

Lesson 11

Chemistry 0

Fall 2020, L. Tracey Gao

Last week's HW Review

- Please count the atoms for the following compounds:
 - NH_3
One nitrogen atom and three hydrogen atoms.
 - H_2O
Two hydrogen atoms and one oxygen atom.
 - C_3H_8
Three carbon atoms and eight hydrogen atoms.
 - K_2CO_3
Two potassium atoms, one carbon atom and three oxygen atoms.
 - $\text{Ca}(\text{OH})_2$
One calcium atom, two oxygen atoms and two hydrogen atoms.

Last week's HW Review

- Please count the atoms for the following compounds:
 - $\text{Mg}_3(\text{PO}_4)_2$
Three magnesium atoms, two phosphorus atoms and eight oxygen atoms.
 - $4\text{H}_2\text{O}$
Eight hydrogen atoms and four oxygen atoms.
 - $5\text{Al}_2\text{O}_3$
Ten aluminum atoms and fifteen oxygen atoms.
 - $8\text{C}_2\text{H}_5\text{OH}$
Sixteen carbon atoms, forty eight hydrogen atoms and eight oxygen atoms.
 - $3(\text{NH}_4)_2\text{SO}_4$
Six nitrogen atoms, twenty four hydrogen atoms, three sulfur atoms and twelve oxygen atoms.

Last week's HW Review

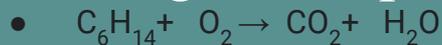
- Please balance the following chemical equations by showing the steps:
 - $\text{NO} + \text{O}_2 \rightarrow \text{NO}_2$
Nitrogen atoms: left 1, right 1
Oxygen atoms: left 3, right 2
 $2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$
 - $\text{Fe} + \text{Cl}_2 \rightarrow \text{FeCl}_3$
Iron atoms: left 1, right 1
Chlorine atoms: left 2, right 3
 $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$

Last week's HW Review

- Please balance the following chemical equations by showing the steps:
 - $C + H_2 \rightarrow C_5H_{12}$
Carbon atoms: left 1, right 5
Hydrogen atoms: left 2, right 12
 $5C + 6H_2 \rightarrow C_5H_{12}$
 - $Fe + H_2O \rightarrow Fe_3O_4 + H_2$
Iron atoms: left 1, right 3
Hydrogen atoms: left 2, right 2
Oxygen atoms: left 1, right 4
 $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$

Last week's HW Review

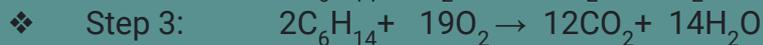
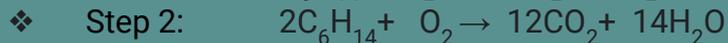
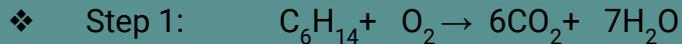
- Please balance the following chemical equations by showing the steps:



Carbon atoms: left 6, right 1

Hydrogen atoms: left 14, right 2

Oxygen atoms: left 2, right 3





Balancing Equation Rules

- Begin by balancing one element at a time.
- First balance elements that appear only once on each side of the equation.
- Balancing multi-element compounds before balancing single-element compound.
- Balance H and O atoms last.
- Use trial and error. Be patient.
- Add up all of the kinds of atoms on both sides of the equation to make sure it is completely balanced.



Types of Chemical Reactions

Basic types of chemical reactions:

1. Synthesis Reaction
2. Decomposition Reaction
3. Single-Replacement Reaction
4. Double-Replacement Reaction

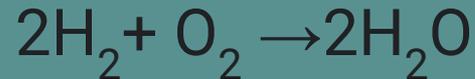
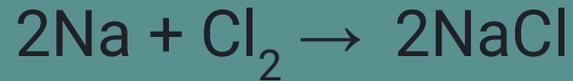


Synthesis Reaction (also known as Combination Reaction)

It is a reaction in which two or more substances combine to form a single new substance.



Examples:



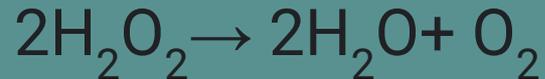


Decomposition Reaction

A decomposition reaction is a reaction in which a compound breaks down into two or more simpler substances.



Examples:



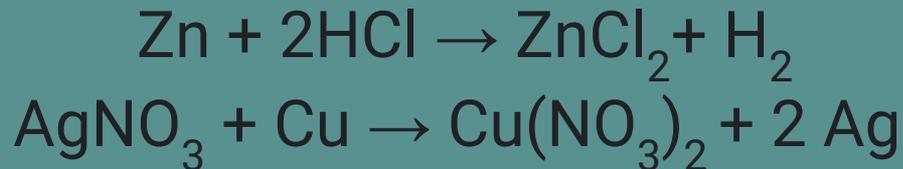


Single-Replacement Reaction

A single-replacement reaction is a reaction in which one element replaces a similar element in a compound.



Examples:



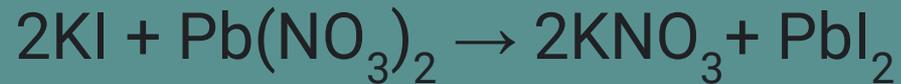


Double-Replacement Reaction

A double-replacement reaction is a reaction in which the positive and negative ions of two ionic compounds exchange places to form two new compounds.



Examples:





Summary

- The law of conservation of matter states that matter is neither created or destroyed during chemical reaction.
- A chemical reaction occurs whenever bonds between atoms and molecules are created or destroyed.
- There are four basic types of chemical reactions.
- Evidences of chemical reactions include bubble formation, color changes, temperature changes and precipitation.