

Intro. to Chemical Reactions

Name: _____

Date: _____

Hour: _____

Formula Review

1. Write the formulas for the following compounds:

a) dinitrogen pentoxide: N_2O_5 b) calcium phosphide: Ca_3P_2

c) copper(II) phosphate: $Cu_3(PO_4)_2$ d) lithium sulfate: Li_2SO_4

2. Write the names for the following compounds:

a) $Ca(CN)_2$: calcium cyanide b) P_2O_3 : diphosphorus trioxide

c) $FeCO_3$: iron(II) carbonate d) K_3N : potassium nitride

Chemical Reactions: What they look like...

Here is what a chemical reaction looks like when it is written:



There is a sentence that you can write to describe what happens above:

Copper(II) nitrate reacts with zinc metal and yields zinc nitrate and copper metal.

Take a minute to notice the relationship between the sentence and the symbols in the reaction. Now, try a few yourself.

Critical Thinking Questions

3. Given the following reaction, write the sentence that goes along with it...



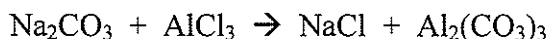
Calcium chloride reacts with silver nitrate to yield calcium nitrate and silver chloride

4. Given the following sentence, use chemical symbols to write a reaction that represents it...

Nickel(II) nitrate reacts with sodium carbonate and yields nickel(II) carbonate and sodium nitrate.



5. Given the following reaction, write the sentence that goes along with it...



Sodium carbonate and aluminum chloride reacts to form sodium chloride and aluminum carbonate

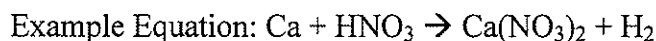
6. Write an equation to go along with the following sentence.

Lithium reacts with water to produce lithium hydroxide and hydrogen



Information: Introduction to Reactions

During a chemical reaction, new substances are formed. Reactants are transformed into different products. Atoms are never created or destroyed, but they are rearranged. A chemical equation represents what happens during a reaction. The following is an example of a chemical equation:



This equation describes the reaction of calcium (Ca) with nitric acid (HNO₃) to produce calcium nitrate (Ca(NO₃)₂) and hydrogen gas (H₂). You may notice that there are more total atoms on the right side than there are on the left side of the equation. If this seems strange to you, don't worry about it now; we'll fix this later.

Note in the above equation that hydrogen gas is written as H₂ and not simply as H. There are a few elements that exist as diatomic molecules. If a substance is diatomic then the substance must always be bonded to something. A hydrogen atom is diatomic and so it must be bonded to something else like in HCl or HNO₃. If nothing is available for it to bond to, it will bond to itself by forming H₂. All of the diatomic substances are listed below:



When by themselves these elements exist as Br₂, I₂, N₂, Cl₂, H₂, O₂, and F₂. By the way, you can remember these by recalling a made-up name: Mr. Brinclhof

Critical Thinking Questions

7. Consider the bromine atoms in this reaction: $\text{LiBr} + \text{P} \rightarrow \text{Li}_3\text{P} + \text{Br}_2$.

a) Why is bromine written as Br_2 on the right side?

It's a diatomic element. When there's nothing else to bond to, it'll bond with itself.

b) The correct formula for lithium bromide is LiBr . Why doesn't bromine need a "2" in the formula?

When it bonds with something else, you need to look at charges to make a neutral compound. Li is a +1 charge Br is -1

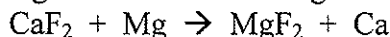
8. Name the "reactants" and the "products" from the reaction in question 7.

R: $\text{LiBr} + \text{P}$

P: $\text{Li}_3\text{P} + \text{Br}_2$

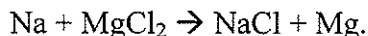
Information: Single Replacement Reactions

There are several types of reactions that follow predictable patterns. The first kind is called a single replacement reaction. See if you can figure out the pattern in each of the following reactions.



Critical Thinking Questions

9. Answer the questions that follow based on this chemical equation:



a) Why can't NaMg be produced (Hint: consider the charges of the sodium and magnesium ions)?

Both are metals, both have positive charges so they won't bond together

b) Why can't NaCl_2 be produced?

Sodium is a +1 Cl is a -1 so NaCl_2 wouldn't be neutral

c) Given your answers to parts a and b, do you think that NaCl and Mg are the only products that can be produced?

yes

10. Given the following equation: $\text{Li} + \text{Ca}_3(\text{PO}_4)_2 \rightarrow \text{Li}_3\text{PO}_4 + \text{Ca}$.

a) Why can't CaLi_2 be produced?

both are metals, both have + charges, so they won't bond

b) Why can't Li_3P be produced?

Because P isn't alone, it's part of the phosphate ion

c) Are Li_3PO_4 and Ca the only substances that can be produced?

yes

11. Write chemical equations for the following reactions.

a) Aluminum sulfate reacts with barium to produce barium sulfate and aluminum.



b) Magnesium reacts with copper(I) nitrate to produce magnesium nitrate and copper.



c) Sodium reacts with calcium phosphide to produce sodium phosphide and calcium.



d) Phosphorus reacts with sodium chloride to produce sodium phosphide and chlorine.



12. Each of the reactions you wrote in question 11 follows a similar pattern. The same pattern is followed by all of the equations in this section. Describe this pattern.

start with a single element and a compound

13. Complete the following reactions:

