4	5	4	3	2	1

Chapters In E-Textbook

Chemical Equations – pages 91-94
 Chemical Symbols and Formulas – pages 77-81

Chemistry Unit 2 Packet 3 Assignment List

ASSIGNMENT NAME	PAGE #	DATE DUE
CHEMISTRY UNIT 2 PACKET 3 LEARNING GOAL LIST	1	N/A
CHEMISTRY UNIT 2 PACKET 3 ASSIGNMENT LIST	2	N/A
WARMUPS (5 pts)	3	9/8/15
NOTES: CHEMICAL EQUATIONS AND CHEMICAL NAMING	4	N/A
IRA REMSEN DEMO (10 pts)	5-6	9/8/15
CHEMISTRY WORKSHEET ON CHEMICAL EQUATIONS (12 pts)	7-8	9/2/15 or 9/3/15
LAB: LIGHT MY FIRE (15 pts)	9-12	9/4/15
LIGHT MY FIRE: CER RUBRIC (9 pts)	13	9/4/15
QUIA WORKSHEET: CHEMICAL EQUATIONS (13.5 pts)	QUIA	9/4/15
COUNTING ATOMS PRACTICE (5 pts)	14-15	9/8/15
WHAT CHEMICAL IS IT? (10 pts)	16-17	9/8/15
CHEMICAL NAMES AND FORMULAS (10 pts)	18-19	9/8/15
COMMON ASSESSMENT 1: CHEMICAL EQUATION TERMS (20 pts)	CA	9/4/15

CHEMISTRY WARM-UPS: Be sure to complete
ALL information! NO BLANKS!

NAME _____ PERIOD ____

DATE _____ Learning Goal _____

Write the WARM-UP Question:

Your Answer:

Correct Answer/Reflection:

Rate: _____

DATE _____ Learning Goal _____

Write the WARM-UP Question:

Your Answer:

Correct Answer/Reflection:

Rate: _____

DATE _____ Learning Goal _____

Write the WARM-UP Question:

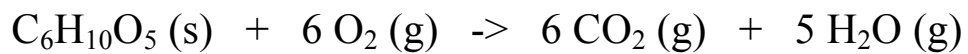
Your Answer:

Correct Answer/Reflection:

Rate: _____

Chemical Equation and Chemical Naming Notes

Chemical Equations



Chemical Formula

Product(s)

Reactant(s)

Solid

Liquid

Gas

Aqueous

Coefficient

Subscript

Yields

Writing Element Formulas

Type 1 (all the rest)

Type 2 (seven elements)

1

2

3

4

5

Type 3 (two elements)

1

2

6

7

Elements

Compounds

Metals

Nonmetals

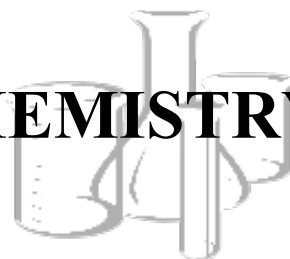
Demo Log Name _____

Ira Remsen Demonstration

KHS CHEMISTRY

5

/10



Draw a sketch of the experimental set-up, labeling all of the equipment.

Hypothesis—What do you predict will happen?

Observations during the experiment—be very specific and use drawings! **Describe at least 3 different things.**

1.

2.

3.

4.

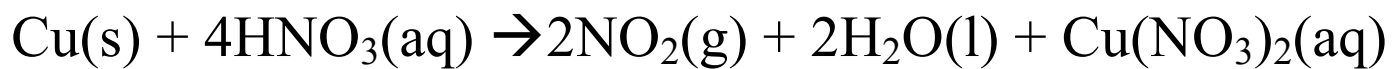
5.

6.

7.

Write the WORD EQUATION for what you observed.

Below is the CHEMICAL EQUATION for what you observed. Identify the parts of the equation.



Was this a chemical or physical change? Use at least 2 observations from above to support your claim.

What is true of all colored gases? _____

What is true of solutions containing copper? _____

Chemistry Worksheet on Chemical Equations - General

Answer the questions about the following reactions.



List the formulas of the reactants: _____

List the formulas of the products: _____

What are the coefficients of the reactants: _____

What are the coefficients of the products: _____

List the subscripts of the reactants: _____

List the subscripts of the products: _____

List the phases of the reactants: _____

List the phases of the products: _____



List the formulas of the reactants: _____

List the formulas of the products: _____

What are the coefficients of the reactants: _____

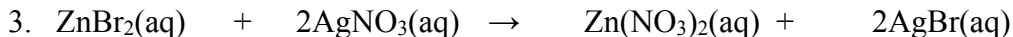
What are the coefficients of the products: _____

List the subscripts of the reactants: _____

List the subscripts of the products: _____

List the phases of the reactants: _____

List the phases of the products: _____



List the formulas of the reactants: _____

List the formulas of the products: _____

What are the coefficients of the reactants: _____

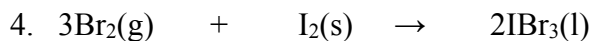
What are the coefficients of the products: _____

List the subscripts of the reactants: _____

List the subscripts of the products: _____

List the phases of the reactants: _____

List the phases of the products: _____



List the formulas of the reactants:

List the formulas of the products:

What are the coefficients of the reactants:

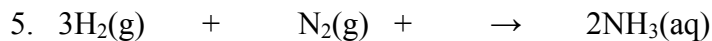
What are the coefficients of the products:

List the subscripts of the reactants:

List the subscripts of the products:

List the phases of the reactants:

List the phases of the products:



List the formulas of the reactants:

List the formulas of the products:

What are the coefficients of the reactants:

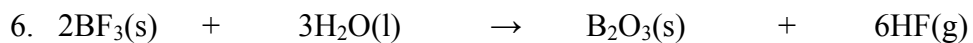
What are the coefficients of the products:

List the subscripts of the reactants:

List the subscripts of the products:

List the phases of the reactants:

List the phases of the products:



List the formulas of the reactants:

List the formulas of the products:

What are the coefficients of the reactants:

What are the coefficients of the products:

List the subscripts of the reactants:

List the subscripts of the products:

List the phases of the reactants:

List the phases of the products:

Laboratory Investigation: Light my Fire!

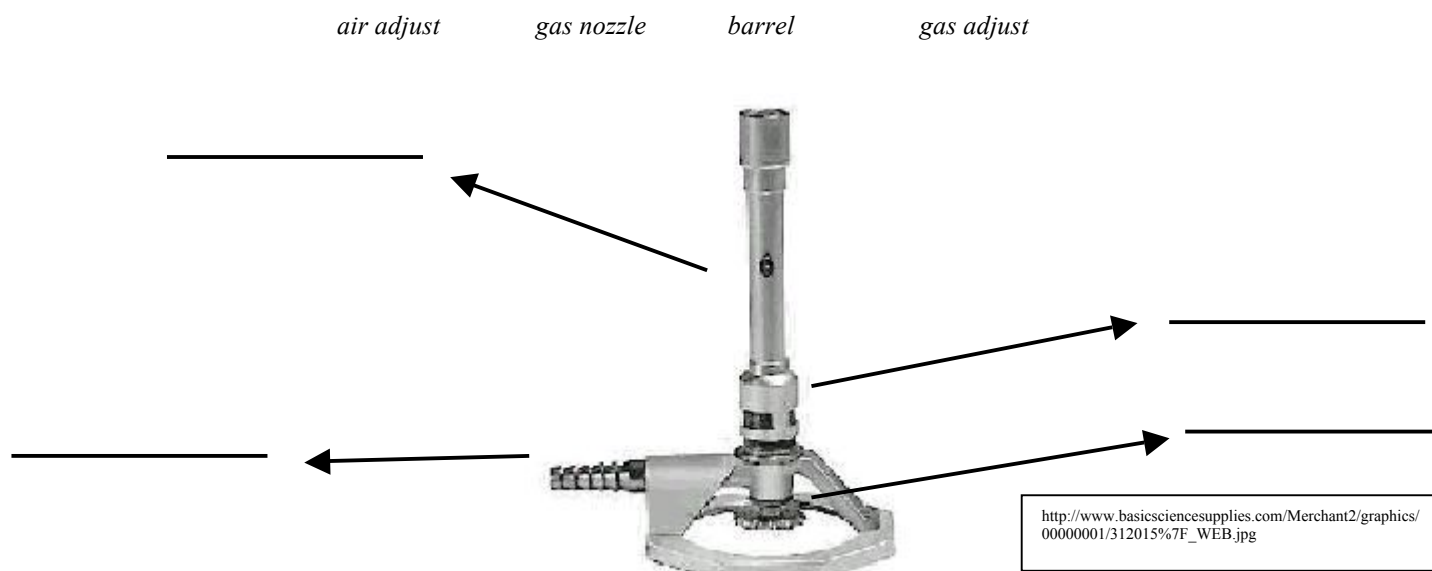
Name _____

Date Due _____ Period _____



Purpose: The purpose of this lab is for you to learn the different parts of the lab burner and to determine the temperatures of different parts of the burner flame. You will use your own methods for investigating these things.

Introduction: A Tirrill or Bunsen burner like those we will use in the lab is shown below. Use the list and guess which part is which—write your guesses on the lines below.



Hypothesis: Make a claim regarding the function of the following burner parts—what do you think the parts listed below are used for? In other words, how do you think adjusting these different parts will affect the nature of the flame?

Air adjust: _____

Gas adjust: _____

Part 1: Now you will gather evidence to support your claims above! Work with a partner and figure out the functions of the different parts of the burner. **CAUTION:** use care not to completely twist off the air and gas adjusts. Experiment with the burner and determine what each part is used for. Notice how the flame changes as you adjust the air and the gas. Were your original hypotheses above correct? If so, write “correct” on the lines below. If they were incorrect, write the correct function of the part on the lines below.

Air adjust: _____

Gas adjust: _____

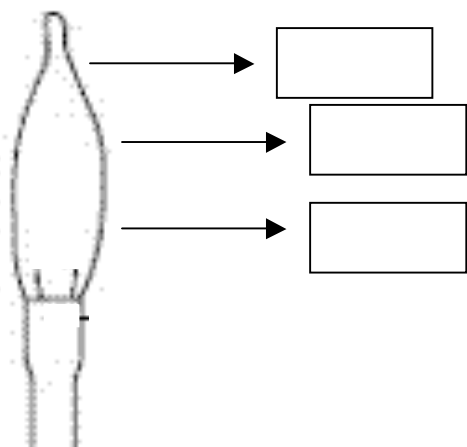
Part 2: Temperature of the burner flame. You will use a nichrome wire to probe the different parts of a burner flame to discover which parts will be hottest and which will be coolest. You will use what you learned about the burner parts to adjust it to a **fluffy yellow** flame, a **single blue** flame and a **double blue** flame.

Hypothesis: Which type of flame do you think will be the hottest? _____

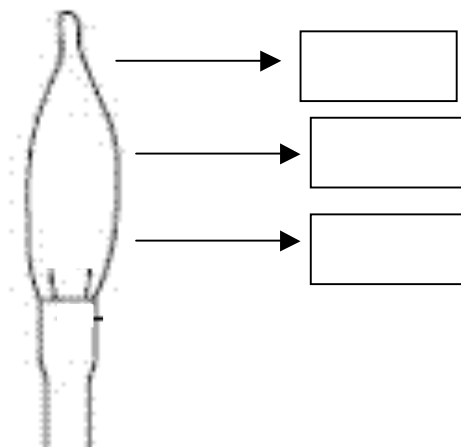
Procedure: Place a nichrome wire into the burner flame at 3 different locations as shown on the drawings below. (Feel free to test additional locations within each flame and record your data.) Observe the color of the wire while it is in the flame; compare the color to the temperature chart below to estimate the temperature of the parts of the flames. [For reference, a 400° F oven is about the same as 200° C, so the flame is very hot!]

Wire Color	Not quite red	Dark red	Bright red	Yellowish red	Not quite white	White
~Temperature (°C)	525	725	900	1100	1300	>1450

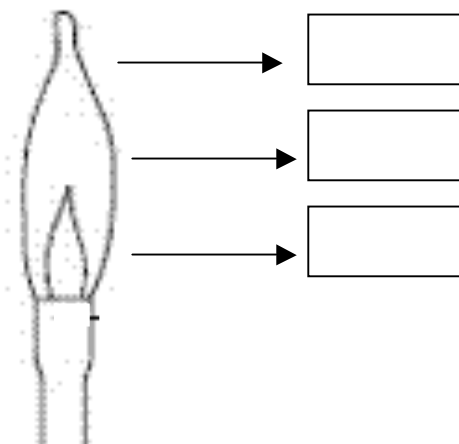
Data: Write the estimated temperature based on your results in the boxes below.



FLUFFY YELLOW FLAME



SINGLE BLUE FLAME

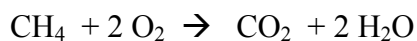


DOUBLE BLUE FLAME

Conclusions and Follow-up Questions

- Which type of flame (fluffy yellow, single blue, or double blue) is the hottest? _____
- Which part(s) of the flame tend to be hottest?

The gas used in the lab burners is **methane**, which has the chemical formula **CH₄**. When the burner is lit, methane reacts with oxygen in the air according to the following chemical equation:

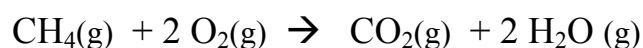


When you adjust the gas you are changing the amount of methane entering the burner. When you adjust the air, you are changing the amount of oxygen entering the flame.

3. With that in mind, explain in 1-2 sentences why the flame gets taller when you add more methane.

4. Explain in 1-2 sentences why the flame gets hotter (blue) when you add more air.

5. On the chemical equation below identify each of the following: Reactants, Products, Yields
Draw circles around 2 subscripts. Draw squares around 2 coefficients.



In what state of matter do all of the substances in the reaction exist?

Write 2 different *chemical formulas* in the equation. _____ and _____

6. Write an appropriate hypothesis for each situation below, and a 1-2 sentence description of how you could test that hypothesis. The Independent Variable (IV) is the thing you will change purposefully; the Dependent Variable (DV) is what you are measuring after you change the IV. The Controlled Variables (CV's) are the things you want to stay the same. Often, a hypothesis will have the form: "If...[a change in the independent variable]..., then...[a predicted change in the dependent variable]." Use the If-Then format when appropriate! Include at least 3 CV's as part of each TEST.

a. You want to know if the reaction between Magnesium metal and acid will go faster at higher temperatures.

IV: _____ DV: _____

Hypothesis: _____

Test/CV's: _____

7. CLAIM, EVIDENCE, REASONING

Below or on another sheet of paper, write a CER (claim, evidence, reasoning) on the topic of:

What conditions do you measure the hottest the flame?

Possible chemistry concepts include: type of flame, where on the flame, the chemical equation, the type of reaction, the reactants and products involved. **Use the rubric on the next page to guide your response.**

Title: _____ CER RUBRIC 2015-16NAME _____ PER _____ DATE _____
 Use the following scoring guide when writing a scientific explanation. **CIRCLE THE LEVEL WHICH YOU ARE ATTEMPTING FOR EACH SECTION.**

Criterion/Level	Beginning (1)	Approaching (2)	Meeting (3)	Surpassing (4)
Claim ____ / 2 possible	Claim lacks 2 or more items/characteristics from level 3 or items are incorrect or unclear . (0-.75pts)	Claim lacks 1 item/characteristic from level 3 or item is incorrect or unclear . (1.25pts)	List at least 3 chemistry concepts that can be used to explain why something happens. (1.5pts)	Meets previous level and includes chemistry concepts beyond what have been discussed in class. (Use outside sources-internet, etc.) (2pts)
Evidence (Data) ____ / 2 possible	More than 2 items from level three are missing or incorrect or unclear . (0-.75pts)	Evidence has 1 or 2 missing items from level 3 or items are incorrect or unclear . (1.25pts)	Evidence is present, including at least 3 direct observations; may include diagrams/pictures. (1.5 pts)	Meets previous level and includes more observations; data is organized including labeled diagrams. (2pts)
Reasoning ____ / 4 possible	Either fails to explain or only somewhat explains how & why data/evidence supports claim; gives limited/no chemical explanation . Several questions needed for clarification. (0-2.5pt)	Moderately explains how & why data/evidence support(s) claim, gives incomplete chemical explanation. One or two questions needed for clarification. (3pts)	Clearly, succinctly & logically explains how & why the data/evidence support(s) the claim; accurate chemical vocabulary/explanations are present. (3.5 pts)	Meets previous level & reasoning also includes and analyzes relevant information gathered beyond what was discussed in class. (4pts)
References ____ / 1 possible	References are incomplete/missing. (0-.5 pt)	References are incomplete. (.5pts)	References are listed. (class notes, textbook) (.75 pts)	Meets previous level and includes relevant references from credible outside sources , such as the internet. (1 pts)

+ _____ 1 point for student self-evaluation.

_____/ 10 total

The examples/explanations below are merely a guide. Most important is to explain things in your own words!

Claim: You may list the chemical concepts. Look at your notes for specific chemistry concepts/vocabulary.
 Example: This demonstration involved combustion, surface area to volume ratio, potential energy changes.

Evidence: Give evidence that you observed which demonstrates the chemical concepts/vocabulary.
 Example: Heat and light were produced, which are signs of combustion. Larger chunks of fuel burned more slowly; smaller pieces burned more quickly. The heat produced is evidence of an exothermic reaction.

Reasoning: Explain the chemical concepts/vocabulary in your own words. Include chemical equations here!
 Example: Combustion requires a fuel source, oxygen and ignition to occur. The chemical equation for this reaction was:
 $C_{31}H_{64}(s) + O_2(g) \rightarrow CO_2(g) + H_2O(g)$. Because the chunks were fuel and burned with oxygen to produce carbon dioxide and water, this is a combustion reaction.
 Because the big chunks burned more slowly, while smaller chunks burned more quickly, surface area increases as the chunks gets smaller. Therefore the surface area to volume ratio is increasing while volume remains the same, resulting in a faster reaction rate.
 Because heat is given off, the amount of potential energy is decreasing, and therefore this reaction is exothermic.

References: Where did you get information for your chemical explanation? Give enough information so someone else can find that same source.

For class notes, give date and topic: Class notes, 9-9-15, Potential Energy

Textbook: Author, Book title, publication date, pages: Timberlake, Karen, Basic Chemistry, 1998, pp. 125-127.

Internet sources: Author, topic, URL, date last updated; How Stuff Works, Why doesn't paraffin burn cleanly?
 Howstuffworks.com, 2008

Counting Atoms

All compounds are made up of multiple atoms. Each element in a compound will have a specific number of atoms that comprise the molecule.

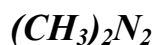


Carbon- 1 atom

hydrogen-4 atoms

oxygen-1 atom

If there is no subscript by a symbol there is 1 atom of that element. Subscripts that are shown indicate how many atoms there are of an element.



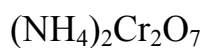
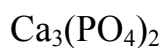
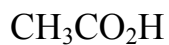
Carbon-2 atoms

Hydrogen-6 atoms

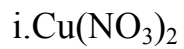
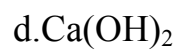
Nitrogen-2 atoms

When elements are in parentheses the rules above apply *except* you must multiply the subscript by the subscript outside the parentheses.

Practice:



Count the following atoms on your own:



WHAT CHEMICAL IS IT?

NAME _____

Work with a partner. Read the labels on each of the products listed. Match the name of one chemical in each product with the product.

- | | |
|-------------------------------------|--------------------------|
| ___ 1. rubbing alcohol | a. phosphoric acid |
| ___ 2. ammonia | b. sodium chloride |
| ___ 3. baking soda | c. acetic acid |
| ___ 4. correction fluid (Wite-out®) | d. ammonium hydroxide |
| ___ 5. hand sanitizer | e. isopropyl alcohol |
| ___ 6. detergent | f. ethanol |
| ___ 7. nail polish remover | g. tetrachloroethane |
| ___ 8. salt | h. sodium lauryl sulfate |
| ___ 9. vinegar | i. sodium bicarbonate |
| ___ 10. soda | j. acetone |

Now for each chemical name listed in the products, write the corresponding chemical formula. Write your answers in the table on the back. You may use the internet or books in the room to find these! Additionally, you should find at least one other use for each chemical. FINALLY, answer the questions below.

1. The chemical formula for caffeine is $C_8H_{10}N_4O_2$. Answer the following questions about caffeine.

- What element is C? _____ What is the subscript on C? _____
- What element is N? _____ What is the subscript on N? _____

2. The chemical formula for hydrogen peroxide is H_2O_2 . Hydrogen peroxide is used to disinfect boo-boos—it's the stuff that bubbles when you put it on your cut. Answer the following questions about hydrogen peroxide.

- What element is H? _____ What is the subscript on H? _____
- What element is O? _____ What is the subscript on O? _____
- Draw a picture using different colors or shapes of what you think " H_2O_2 " particles look like.

3. Webster Groves Senior Jasper Hausenpfeffer says, "I never use chemicals." Comment on his statement.

Chemicals in Common Products

Common Product AND One Chemical Name of Contents	Chemical Formula	2 Uses of Chemical
rubbing alcohol		
ammonia		
baking soda		
correction fluid		
hand sanitizer		
detergent		
nail polish remover		
salt		
vinegar		
soda pop		
(AAB)* Your choice:		
(AAB)* Your choice:		

*Above and Beyond(AAB)-Pick 2 household products you use that were not shown in class. Research and determine their chemical make-up and formulas.

Chemistry Learning Activity **Chemical Names and Formulas** Name _____

Background Knowledge: Classify the following as Elements (E) or Compounds (C):

a. Co _____ b. SiO₂ _____ c. CaCl₂ _____ d. Mg(OH)₂ _____ e. Br₂ _____ f. PF₅ _____ g. P₄ _____

Background Knowledge: Classify the following as Metals (M) or Nonmetals (NM):

a. Co _____ b. N _____ c. F _____ d. Mg _____ e. Fe _____ f. U _____ g. H _____ h. Na _____

Develop your skills: Use your yellow reference card to help you write chemical formulas or names.

SITUATION 1

Chemical Name	Types of Elements Present (Metals/Nonmetals/Both)	Use Numerical Prefixes? (Yes or No)	Chemical Formula
Dinitrogen tetroxide			
Beryllium fluoride			
			K ₂ Se
			S ₃ O ₇
Carbon monoxide			
			NO ₂
Aluminum sulfide			
Iron(II) nitride			
			CrBr ₃
Tetranitrogen nonafluoride			
Copper(II) selenide			
Nitrogen			
Zinc oxide			

SITUATIONS 1 and 2

Chemical Name	Types of Elements Present (Metals/Nonmetals/Both)	Use Numerical Prefixes? (Yes or No)	Chemical Formula
			$\text{Ca}(\text{NO}_3)_2$
			$\text{Ba}_3(\text{PO}_4)_2$
Iron(III) acetate			
Disulfur hexabromide			
Potassium phosphide			
			$\text{Pb}(\text{OH})_2$
			IBr_2
			O_2
Ammonium sulfate			
Tin(II) hydroxide			
Fluorine			
			AlPO_4
Sodium bicarbonate			
			CrSO_4
Lead(IV) sulfate			