

PHYSICAL AND CHEMICAL PROPERTIES AND CHANGES

Name _____

<p>PHYSICAL PROPERTY</p> <ol style="list-style-type: none"> 1. observed with senses 2. determined without destroying matter 	<p>CHEMICAL PROPERTY</p> <ol style="list-style-type: none"> 1. indicates how a substance reacts with something else 2. matter will be changed into a new substance after the reaction
--	--

Identify the following as a chemical (C) or physical property (P):

- | | |
|---|--|
| <ul style="list-style-type: none"> _____ 1. blue color _____ 2. density _____ 3. flammability (burns) _____ 4. solubility (dissolves) _____ 5. reacts with acid _____ 6. supports combustion _____ 7. sour taste | <ul style="list-style-type: none"> _____ 8. melting point _____ 9. reacts with water _____ 10. hardness _____ 11. boiling point _____ 12. luster _____ 13. odor _____ 14. reacts with air |
|---|--|

<p>PHYSICAL CHANGE</p> <ol style="list-style-type: none"> 1. a change in size, shape, or state 2. no new substance is formed 	<p>CHEMICAL CHANGE</p> <ol style="list-style-type: none"> 1. a change in the physical and chemical properties 2. a new substance is formed
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Identify the following as physical (P) or chemical (C) changes.

- | | |
|---|---|
| <ul style="list-style-type: none"> _____ 1. NaCl (Table Salt) dissolves in water. _____ 2. Ag (Silver) tarnishes. _____ 3. An apple is cut. _____ 4. Heat changes H₂O to steam. _____ 5. Baking soda reacts to vinger. _____ 6. Fe (Iron) rusts. _____ 7. Alcohol evaporates . _____ 8. Ice melts. | <ul style="list-style-type: none"> _____ 9. Milk sours. _____ 10. Sugar dissolves in water. _____ 11. Wood rots. _____ 12. Pancakes cook. _____ 13. Grass grows. _____ 14. A tire is inflated. _____ 15. Food is digested. _____ 16. Paper towel absorbs water. |
|---|---|

Physical and Chemical Changes

Part A

Can you recognize the chemical and physical changes that happen all around us? If you change the way something looks, but haven't made a new substance, a **physical change (P)** has occurred. If the substance has been changes into another substance, a **chemical change (C)** has occurred.

1.		An ice cube is placed in the sun. Later there is a puddle of water. Later still the puddle is gone.
2.		Two chemical are mixed together and a gas is produce.
3.		A bicycle changes color as it rusts.
4.		A solid is crushed to a powder.
5.		Two substances are mixed and light is produced.
6.		A piece of ice melts and reacts with sodium.
7.		Mixing salt and pepper.
8.		Chocolate syrup is dissolved in milk.
9.		A marshmallow is toasted over a campfire.
10.		A marshmallow is cut in half.

Part B

Read each scenario. Decide whether a physical or chemical change has occurred and give evidence for your decision. The first one has been done for you to use as an example.

	Scenario	Physical or Chemical Change?	Evidence...
1.	Umm! A student removes a loaf of bread hot from the oven. The student cuts a slice off the loaf and spreads butter on it.	Physical	No change in substances. No unexpected color change, temperature change or gas given off.
2.	Your friend decides to toast a piece of bread, but leaves it in the toaster too long. The bread is black and the kitchen is full of smoke.		
3.	You forgot to dry the bread knife when you washed it and reddish brown spots appeared on it.		
4.	You blow dry your wet hair.		
5.	In baking biscuits and other quick breads, the baking powder reacts to release carbon dioxide bubbles. The carbon dioxide bubbles cause the dough to rise.		
6.	You take out your best silver spoons and notice that they are very dull and have some black spots.		
7.	A straight piece of wire is coiled to form a spring.		
8.	Food color is dropped into water to give it color.		
9.	Chewing food to break it down into smaller particles represents a _____ change, but the changing of starch into sugars by enzymes in the digestive system represents a _____ change.		
10.	In a fireworks show, the fireworks explode giving off heat and light.		

Part C: True (T) or False (F)

1.	Changing the size and shapes of pieces of wood would be a chemical change.
2.	In a physical change, the makeup of matter is changed.
3.	Evaporation occurs when liquid water changes into a gas.
4.	Evaporation is a physical change.
5.	Burning wood is a physical change.
6.	Combining hydrogen and oxygen to make water is a physical change.
7.	Breaking up concrete is a physical change.
8.	Sand being washed out to sea from the beach is a chemical change.
9.	When ice cream melts, a chemical change occurs.
10.	Acid rain damaging a marble statue is a physical change.

Shall We Dance? – Classifying Types of Chemical Reactions

New Concepts

Types of Chemical Reactions: Use your Textbook pages 212-223 as needed.

- **Synthesis** elements or less complex compounds come together to form a single more complex compound
- **Decomposition** a compound breaks apart into either elements or less complex compounds
- **Single replacement** a single element replaces another one in a compound
- **Double replacement** ions in a compound switch places with ions in another compound to form two new compounds
- **Combustion** fuel (generally in the form of a hydrocarbon) reacts with oxygen and produces carbon dioxide and water.

Model 1: Analogy - Dancing with Reactants

When you are thinking about the four different types of reactions I'd like you to think about its similarity to dancing (yes, dancing). I'll show you what I mean.

The dance...

Adam and Barbara were both single. No one was talking about "Adam and Barbara" being together before the dance. They both go to the dance alone. However, they meet at just the perfect time when a song they both adore is playing. They end up holding hands the entire dance. After that fateful meeting no one ever sees Adam without Barbara, they are forever referred to as "Adam and Barbara".

Key Questions

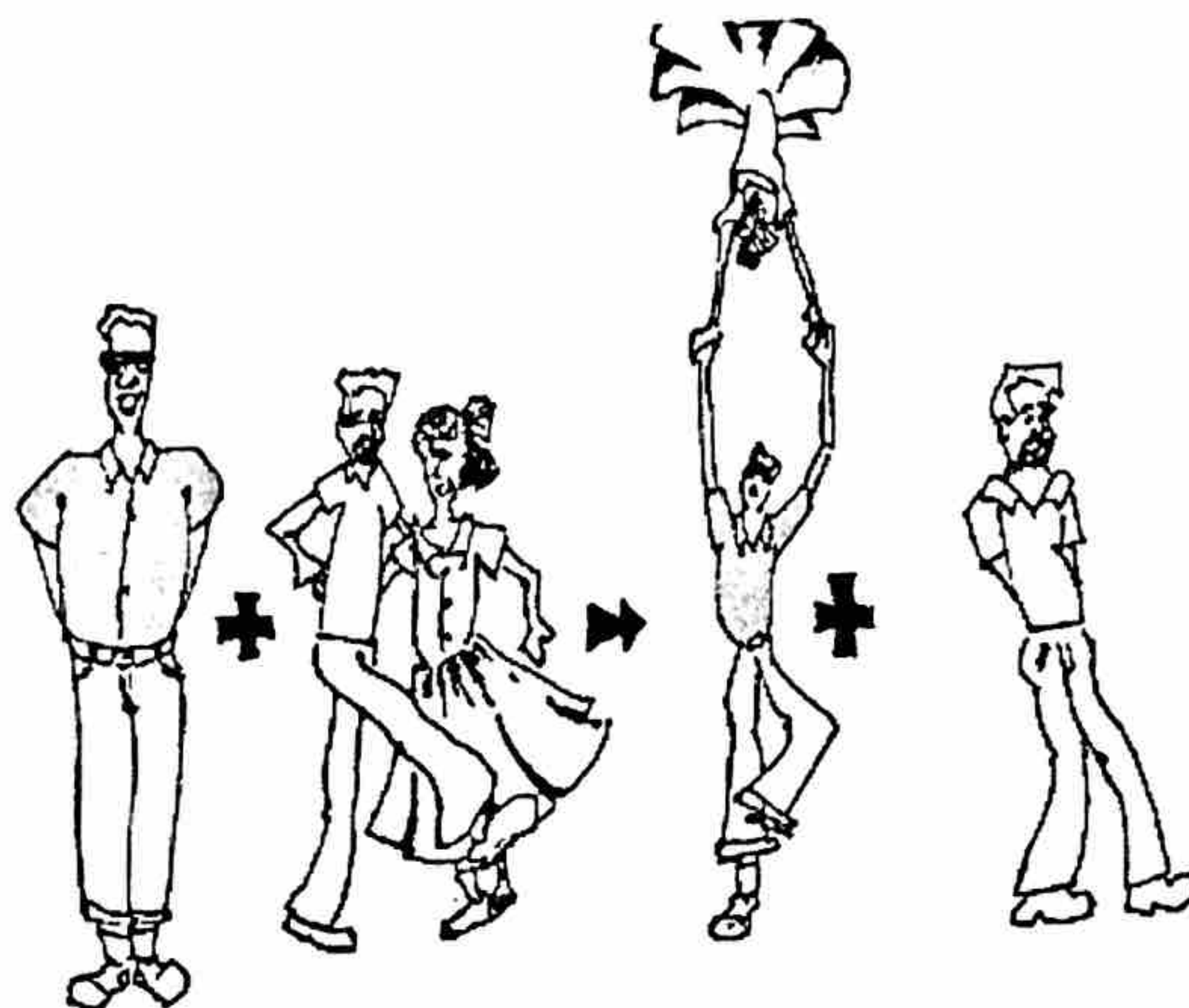
1. Represent the drama of Adam and Barbara as a chemical equation? Use A to represent Adam and B to represent Barbara.
2. If A and B represent elements can you describe what is happening?
3. How would you classify A and B using the words from the New Concepts section on the first page of this activity?

The dance continues...

Later that same evening Xavier and Yasmine, who have been 'the couple' forever, have a heated quarrel and break up.

4. Represent the drama of Xavier and Yasmine as a chemical equation? Use X to represent Xavier and Y to represent Yasmine.
5. If X and Y represent elements can you describe what is happening?
6. How would you classify X and Y using the words from the New Concepts section on the first page of this activity?

7. What type of reaction is represented in the picture to the right? Write your own analogy for the reaction illustrated in the picture.



<http://www.usoe.k12.ut.us/curr/science/sciber00/8th/matter/sciber/chemtype.htm>

The dance continues...

In their blissful state, Adam and Barbara (AB) meet a new couple, Mandy and Nathan (MN), and go to the same dance. Adam asks Mandy to dance. Nathan and Barbara decided that they will dance together as well.

8. Represent Adam and Barbara's dancing with Nathan and Mandy.

9. What type of reaction does this scenario represent? (Based on the New Concepts words)

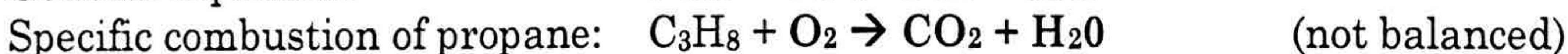
Not at the dance. . . A Combustion Reaction

A student decides to light a Bunsen burner. The fuel in this case is propane gas (C_3H_8). This reacts with oxygen and produces carbon dioxide and water. See the general equation and specific equation below.

General Equation:



Specific combustion of propane:



****Notice that the bold part of the equation always stays the same for a combustion reaction! Maybe you can think of a creative story!**

Summary Questions: Classify the following equations and balance them!

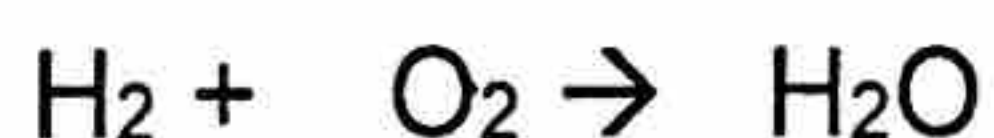
1. _____



2. _____



3. _____



4. _____

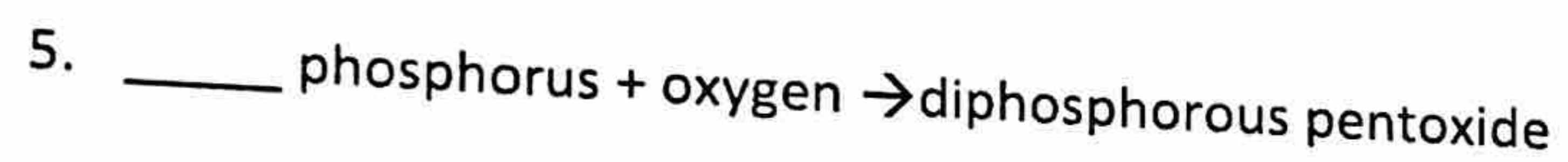
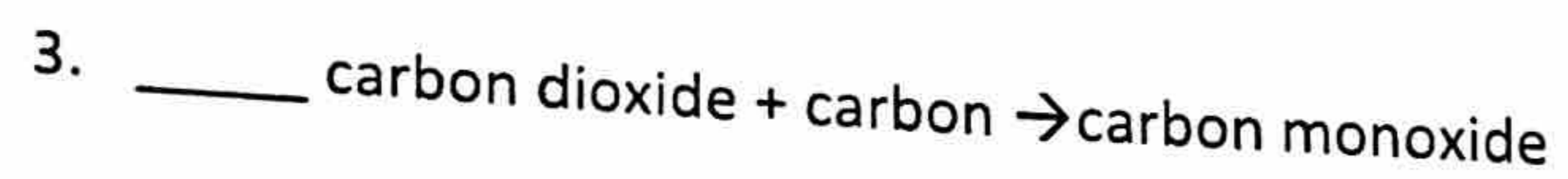
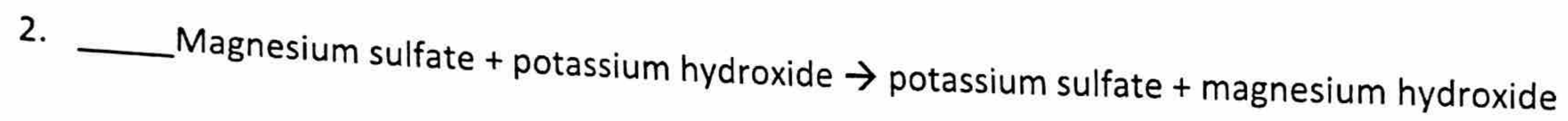


5. _____

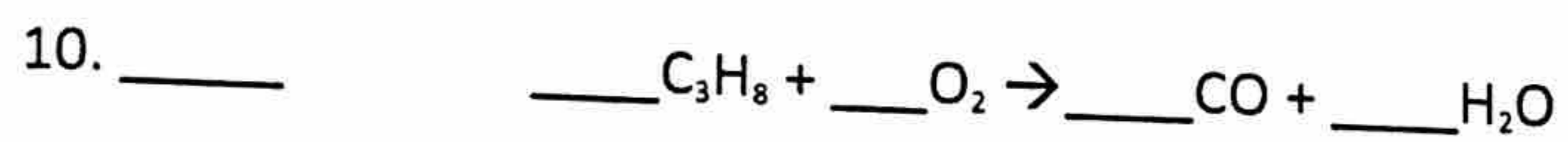
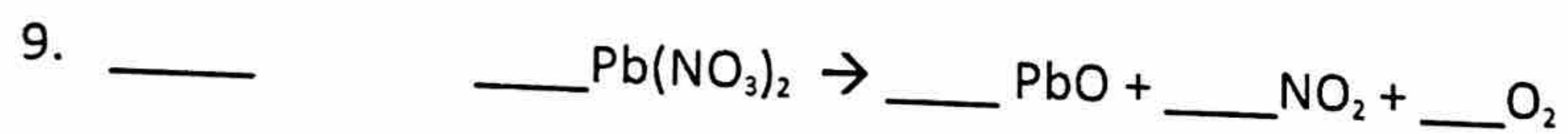
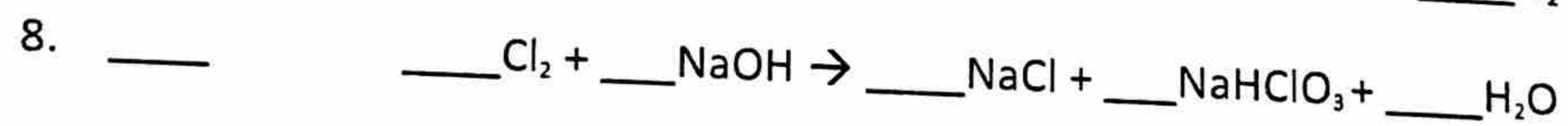
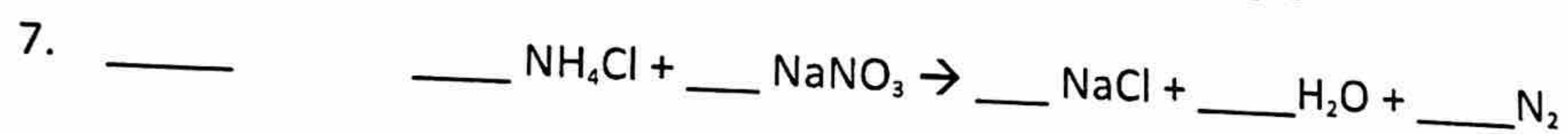


Balancing Chemical Reactions

Part I. Write a balanced chemical equation for the following at the very end Identify the type:



Part I. Balance and at the very end identify the type of reaction:



Name: _____

TYPES OF REACTIONS

Group the reactions into five separate categories. Each group must contain exactly three reactions that are related to one another in some way.

GROUP 1:

Why did you group these three together?

GROUP 2:

Why did you group these three together?

GROUP 3:

Why did you group these three together?

GROUP 4:

Why did you group these three together?

GROUP 5:

Why did you group these three together

Name: _____



BALANCING CHEMICAL EQUATIONS

Balance the following chemical equations by placing the correct coefficients in the blanks provided.

1. $\underline{\quad} \text{H}_2\text{O}_2 \rightarrow \underline{\quad} \text{H}_2\text{O} + \underline{\quad} \text{O}_2$
2. $\underline{\quad} \text{HCl} + \underline{\quad} \text{NaOH} \rightarrow \underline{\quad} \text{NaCl} + \underline{\quad} \text{H}_2\text{O}$
3. $\underline{\quad} \text{CaCl}_2 + \underline{\quad} \text{F}_2 \rightarrow \underline{\quad} \text{CaF}_2 + \underline{\quad} \text{Cl}_2$
4. $\underline{\quad} \text{KClO}_3 \rightarrow \underline{\quad} \text{KCl} + \underline{\quad} \text{O}_2$
5. $\underline{\quad} (\text{NH}_4)_2\text{SO}_4 + \underline{\quad} \text{Ba}(\text{NO}_3)_2 \rightarrow \underline{\quad} \text{BaSO}_4 + \underline{\quad} \text{NH}_4\text{NO}_3$
6. $\underline{\quad} \text{C}_6\text{H}_6 + \underline{\quad} \text{O}_2 \rightarrow \underline{\quad} \text{CO}_2 + \underline{\quad} \text{H}_2\text{O}$
7. $\underline{\quad} \text{N}_2 + \underline{\quad} \text{O}_2 \rightarrow \underline{\quad} \text{N}_2\text{O}_5$
8. $\underline{\quad} \text{SO}_3 + \underline{\quad} \text{H}_2\text{O} \rightarrow \underline{\quad} \text{H}_2\text{SO}_4$
9. $\underline{\quad} \text{C}_{12}\text{H}_{12} + \underline{\quad} \text{O}_2 \rightarrow \underline{\quad} \text{CO}_2 + \underline{\quad} \text{H}_2\text{O}$
10. $\underline{\quad} \text{Na}_2\text{O} + \underline{\quad} \text{H}_2\text{O} \rightarrow \underline{\quad} \text{NaOH}$
11. $\underline{\quad} \text{KI} + \underline{\quad} \text{Br}_2 \rightarrow \underline{\quad} \text{KBr} + \underline{\quad} \text{I}_2$
12. $\underline{\quad} \text{C}_4\text{H}_8 + \underline{\quad} \text{O}_2 \rightarrow \underline{\quad} \text{CO}_2 + \underline{\quad} \text{H}_2\text{O}$
13. $\underline{\quad} \text{Zn} + \underline{\quad} \text{FeCl}_3 \rightarrow \underline{\quad} \text{ZnCl}_2 + \underline{\quad} \text{Fe}$
14. $\underline{\quad} \text{CaCO}_3 \rightarrow \underline{\quad} \text{CaO} + \underline{\quad} \text{CO}_2$
15. $\underline{\quad} \text{NaOH} + \underline{\quad} \text{CuCl}_2 \rightarrow \underline{\quad} \text{NaCl} + \underline{\quad} \text{Cu}(\text{OH})_2$
16. $\underline{\quad} \text{NaHCO}_3 \rightarrow \underline{\quad} \text{Na}_2\text{CO}_3 + \underline{\quad} \text{CO}_2 + \underline{\quad} \text{H}_2\text{O}$

Predicting Products of Chemical Reactions

Directions: First write the names of the products on the lines provided, translate the word equation to chemical formulas, then balance. Don't forget your DIATOMICS!

Synthesis- a chemical change in which two or more substances react to form a new single substance

Example: Iron + sulfur → iron (II) sulfide
 $8\text{Fe} + \text{S}_8 \rightarrow 8\text{FeS}$

1. Magnesium + Iodine → _____

2. Potassium + Chlorine → _____

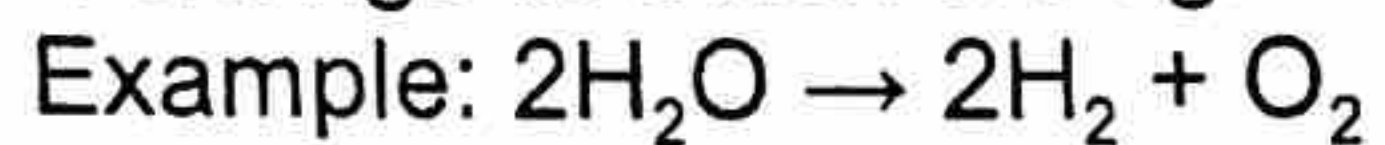
3. Aluminum + Oxygen → _____

4. Lithium + Nitrogen → _____

5. calcium + oxygen → _____

6. sodium + iodine → _____

Decomposition- a chemical change in which a single compound breaks down into two or more simpler products.



1. Calcium sulfide \rightarrow _____ + _____

2. sodium chloride \rightarrow _____ + _____

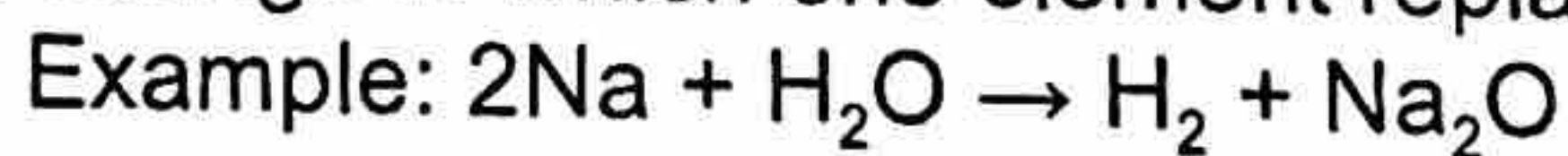
3. strontium nitride \rightarrow _____ + _____

4. barium phosphide \rightarrow _____ + _____

5. nickel(II) fluoride \rightarrow _____ + _____

6. aluminum oxide \rightarrow _____ + _____

Single Replacement- a chemical change in which one element replaces a second element in a compound.



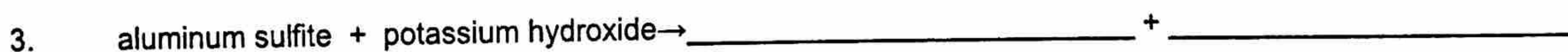
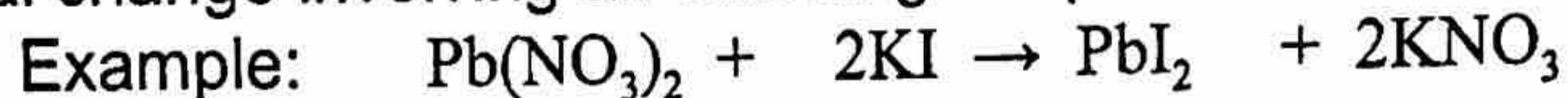
1. Sodium + Magnesium chloride \rightarrow _____ + _____

2. Calcium + Silver chloride \rightarrow _____ + _____

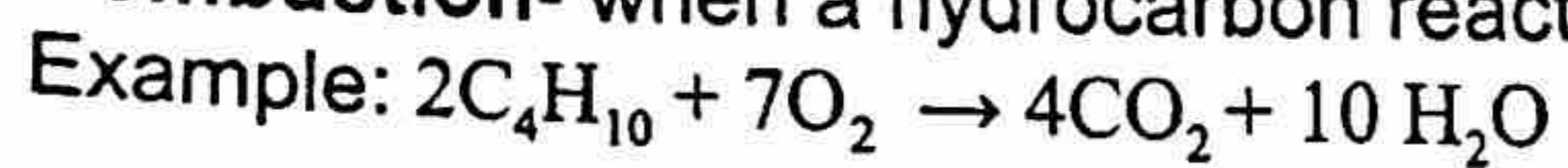
3. Copper + Iron (II) sulfate \rightarrow _____ + _____



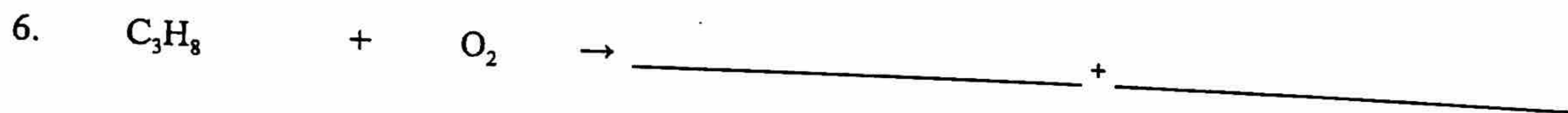
Double Replacement- a chemical change involving an exchange of positive ions between two compounds.



Combustion- when a hydrocarbon reacts with O_2 to form CO_2 and H_2O .



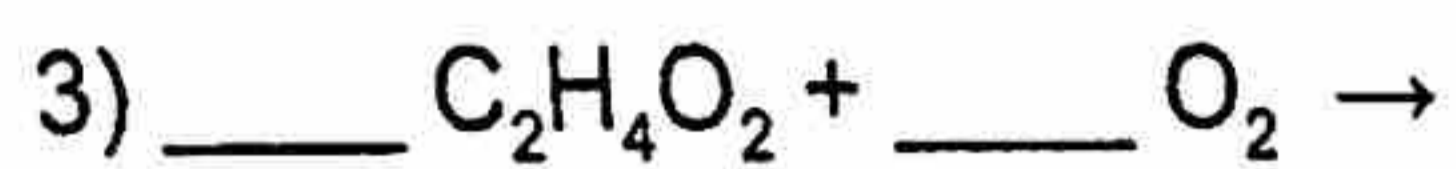
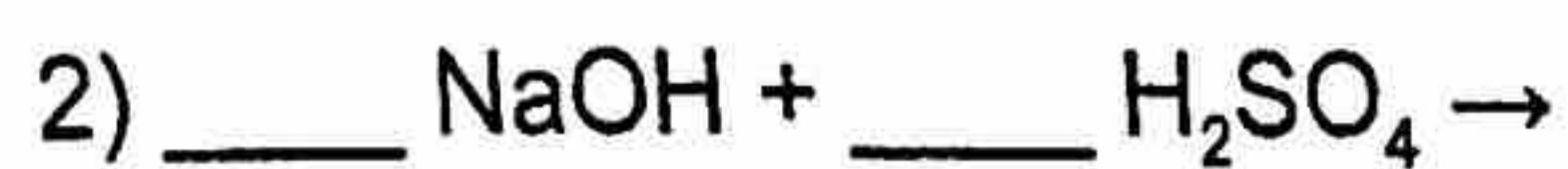
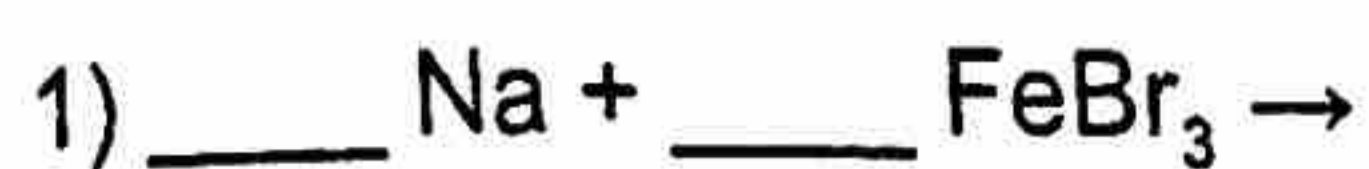
When balancing: 1. Count carbons. 2. Count hydrogens. 3. Count oxygens.



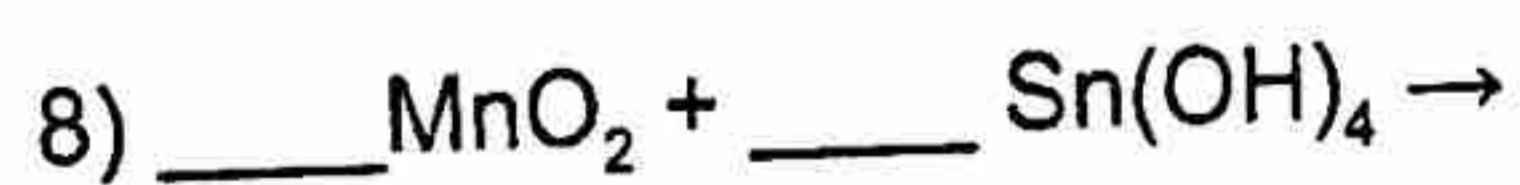
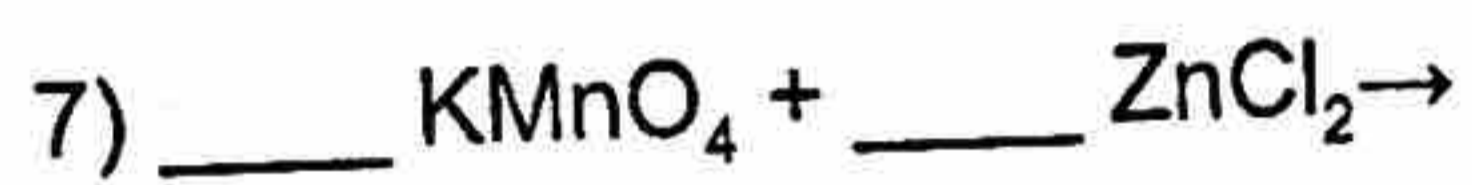
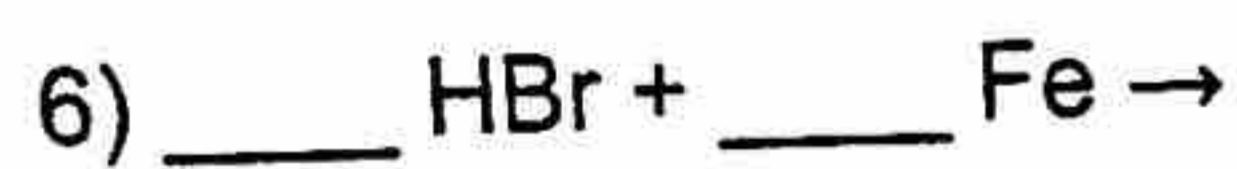
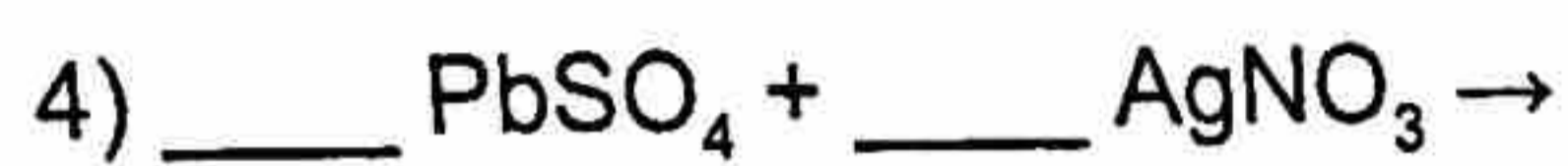
Predicting Products Practice

Name: _____

Predicting Reaction Products Balance the equations and predict the products for the following reactions:

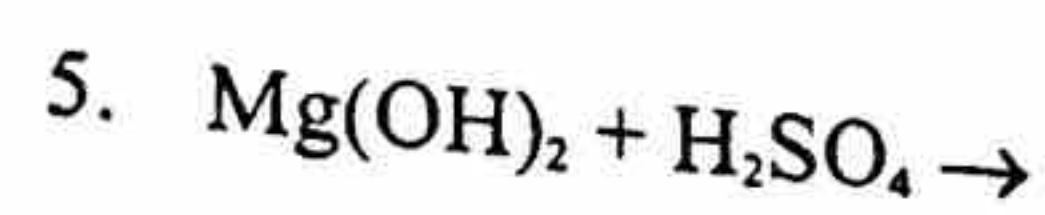
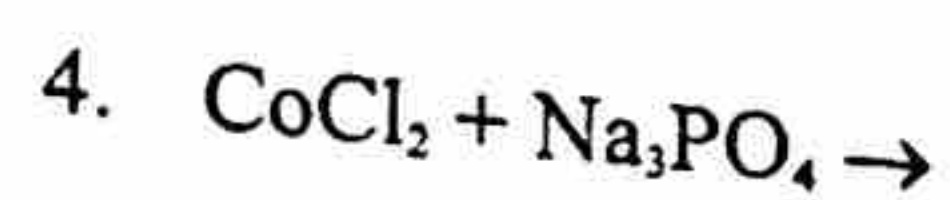
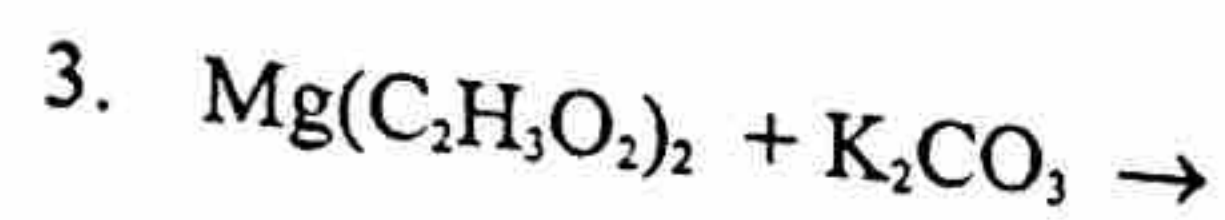
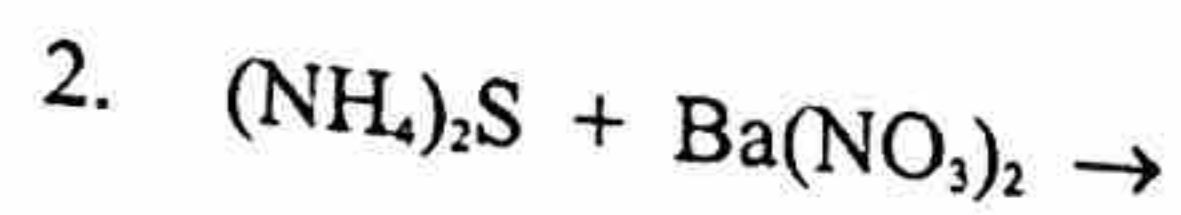
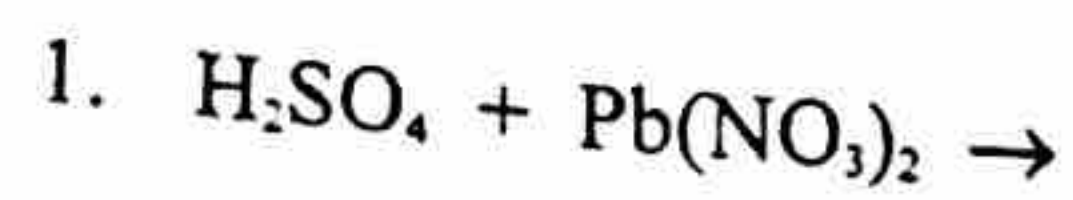


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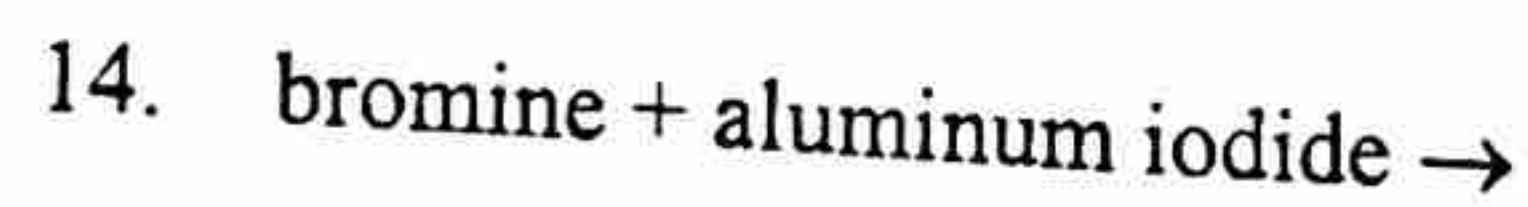
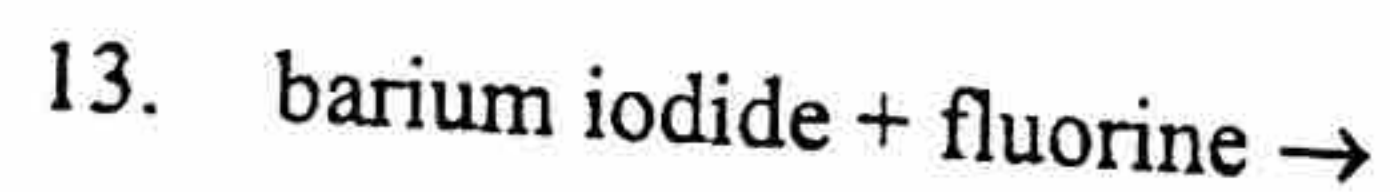
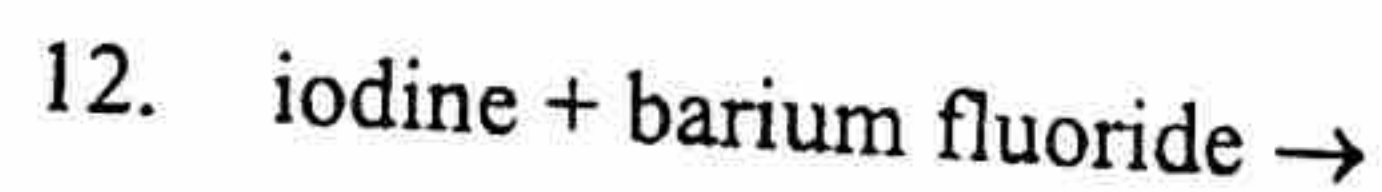
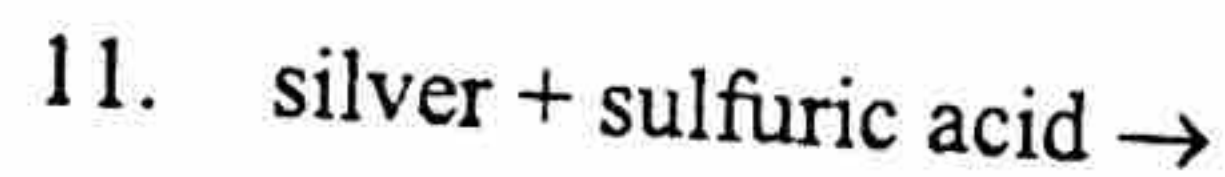
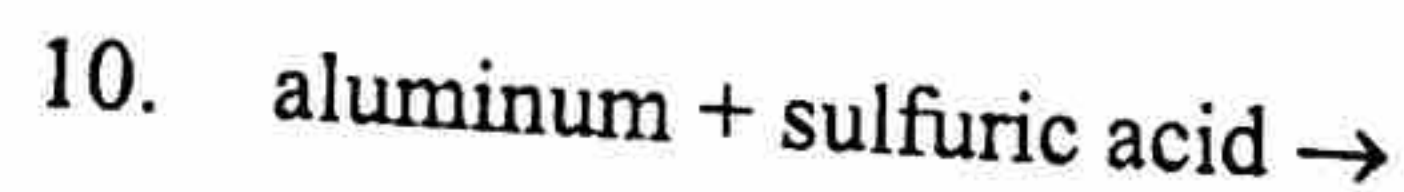
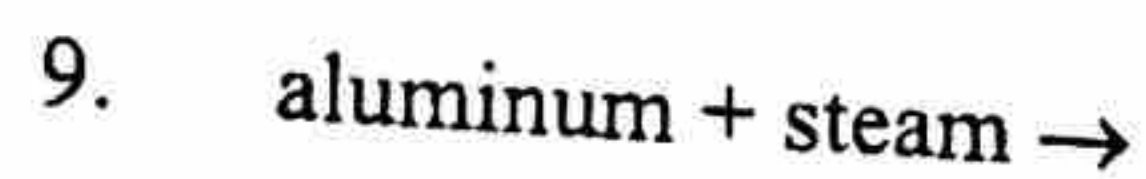
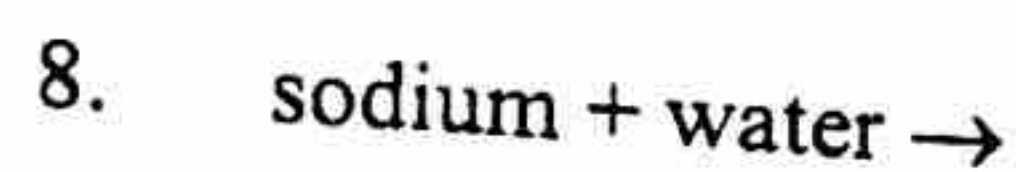
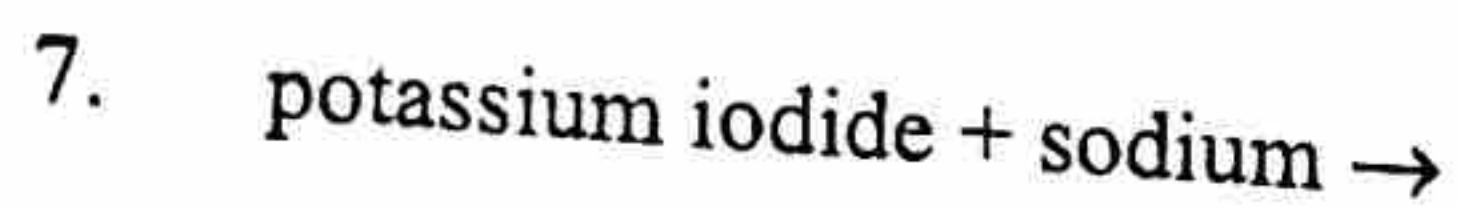
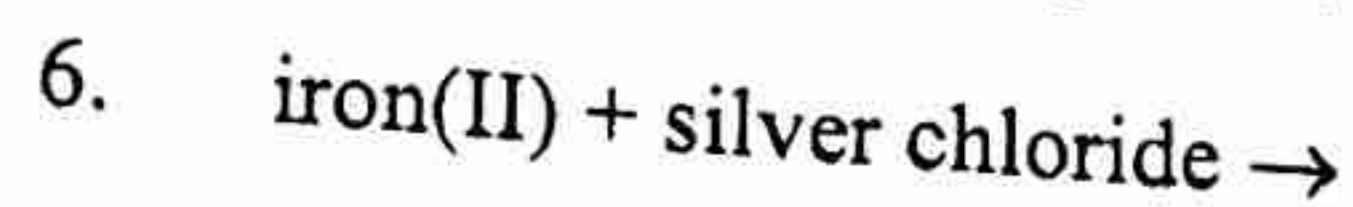


DOUBLE REPLACEMENT:

- 1) Switch ions, re-cross charges, and balance the equation.
- 2) Decide if the reaction will work in the lab because it is an acid-base reaction (type 4b) or because it will form a precipitate (solid) according to the Solubility Rules (type 4a), OR that it is "no rxn."

**SINGLE REPLACEMENT:**

- 1) Check to see if the element by itself can react with the compound according to the activity series.
- 2) If yes, then predict the products using the correct model from the reference tables (3a, 3b, 3c, or 3d) and balance the equation (remember to re-cross charges). If no, then write "no rxn."



Name _____ Date _____ Period _____

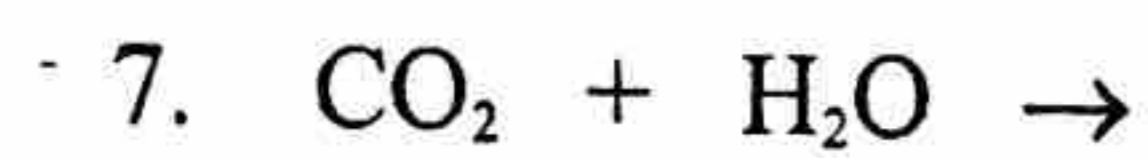
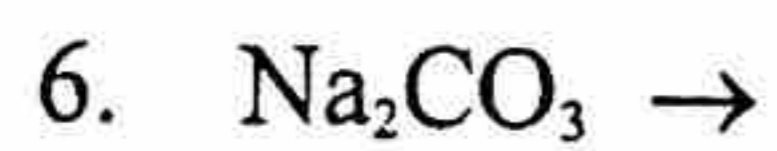
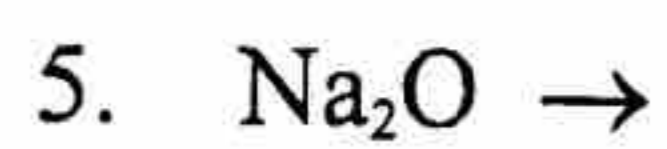
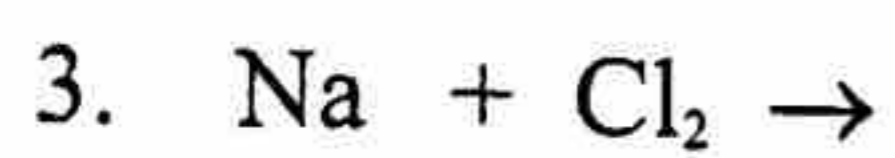
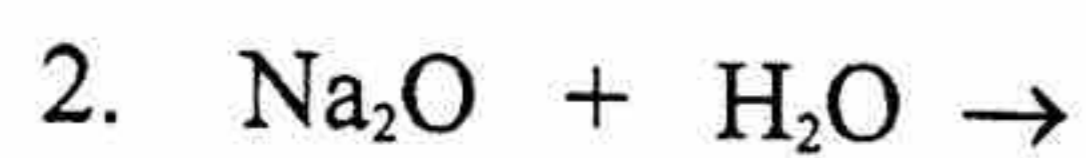
- Name or give the chemical formula for each of the following compounds.
- State whether they are soluble (will dissolve) or insoluble (will not dissolve) in solution. Use solubility rules.

Chemical Formula	Name	Solubility
1. $\text{NH}_4\text{CH}_3\text{COO}$		
2. $\text{Ba}(\text{OH})_2$		
3.	Iron (II) Carbonate	
4. NaOH		
5. RbNO_3		
6.	Cesium Sulfate	
7. MgSO_4		
8. ZnCl_2		
9.	Zinc Hydroxide	
10. $\text{Zn}_3(\text{PO}_4)_2$		
11. AgBr		
12. KNO_3		
13. Al_2S_3		
14.	Silver Acetate	
15. Sr_2CrO_4		
16.	Aluminum Phosphate	
17. BaSO_4		
18. $\text{Ca}(\text{OH})_2$		
19. BaCO_3		
20. MgCrO_4		
21.	Iron (III) sulfide	
22. NH_4CN		
23.	Silver Iodide	
24. Hg_2SO_4		

Name: _____

Synthesis/Decomposition Mixed Practice WS

Predict the products and Balance:



Names: _____

Predicting Product Practice II

1. barium and chlorine →

Type:

Equation:

2. sodium oxide and water →

Type:

Equation:

3. carbon dioxide and water →

Type:

Equation:

4. LiOH →

Type:

Equation:

5. copper(II) oxide →

Type:

Equation:

6. sodium hydrogen carbonate →

Type:

Equation:

7. tin(IV) + nickel(II) sulfate →

Type:

Equation:

8. gold + water →

Type:

Equation:

9. lead(IV) + silver chloride →

Type:

Equation:

10. sodium nitrate + lithium fluoride →

Type:

Equation:

11. NaOH + H₃PO₄ →

Type:

Equation:

12. beryllium phosphate + potassium bromide →

Type:

Equation:

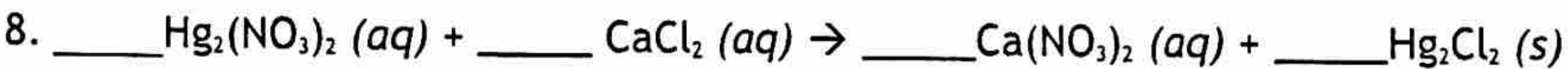
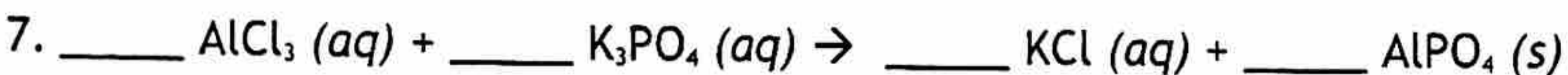
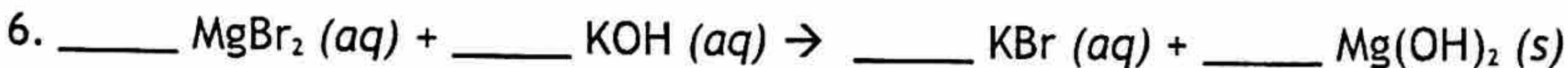
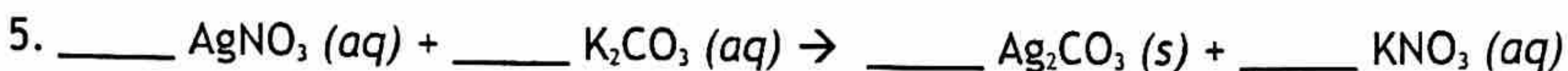
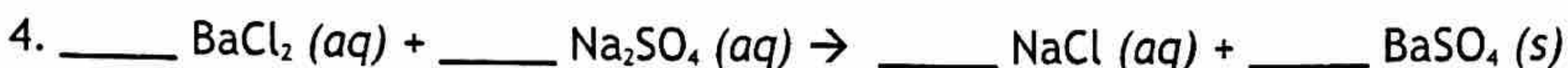
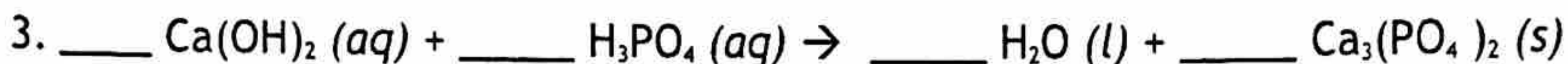
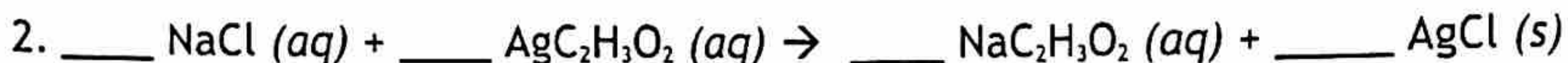
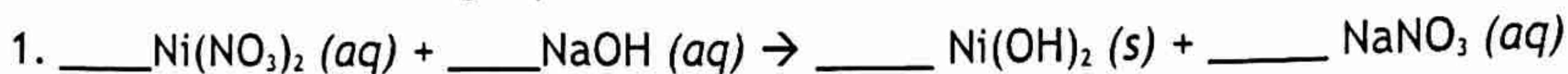
Name _____

Date _____

Period _____

Net Ionic Equations Worksheet

BALANCE the following equations then write the NET IONIC EQUATION for each one:

Using the solubility rules, predict the products, balance the equation, and write the complete ionic and net ionic equations for each of the following reactions.