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Lesson 2.7.2: Physical Science – Chemical Reactions Part 3: Balancing Equations

Weekly Focus: Comprehension
Weekly Skill: Math Concepts in Science

Lesson Summary: This week students will continue with a more in depth look at chemical reactions with a comprehension reading and then use mathematical concepts to balance equations. Note: This lesson requires some algebraic problem solving, if students are new to this type of mathematical work, it may take some time for them to become acquainted with the material. Please be prepared to assist.

Materials Needed:

- Reading with comprehension questions **Unit 2.7.2 Handout 1**
- Video **Unit 2.7.2 – Balancing Chemical Equations** (3:25 min)
- Practice **Unit 2.7.2 Handout 2** (The video may need to be played a few times. Be prepared with the extra handout **(Unit 2.7.2 Handout 4)** for assistance.)
- Extra Work/Homework **Unit 2.7.2 Handout 3**

Objectives: Students will be able to…

- Activate prior knowledge and review previous material in physical science related to chemical reactions
- Begin to work on the math concepts in science related to balancing chemical equations

College and Career Readiness Standards: RI, RST, WHST, SL

ACES Skills Addressed: EC, LS, ALS, CT, SM, N

Notes: Please review and be familiar with classroom routine notes for: reading for fluency strategies (**Routine 2**), summarizing techniques (**Routine 4**), self-management skills (**Routine 1**). The notes will help with making a smooth transition to each activity.

GED 2014 Science Test Overview – For Teachers and Students

The GED Science Test will be 90 minutes long and include approximately 34 questions with a total score value of 40. The questions will have focus on three content areas: life science (~40%), physical science (~40%), and Earth and space science (~20%). Students may be asked to read, analyze, understand, and extract information from a scientific reading, a news brief, a diagram, graph, table, or other material with scientific data and concepts or ideas.

The online test may consist of multiple choice, drop down menu, and fill-in-the-blank questions. There will also be two short answer questions (suggested 10 minutes each) where students may have to design an experiment or identify errors in a conducted experiment, summarize, find evidence (supporting details), and reason or make a conclusion from the information (data) presented.

The work students are doing in class will help them with the GED Science Test. They are also learning skills that will help in many other areas of their lives.

Activities:

Warm-Up: Journal Writing	**Time: 5 - 10 minutes**
As students enter the class, Write on the board *"What is the difference between endothermic and exothermic chemical reactions?"* Ask students to write about this in their notebooks or journals. This is an opportunity for students to recall information from the readings and science experiments from the last few lessons regarding chemical reactions.	

Activity 1: Balancing Chemical Equations – Reading Passage (Unit 2.7 Handout 1)	**Time: 35- 40 minutes**
1) Hand out **Unit 2.7.2 Handout 1** to students. **2)** Discuss with students that when reading, they should pay close attention to what all of the passage is about. This passage has a connection to ideas and information about chemical reactions. **3)** Ask students to read the passage and answer the questions that follow. Circulate the class while students are working independently to help as needed. Remind students to review the guide words in bold on the left to help with new vocabulary. **4)** When students are finished, review answers as a whole class. **5)** Ask for students to share their answers if they would like. If there is time, you may have students practice reading for fluency and read the passage to each other in pairs.	

Break: 10 minutes

Activity 2: Balancing Chemical Equations – Hands on practice (Unit 2.7.2 Handout 2)	**Time: 50 - 55 minutes**
1) Hand out **Unit 2.7.2 Handout 2** to students. Explain to them that since they have been reading and conducting experiments about chemical reactions, it is time to move to the next step with chemical reactions, which is incorporating mathematical concepts into balancing equations. **2)** Discuss with students that the concept of balancing chemical equations requires careful attention to details and some algebraic thinking. **3)** Have students read the first part of the handout. Then, show the video. **4)** Explain to students while they are watching the video, they have to fill in some areas of the handout. You may need to pause and replay some parts of the video. **5)** Review the answers with the class to make sure they understand the basics of balancing equations. **6)** Do a few of the equations on the handout to demonstrate/model to students, and then do a few together as a class. Finally, have students work alone or in groups to solve the problems. **7)** Review their answers as a whole class. (If possible ask students to solve problems on the board or explain how they did the work.)	

Wrap-Up: Summarize	Time: 5 minutes
Have students turn to a partner (or write in their journals) about what they have learned today from balancing chemical equations. Ask them to tell a partner how they went about balancing the equations from the handout. *Note: Use Routine 4 Handout*	

Extra Work/Homework: Unit 2.7.3 Handout 3	Time: 30 minutes outside of class
Students can continue with balancing chemical equations with the one page handout.	

Differentiated Instruction/ELL Accommodation Suggestions	Activity
If some student groups finish early, they can turn their paper over and summarize the reading passage.	**Handout 1**

Online Resources:

Online chemical equation balancing quiz -
http://chemistry.about.com/od/chemicalequations/l/blbalancequiz.htm

Suggested Teacher Readings:

- **GED Testing Service** – online free Science practice test (to get an idea of test questions – there is no grading on this practice test and there are no answers given)

http://www.gedtestingservice.com/freepractice/download/GED_Science/GEDSciencePracticeTest.html

- **GED Testing Service** – GED Science Item Sample (to get an idea of what the test *may* be like)

http://www.gedtestingservice.com/itemsamplerscience/

- **4tests.com** – free online practice tests – Practice Test B is for GED 2014 (Practice Test A is for older version of test) students can get a feel for what the online test is like.

http://www.4tests.com/exams/examdetail.asp?eid=139

- **Assessment Guide for Educators**: A guide to the 2014 content from GED Testing Service:

http://www.riaepdc.org/Documents/ALALBAASSESSMENT%20GUIDE%20CHAPTER%203.pdf

- **Minnesota is getting ready for the 2014 GED test!** – website with updated information on the professional development in Minnesota regarding the 2014 GED.

http://abe.mpls.k12.mn.us/ged_2014_2

- **Essential Education's 2014 GED Test Curriculum Blueprint** (PDF)

http://www.passged.com/media/pdf/educators/curriculum-blueprint.pdf

Unit 2.7.2 Handout 1 (4 pages total)

What Are Types of Chemical Reactions?

Classifying Reactions

In a chemical reaction, bonds in two molecules are rearranged, and the atoms form new molecules. Chemical equations describe the way atoms are grouped when substances react.

A chemical equation is a way of showing the chemical formulas and symbols of the substances that react and form in a chemical reaction. An arrow separates the "before" and "after" parts of the reaction. The substances that react are on the left side of the arrow. The substances that form are on the right side of the arrow.

Chemical Reaction Type	Generic Chemical Equation
synthesis	$A + B \rightarrow AB$
decomposition	$AB \rightarrow A + B$
single-replacement	$A + BC \rightarrow B + AC$
double-replacement	$AB + CD \rightarrow AD + CB$
combustion	Carbon compound + $O_2 \rightarrow CO_2 + H_2$

Chemical reactions can be grouped according to the way the atoms of the reacting substance group together or come apart. Chemical reactions can be classified as synthesis, decomposition, single-replacement, double-replacement, or combustion reactions.

Synthesis When two substances react and form one substance, the reaction is called a synthesis reaction. Only one substance is written on the right side of the arrow in the equation.

Decomposition In a decomposition reaction, a single substance breaks down to form two or more substances. There is only one substance on the left side of the arrow.

Single Replacement When one element replaces another element in a compound, the reaction is called a single-replacement reaction. In the chemical equation, pure elements will be on both sides of the arrow.

Double Replacement In a double-replacement reaction, two atoms or groups of atom switch places.

Combustion When a carbon compound reacts with oxygen, it goes through combustion, and carbon dioxide and water are produced. Combustion is almost always an exothermic reaction.

Conservation of Matter

In any chemical reaction, the total mass of the substances does not change, even when new products form. The law of conservation of matter says that matter cannot be made or destroyed. In a chemical reaction, this means that the total mass of the substance before a chemical reaction is equal to the total mass of the substances that are produced. This is true even if you cannot see the substances that form during the reaction, such as when a gas is formed.

You can use a scale to find the mass of substances before and after a chemical reaction. For example, when fruit decays, the fruit's tissues break down, new compounds form, and gases are released. But the total mass remains the same before and after the chemical change.

Balancing Chemical Equations

Chemical equations don't just show which substances are reacting and forming in a chemical reaction. They also show the law of conservation of matter. A balanced chemical equation shows that the numbers and types of atoms are the same on both sides of the arrow.

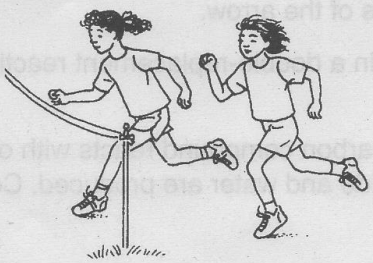
Here is the equation for the decomposition of water: $2H_2O \rightarrow 2H_2 + O_2$. The equation is balanced because it shows there are four hydrogen atoms and two oxygen atoms on each side of the arrow. It also tells you that you need 2 molecules of water to make 2 molecules of hydrogen and 1 molecule of oxygen.

Coefficients are the numbers in front of each chemical formula. They show the amounts of each substance in the reaction.

Respiration is an exothermic reaction that gives your body the energy it needs to do the things that you do. The balanced chemical equation below shows the chemical reaction that takes place during respiration.

Glucose + Oxygen ⟶ Carbon Dioxide + Water

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$$



Name _____ Date _____

What Are Types of Chemical Reactions?

Fill in the blanks.

1. A(n) _____ is a way of showing the chemical formulas and symbols of the substances that react and form in a chemical reaction.
2. The "before" and "after" parts of a chemical reaction are separated by a(n) _____ in the chemical equation.
3. In any chemical reaction, the total _____ of the substances does not change, no matter what new products form.

Fill in the blanks in the table below.

Type of Reaction	Example of Reaction
4. _____	$CaO + H_2O \rightarrow Ca(OH)_2$
5. _____	$2HgO \rightarrow 2Hg + O_2$
6. _____	$2AgNO_3 + Cu \rightarrow Cu(NO_3)_2 + 2Ag$
7. _____	$MgSO_4 + CaCl_2 \rightarrow CaSO_4 + MgCl_2$
8. _____	$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

9. **Main Idea** What are five types of chemical reactions?

_____

_____

_____

_____

Name _____ Date _____

10. Vocabulary How are balanced chemical equations related to the law of conservation of matter?

_____

_____

_____

11. Reading Skill: Classify What type of chemical reaction is represented by the following chemical equation?

$2Na + Cl_2 \rightarrow 2NaCl$

_____

_____

12. Critical Thinking: Apply The chemical equation describing the burning of hydrogen gas is: $2H_2 + O_2 \rightarrow 2H_2O$. Why is this both a synthesis and a combustion reaction?

_____

_____

_____

13. Inquiry Skill: Compare Compare the two sides of the following unbalanced equation. Then change the coefficient to balance the equation:

$Zn + HCl \rightarrow ZnCl_2 + H_2$

_____

_____

_____

14. Test Prep What kind of reaction is described by the following equation?

$3CuCl_2 + 2Al \rightarrow 2AlCl_3 + 3Cu$

A synthesis

B decomposition

C single-replacement

D double-replacement

Unit 2.7.2 Handout 1

TEACHER ANSWER KEY

1. Chemical equation
2. Arrow
3. Mass
4. Synthesis
5. Decomposition
6. Single replacement
7. Double replacement
8. Combustion
9. Synthesis, decomposition, single-replacement, double-replacement, combustion
10. Balanced chemical equations show that the numbers and types of atoms are the same on both sides of the arrow
11. The formation of sodium chloride from sodium and chlorine is a synthesis reaction.
12. It is a synthesis reaction because two substances react to form a single substance. It is a combustion reaction because a substance reacts with oxygen to form water.
13. The right side of the equation has more atoms. The balanced equation is

$$Zn + 2HCl \rightarrow ZnCl_2 + H_2$$

14. C – single replacement.

Unit 2.7.2 Handout 2 (2 pages total)

Balancing Chemical Equations

A chemical equation describes what happens in a chemical reaction. The equation identifies the reactants (starting materials) and products (resulting substance), the formulas of the participants, the phases of the participants (solid, liquid, gas), and the amount of each substance. Balancing a chemical equation refers to establishing the mathematical relationship between the quantity of reactants and products.

It takes practice to be able to write balanced equations and it is also a skill that may be on the 2014 GED science module.

Write the unbalanced equation.

- Chemical formulas of reactants are listed on the left-hand side of the equation.
- Products are listed on the right-hand side of the equation.
- Reactants and products are separated by putting an arrow (➔) between them to show the direction of the reaction. Reactions at equilibrium will have arrows facing both directions.

GED Science Unit 2.7.2 Video: Balancing Chemical Equations

Watch the video that shows how to balance a simple chemical equation and fill in information to help you understand the concepts of balancing chemical equations.

The **Law of Conservation** (GED Science Unit 2.17) states that "we must have exactly the same amount of _____ at the start of a reaction as at the end of a reaction."

How do you balance the equation Na + Cl_2 ➔ NaCl? _____

How do you balance the following equations?

H2 + Cl_2 ➔ HCl

_____

C + H_2 ➔ CH_4

_____

The next page will give you practice on balancing chemical equations. Do the first few with your teacher or table group, you can then balance the rest on your own.

Name: _____ **Date:** _____

Balancing Equations

Balance the following chemical equations.

1. _____ Fe + _____ H_2S0_4 ⟶ _____ $Fe_2(SO_4)_3$ + _____ H_2

2. _____ C_2H_6 + _____ O_2 ⟶ _____ H_2O + _____ CO_2

3. _____ KOH + _____ H_3PO_4 ⟶ _____ K_3PO_4 + _____ H_2O

4. _____ SnO_2 + _____ H_2 ⟶ _____ Sn + _____ H_2O

5. _____ NH_3 + _____ O_2 ⟶ _____ NO + _____ H_2O

6. _____ KNO_3 + _____ H_2CO_3 ⟶ _____ K_2CO_3 + _____ HNO_3

7. _____ B_2Br_6 + _____ HNO_3 ⟶ _____ $B(NO_3)_3$ + _____ HBr

8. _____ BF_3 + _____ Li_2SO_3 ⟶ _____ $B_2(SO_3)_3$ + _____ LiF

9. _____ $(NH_4)_3PO_4$ + _____ $Pb(NO_3)_4$ ⟶ _____ $Pb_3(PO_4)_4$ + _____ NH_4NO_3

10. _____ $SeCl_6$ + _____ O_2 ⟶ _____ SeO_2 + _____ Cl_2

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Unit 2.7.2 Handout 2

TEACHER ANSWER KEY

The **Law of Conservation** (GED Science Unit 2.17) states that "we must have exactly the same amount of **atoms** at the start of a reaction as at the end of a reaction."

How do you balance the equation Na + Cl_2 ➔ NaCl? **2**Na + Cl_2 ➔ **2**NaCl

How do you balance the following equations?

H2 + Cl_2 ➔ HCl **solution:** H2 + Cl_2 ➔**2**HCl

C + H_2 ➔ CH_4 **solution:** C + **2**H_2 ➔CH_4

1. 2 Fe + 3 H_2S0_4 → 1 $Fe_2(SO_4)_3$ + 3 H_2

2. 2 C_2H_6 + 7 O_2 → 6 H_2O + 4 CO_2

3. 3 KOH + 1 H_3PO_4 → 1 K_3PO_4 + 3 H_2O

4. 1 SnO_2 + 2 H_2 → 1 Sn + 2 H_2O

5. 4 NH_3 + 5 O_2 → 4 NO + 6 H_2O

6. 2 KNO_3 + 1 H_2CO_3 → 1 K_2CO_3 + 2 HNO_3

7. 1 B_2Br_6 + 6 HNO_3 → 2 $B(NO_3)_3$ + 6 HBr

8. 2 BF_3 + 3 Li_2SO_3 → 1 $B_2(SO_3)_3$ + 6 LiF

9. 4 $(NH_4)_3PO_4$ + 3 $Pb(NO_3)_4$ → 1 $Pb_3(PO_4)_4$ + 12 NH_4NO_3

10. 1 $SeCl_6$ + 1 O_2 → 1 SeO_2 + 3 Cl_2

Unit 2.7.2 Handout 3

Extra Practice with Balancing Chemical Equations

Name: _____ **Date:** _____

Balancing Equations

Balance the following chemical equations.

1. ____ CH_4 + ____ O_2 ⟶ ____ CO_2 + ____ H_2O

2. ____ Na^+ + ____ Cl^- ⟶ ____ $NaCl$

3. ____ Al + ____ O_2 ⟶ ____ Al_2O_3

4. ____ N_2^+ + ____ H_2 ⟶ ____ NH_3

5. ____ $CO(g)$ + ____ $H_2(g)$ ⟶ ____ $C_8H_{18}(l)$ + ____ H_2O

6. ____ $Fe_2O_3(s)$ + ____ $CO(g)$ ⟶ ____ $Fe(l)$ + ____ $CO_2(g)$

7. ____ H_2SO_4 + ____ $Pb(OH)_4$ ⟶ ____ $Pb(SO_4)_2$ + ____ H_2O

8. ____ Al + ____ HCl ⟶ ____ $AlCl_3$ + ____ H_2

9. ____ $Ca_3(PO_4)_2$ + ____ H_2SO_4 ⟶ ____ $CaSO_4$ + ____ $Ca(H_2PO_4)_2$

10. ____ H_3PO_4 + ____ HCl ⟶ ____ PCl_5 + ____ H_2O

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Unit 2.7.2 Handout 3

TEACHER ANSWER KEY

Name: _____ **Date:** _____

Balancing Equations

Balance the following chemical equations.

1. 1 CH_4 + 2 O_2 → 1 CO_2 + 2 H_2O

2. 2 Na^+ + 2 Cl^- → 1 NaCl

3. 4 Al + 3 O_2 → 2 Al_2O_3

4. 1 N_2^+ + 3 H_2 → 2 NH_3

5. 8 CO(g) + 17 H_2(g) → 1 C_8H_{18}(l) + 8 H_2O

6. 1 Fe_2O_3(s) + 3 CO(g) → 2 Fe(l) + 3 CO_2(g)

7. 2 H_2SO_4 + 1 $Pb(OH)_4$ → 1 $Pb(SO_4)_2$ + 4 H_2O

8. 2 Al + 6 HCl → 2 $AlCl_3$ + 3 H_2

9. 1 $Ca_3(PO_4)_2$ + 2 H_2SO_4 → 2 $CaSO_4$ + 1 $Ca(H_2PO_4)_2$

10. 1 H_3PO_4 + 5 HCl → 1 PCl_5 + 4 H_2O

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Unit 2.7.4 Handout 4 (2 pages total) **Extra Review Sheet for Chemical Reactions**

Types of Chemical Reactions

CK-12 Study Guides MADE BY STUDENTS!

Chemistry

Big Picture

From the combustion of fuel to the digestion of food, chemical reactions happen all around us. They convert one set of substances (reactants) into another set (products). Chemical reactions must always be balanced in order to obey the law of conservation of mass. Understanding chemical reactions and how matter changes is a fundamental part of of chemistry.

Key Terms

Chemical Reaction: Conversion of reactants to products, involves a change in energy.

Reactant: A molecule present before the reaction.

Product: A molecule present after the reaction.

Law of Conservation of Mass: States that the total mass of the reactants equals the total mass of the products.

Total Ionic Equation: Splits up the aqueous compounds in the reaction into ions.

Net Ionic Equation: Total ionic equation with the spectator ions removed.

Spectator Ions: Ions that don't participate in a reaction (they show up on both sides of the equation).

How to Read & Write a Chemical Reaction

A **chemical reaction** is a chemical change where substances change into new substances. A chemical equation is a shorthand notation that describes the reaction.

- The substances on the left side of the arrow are the **reactants** and the substances on the right side are the **products**. The arrow means "yields" or "reacts to produce."

  reactants → products

- Multiple reactants and products are separated by plus signs.
- The substances can be solid, liquid, gaseous, or aqueous (dissolved in water) and are shown as subscripts in parentheses. Often, the phases of elements will change during the reaction.
  - (*g*) gas
  - (*l*) liquid
  - (*s*) solid
  - (*aq*) aqueous–dissolved in water
- The coefficients in front of the substances indicate the number of molecules of each substance involved in the reaction.

Types of Chemical Reactions

There are five general types of chemical reaction. A reaction can fit into one, more than one, or none of these categories.

- Synthesis: Formation of a compound from simpler reactants.
  - Formation of ammonia (Haber process): $3H_{2(g)} + N_{2(g)} \rightarrow 2NH_{3(g)}$
  - Formation of water: $2HCl_{(aq)} + Na_2CO_{3(s)} \rightarrow 2NaCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$
- Decomposition: When a compound is broken down into simpler products.
  - Breakdown of hydrogen peroxide: $2H_2O_{2(l)} \rightarrow 2H_2O_{(l)} + O_{2(g)}$
  - Breakdown of calcium carbonate: $CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$
- Single Displacement: When an element or ion replaces another.
  - Single displacement of copper by iron: $Fe_{(s)} + CuSO_{4(aq)} \rightarrow Cu_{(s)} + FeSO_{4(aq)}$
- Double Displacement: When two elements or ions replace each other.
  - Double displacement of sodium chloride and silver nitrate: $NaCl_{(aq)} + AgNO_{3(aq)} \rightarrow NaNO_{3(aq)} + AgCl_{(s)}$
- Combustion: A compound reacting with oxygen. If the compound contains carbon, the reaction will produce carbon dioxide and water.
  - Combustion of methane: $CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(g)}$

This is known as complete combustion. In real life however, products such as CO (carbon monoxide) or C (ash, smoke) are also produced. Combustion reactions occur more completely for smaller carbon substances (methane) and less completely for larger compounds (wood).

This guide was created by Steven Lai, Rory Runser, and Jin Yu. To learn more about the student authors, visit http://www.ck12.org/about/about-us/team/interns.

Chemistry

Types of Chemical Reactions cont.

Balancing Chemical Reactions

Due to the **law of conservation of mass**, all the atoms that enter a reaction must appear in the product, or something has gone seriously wrong. The atoms may be bounded to different elements or in different phases, but they will never disappear. This means the same amount of each element will be on both sides. Balancing reactions tends to be fairly straightforward, but here are some important tips.

We will use the unbalanced reaction as an example.

$$HCl_{(aq)} + NaOH_{(aq)} \rightarrow H_2O_{(l)} + NaCl_{(aq)}$$

1. Find an element that only shows up in one molecule on each side. In a combustion equation, balance the carbon first. In this case, the sodium atom only shows up once on both sides.
2. Find the lowest common denominator that will balance the element. In this case, there are two Na atoms on the reactant side and one Na atom on the product side. The common denominator of one and two is two.
3. Find how many molecules you need to get that number (the lowest common denominator from step #2) of elements on both sides of the equation. In this case, we need two NaCl to balance one Na_2CO_3.
4. Put in the coefficients in front (do not alter the chemical formula). The reaction becomes
$$HCl_{(aq)} + Na_2CO_{3(s)} \rightarrow 2NaCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$$
5. Use the new coefficients to balance the other substances. The balanced reaction becomes:
$$2HCl_{(aq)} + Na_2CO_{3(s)} \rightarrow 2NaCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$$
6. If you find out you have fractional coefficients, multiply everything to remove the fractions.
7. After balancing the equation, check the coefficients and make sure every element is balanced. Make sure that the coefficients are in the lowest possible ratios.

Pitfall Prevention

The following are common mistakes when balancing chemical reactions. Make sure you don't do them!

- Change quantities of substances by changing the coefficients to the entire molecule, not by changing the subscripts.
  - Example: Here is the unbalanced equation for the formation of salt from sodium and chlorine gas:
    $$Na + Cl_2 \rightarrow NaCl.$$
    It is tempting to notice that the sodium is already balanced and try to just balance the chlorine. However, you need to remember that you cannot change the subscripts, so do not write $NaCl_2$. Instead, put a 2 before the Na and write 2NaCl. Thus, you get $2Na + Cl_2 \rightarrow 2NaCl$
- You cannot have fractional coefficients! If you are left with $\frac{3}{2}O_2$, multiply both sides of the equation by two to eliminate the fraction.
- Add up the quantities of each element on both sides of the reaction. If they aren't the same, you have made a mistake!

Net Ionic Equations

Net ionic equations allow us to see the overall reaction that occurs. Let's use this reaction as an example:

$$HCl_{(aq)} + NaOH_{(aq)} \rightarrow H_2O_{(l)} + NaCl_{(aq)}$$

- First, we need to turn it into the total ionic form. Most ionic compounds will separate into cations and anions when dissolved in water, so we will split apart all aqueous substances into ions. Keep solids, liquids, and gases together.
$$H^+ + Cl^- + Na^+ + OH^- \rightarrow H_2O_{(l)} + Na^+ + Cl^-$$
- Now see which ions are present on both sides. These are spectator ions that are not involved in the reaction. We see that the sodium and chloride ions are both present. After we remove them, we have the net ionic equation.
$$H^+ + OH^- \rightarrow H_2O_{(l)}$$
- Balance the net ionic equation (make sure the charges are also balanced).
$$2H^+ + OH^- \rightarrow H_2O_{(l)}$$

Spectator ions are like the spectators at a sports game - the spectators are at the game, but they don't actually play or participate in the game.

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