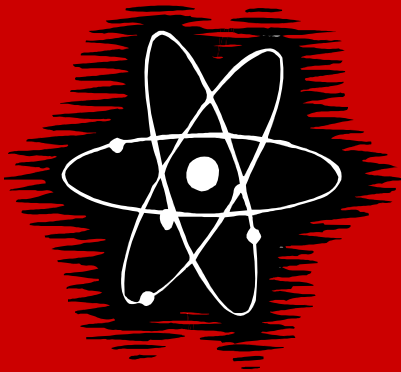


2008 K-8 Update

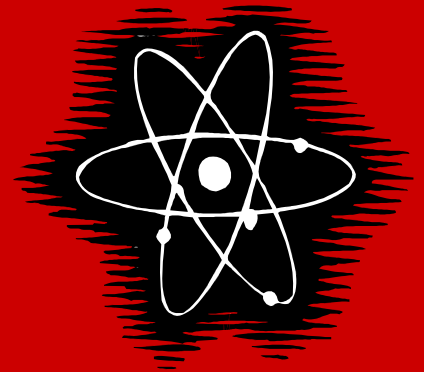


# Chemistry Lessons to Engage Your Students



Presented by  
**Tracy Trimpe**

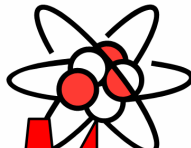
8<sup>th</sup> Grade Science Teacher  
Havana Junior High School





**Start every class with a challenge!**

**Chemistry Topics:**  
 Element Challenge  
 Elemental Puns  
 Atomic Math  
 Common Compounds  
 Compound Challenge  
 Periodic Table Basics



Science Starters

# Atomic Math

Challenge #1

T. Trimpe 2008 <http://sciencespot.net/>

Use the information provided to answer the questions.

|                            |                          |                              |                                |
|----------------------------|--------------------------|------------------------------|--------------------------------|
| 2<br>He<br>Helium<br>4.003 | 5<br>B<br>Boron<br>10.81 | 11<br>Na<br>Sodium<br>22.990 | 17<br>Cl<br>Chlorine<br>35.453 |
|----------------------------|--------------------------|------------------------------|--------------------------------|

- What is the atomic number for Chlorine?  
 What is the atomic mass for Boron?  
 How many protons are in an atom of Na?  
 How many neutrons are in an atom of He?  
 How many electrons are in an atom of Cl?  
 6. How many protons and neutrons would be in an atom of Chlorine?  
 7. How many neutrons are in an atom of Na?  
 8. How many protons and neutrons are in an atom of Helium?

The answers are ...

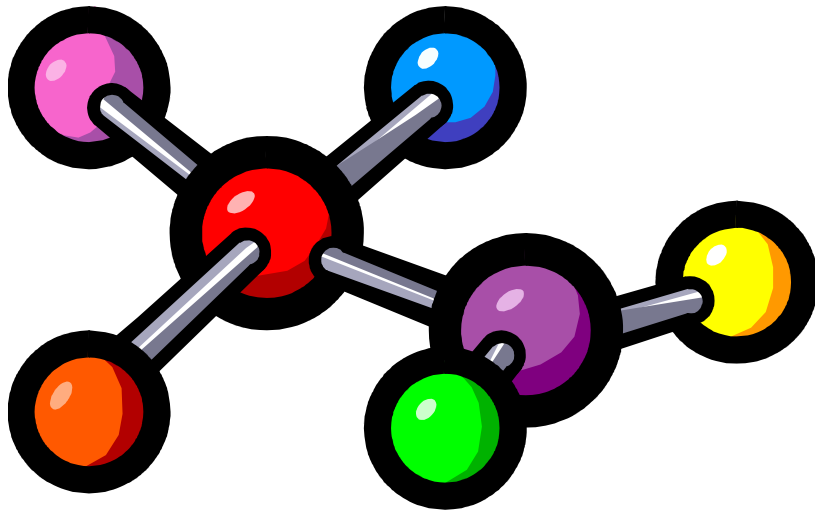
|                            |                          |                              |                                |
|----------------------------|--------------------------|------------------------------|--------------------------------|
| 2<br>He<br>Helium<br>4.003 | 5<br>B<br>Boron<br>10.81 | 11<br>Na<br>Sodium<br>22.990 | 17<br>Cl<br>Chlorine<br>35.453 |
|----------------------------|--------------------------|------------------------------|--------------------------------|

- What is the atomic number for Chlorine? **17**  
 What is the atomic mass for Boron? **10.81 or 11**  
 How many protons are in an atom of Na? **11**  
 How many neutrons are in an atom of He? **2**  
 How many electrons are in an atom of Cl? **17**  
 6. How many protons and neutrons would be in an atom of Chlorine? **35.453 or 35**  
 7. How many neutrons are in an atom of Na? **12**  
 8. How many protons and neutrons are in an atom of Helium? **4.003 or 4**

All the Science Starters are available as PowerPoint presentations and available on my website – <http://sciencespot.net/> ➡

**Ready for a challenge?**

# Name That Compound



## Challenge #1

Give the correct name for each compound.

1.  $\text{NaCl}$  – A common seasoning for food

2.  $\text{FeO}_2$  – Formula for rust

3.  $\text{HCl}$  – An acid found in your stomach

4.  $\text{CH}_4$  – A gas produced in your body

5.  $\text{H}_2\text{O}$  – An important liquid

The answers are ...

1.  $\text{NaCl}$  – A common seasoning for food

**Sodium Chloride or Salt**

2.  $\text{FeO}_2$  – Formula for rust

**Iron Oxide**

3.  $\text{HCl}$  – An acid found in your stomach

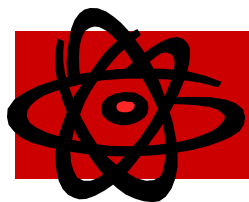
**Hydrochloric Acid**

4.  $\text{CH}_4$  – A gas produced in your body

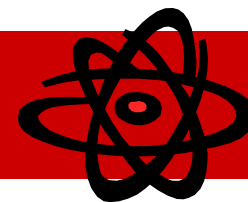
**Methane**

5.  $\text{H}_2\text{O}$  – An important liquid

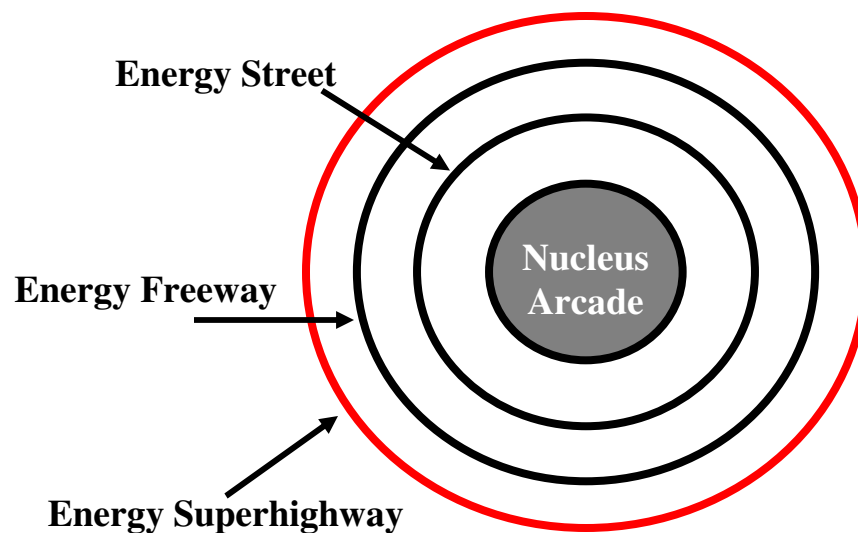
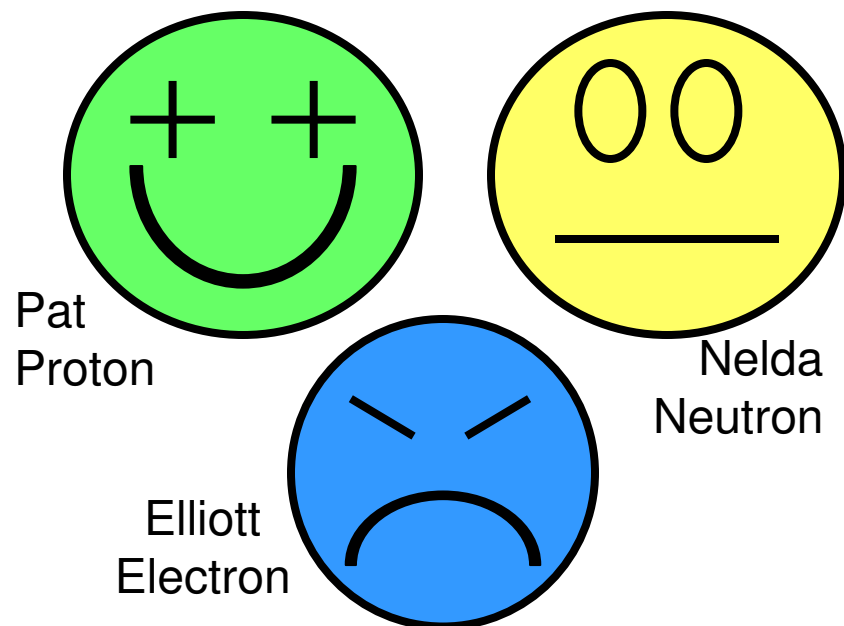
**Water**



# Atoms & Elements



Introduce your students to the Atoms Family & explore Matterville



Also available ... Atomic Math Challenge – Students learn how to use the periodic table to calculate the number of subatomic particles in each atom.

Atoms Family  
PowerPoint  
Available Online



## The Atoms Family Song – Sing to the tune of the Adams Family Theme Song

### 1st Verse:

They're tiny and they're teeny,  
Much smaller than a beany,  
They never can be seeny,  
The Atoms Family.

Chorus

### 2nd Verse:

Together they make gases,  
And liquids like molasses,  
And all the solid masses,  
The Atoms Family

Chorus



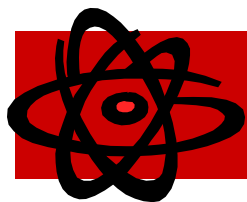
### 3rd Verse:

Neutrons can be found,  
Where protons hang around;  
Electrons they surround  
The Atoms Family.

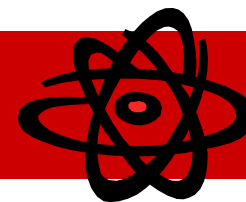
Chorus

### Chorus:

They are so small.  
(Snap, snap)  
They're round like a ball.  
(Snap, snap)  
They make up the air.  
They're everywhere.  
Can't see them at all.  
(Snap, snap)



# Atoms & Elements



## Have your students adopt an element or two and learn more about them!

### Element Trading Cards

For this project you will need to use the Internet to research the elements in the Periodic Table. Each card must include:

- Periodic Table information
- Number of protons, neutrons, and electrons
- Discovery information (Person and date)
- Important Uses
- Pictures that illustrate one or more uses for your element

|  |   |   |        |       |  |
|--|---|---|--------|-------|--|
| <table style="margin: auto; border: 1px solid black; padding: 5px;"> <tr><td style="text-align: center;">8</td></tr> <tr><td style="text-align: center;">O</td></tr> <tr><td style="text-align: center;">Oxygen</td></tr> <tr><td style="text-align: center;">15.98</td></tr> </table> | 8   | O | Oxygen | 15.98 | Fill in the square with the information from the periodic table.<br>* Be sure to follow the same format! |
| 8  |   |   |        |       |  |
| O  |   |   |        |       |  |
| Oxygen   |   |   |        |       |  |
| 15.98  |   |   |        |       |  |
| P = ___ N = ___ E = ___  | Determine the number of protons (P), neutrons (N), and electrons (E).                               |   |        |       |  |
| Discovered in ___ by ___   | Research your element to find out who discovered or named your element and give the year.           |   |        |       |  |
| Important Uses:  | Provide at least 3 uses for your element.   |   |        |       |  |
|  | Provide one or more pictures on the back of the trading card that illustrate uses for your element. |   |        |       |  |

My elements are: \_\_\_\_\_

Project Due Date: \_\_\_\_\_

A list of periodic table sites has been provided on the Chemistry Links page of the Kid Zone!  
Go to <http://sciencespot.net/> and click Kid Zone!

### Adopt-An-Element

**Requirements:**

**1) Complete an Adopt An Element information sheet. (60% of grade)**  
You may use a variety of reference sources. Possible ideas are encyclopedias (book or CD Rom), science encyclopedias, science catalogs, magazines, and/or Internet sites\*. Information sheets must be neat, written in black ink, and contain all the information requested. You also need to provide a list of your sources on the back of your information sheet. A minimum of three sources are required.

**2) Create an advertisement for your element. (40% of grade)**  
The advertisement must include the element's name, symbol, atomic number, atomic mass, cost, and an advertising slogan that describes one or more of its important uses. Advertisements must be neat, colorful, and contain all the information listed above. You may add pictures that relate to your advertisement theme.

**Example:**

Be sure to include:

- ✓ Element's symbol
- ✓ Element's name
- ✓ Atomic number
- ✓ Atomic mass
- ✓ Ad slogan
- ✓ Cost
- ✓ Your name

You may add pictures or drawings that illustrate the various uses for your element.

**Your ad must follow the same format as this example!**

|  |      |    |         |
|--|------|----|---------|
| 33   | 74.9 |    |         |
| <table style="margin: auto; border: 1px solid black; padding: 5px;"> <tr><td style="text-align: center; font-size: 2em;">As</td></tr> <tr><td style="text-align: center;">Arsenic</td></tr> </table> |      | As | Arsenic |
| As   |      |    |         |
| Arsenic  |      |    |         |
| Arsenic's a sure fire way to deal with a nasty rat. It works better than a mean old cat!   |      |    |         |
| Cost = \$3.20 for 1 gram   |      |    |         |
| John Smith   |      |    |         |

A list of periodic table sites is available on **The Science Spot**  
<http://sciencespot.net/>  
Go to **Kid Zone**, then choose **Chemistry Links**

### Element Baby Book

Cover Due: \_\_\_\_\_  
Final Project Due: \_\_\_\_\_

In this project you will adopt an element from the periodic table. The element that you choose must have an atomic number from 1 – 20.

As a proud parent of your element you will create a baby book to remember each stage of your element's life.

This project will count as **TWO** test/project grades in science. You will also receive a grade in English/Language Arts. I will give you time in the library to research your element and some class time to work on your book. You will work on writing and proofreading in language arts.

Sources of Information:  
**Websites** to help you in your search (I will provide these.)  
The **periodic table** in your book will give you some information.  
Encyclopedias

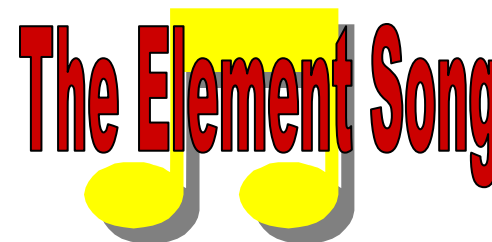
There will be **two** due dates: one for the cover so that it can be laminated, and one for the final project. I will bind each baby book. You may create your book on the computer, but it is not necessary.

**Requirements:**  
(Check each one as you complete it.)

- \_\_\_\_\_ **Cover page – 3 points**  
Name of element and your name  
Decorative cover
- \_\_\_\_\_ **Page 1 – 35 points! This should be written in paragraph form.**  
Name of element (Give your element a first name)  
Nickname of element (Symbol)  
Birth date (date element was discovered)  
Birth weight (atomic mass)  
Birth height (atomic number)  
Race (type of element)  
Attending physician (Discoverer)  
Gender (state of matter at room temperature)  
Place of birth (country of discovery)  
Personality (emotions: boiling point and melting point)
- \_\_\_\_\_ **Page 2 – 5 points**  
Pronunciation rebus

Created by Lisa Curry - 2003

## Use the completed student projects to create a periodic table display in the hallway!





**F** Fluorine

Atomic Number: 9  
Atomic Mass: 19

# The Periodic Table

**N** Nitrogen

Atomic Number: 7  
Atomic Mass: 14.01

Explore the relationships between the elements in the periodic table.

### Periodic Table Basics

**Step 1:** Complete the squares for each element by adding the atomic number, name, and atomic mass.

Write the atomic number at the top of the square.

Write the element's name under the symbol.

Write the atomic mass at the bottom of the square.

**Step 2:** Determine the number of protons, neutrons, and electrons in each element.

**Step 3:** Create a Bohr diagram for each element.

**Step 4:** Draw the Lewis Structure for each element.

**Step 5:** Use the following colors to shade in the square for each element. You should ONLY color in the small square in the upper left-hand corner and not the entire card.

Green = Li & Na    Pink = O & S    Blue = Be & Mg    Purple = F & Cl  
Orange = B & Al    Red = C & Si    Tan = N & P    Yellow = He, Ne, & Ar

**Step 6:** Cut the cards apart and arrange according to atomic number in the pattern shown below. Once you have the cards arranged in the correct order, glue them to a large sheet of construction paper.

|    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|
| 1  |    |    |    |    |    |    | 2  |
| 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

**Step 7:** Answer the questions on the back of this worksheet using the information on your Periodic Table.

### Periodic Table Basics

Name \_\_\_\_\_

- Which elements had complete outer shells? Give the name and symbol for each.
- What do you notice about the location of the elements in #1?
- Which elements had only one valence electron?
- What do you notice about the location of the elements in #3?
- What do you notice about the number of valence electrons as you move from left to right across a row or period in the periodic table? (Na → Mg → Al → Si → P → S → Cl → Ar)
- What do you notice about the number of energy levels or shells as you move down a group or column in the periodic table? (H → Li → Na)
- Elements are organized into families according to their physical and chemical properties. Identify the elements that you used in Step 5 that belong to each family based on the number of valence electrons. Give the name and symbol for each element.

Alkali Metals - 1 valence electron \_\_\_\_\_ & \_\_\_\_\_

Alkaline Earth Metals - 2 valence electrons \_\_\_\_\_ & \_\_\_\_\_

Boron Family - 3 valence electrons \_\_\_\_\_ & \_\_\_\_\_

Carbon Family - 4 valence electrons \_\_\_\_\_ & \_\_\_\_\_

Nitrogen Family - 5 valence electrons \_\_\_\_\_ & \_\_\_\_\_

Oxygen Family - 6 valence electrons \_\_\_\_\_ & \_\_\_\_\_

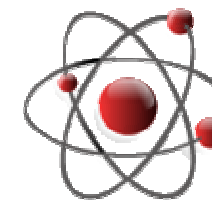
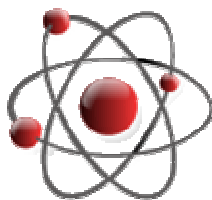
Halides - 7 valence electrons \_\_\_\_\_ & \_\_\_\_\_

Noble Gases - Complete outermost shell \_\_\_\_\_ & \_\_\_\_\_

- What do you notice about the location of the elements in each family?
- How would you classify hydrogen? Why?
- Predict the number of valence electrons for each element based on its location in the Periodic Table of Elements. You will need to use the table in your textbook.

Barium = \_\_\_\_\_ Lead = \_\_\_\_\_ Xenon = \_\_\_\_\_ Potassium = \_\_\_\_\_

|  |  |  |
|--|--|--|
| <p>B</p> <p>P = _____</p> <p>N = _____</p> <p>E = _____</p> <p>Bohr Diagram</p> <p>Lewis Structure B</p> | <p>Li</p> <p>P = _____</p> <p>N = _____</p> <p>E = _____</p> <p>Bohr Diagram</p> <p>Lewis Structure Li</p> | <p>Ne</p> <p>P = _____</p> <p>N = _____</p> <p>E = _____</p> <p>Bohr Diagram</p> <p>Lewis Structure Ne</p> |
|--|--|--|





Click here to return to the  
**Main Menu**

## Chemistry - Periodic Table Sites

[Web Elements](#)  
[Chemicool](#)  
[Los Alamos Periodic Table](#)  
[Visual Elements](#)  
[Lenntech Periodic Table](#)  
[It's Elemental Table](#)  
[Elemental Fascination](#)  
[All Periodic Tables.com](#)  
[MII Periodic Table](#)  
[Chemical Elements.com](#)  
[Bayer Periodic Table](#)  
[American Elements.com](#)  
[Chemical Comics](#)  
[Development of the Periodic Table](#)  
[CHEMystery Periodic Table](#)

Listen to  
[Tom Lehrer's Song of the Elements!](#)



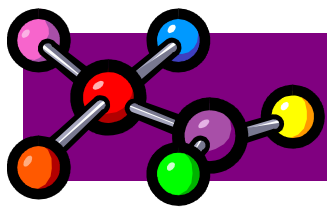
Also visit the Kid Zone Pages for  
[Matter & Atoms](#) and  
[Acids & Bases](#)



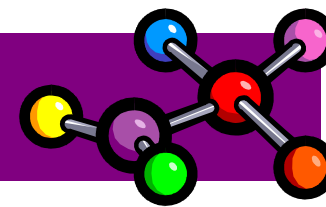
**Periodic Table sites are listed in  
the Chemistry section of the Kid  
Zone at my website.** →

**The Jefferson Lab website is an  
excellent resource for classroom  
activities as well as online games  
and challenges.**

The screenshot shows the Jefferson Lab Science Education website. At the top, there is a navigation bar with 'HOME', 'SEARCH', and 'CONTACT JLAB'. Below this is a secondary navigation bar with icons for 'Education Home', 'Teacher Resources', 'Student Zone', 'Games & Puzzles', 'Programs & Events', and 'Search Education'. The main content area is titled 'Teacher Resources' and features several sections: 'Teacher Programs' with links to 'JLab Science Activities for Teachers' and 'DOE Academies Creating Teacher Scientists'; 'Hands-on Activities' with a list of activities like 'A Different Way of Measuring Cold Stuff' and 'Magnets & Electromagnets'; 'Workshops' including 'PIE: Physics is Elementary' and 'The Virginia Section of the American Nuclear Society'; 'Reference Materials' with links to 'All About Atoms' and 'Table of Elements'; and 'Worksheets, Puzzles and Games' with various interactive activities like 'BEAMS Bingo' and 'Mystery Picture'.



# Chemical Bonding



**NEW**



## Bonding Basics (2008 Version)

Students use ping pong balls to create models of valence electrons and then explore how the atoms can form ionic or covalent bonds.

### Bonding Basics

ANSWER KEY

Section A: Complete the chart using a periodic table to help you.

| Element   | Atomic Symbol | Total # of Electrons | # of Valence Electrons | # of Electrons Needed to Gain or Lose to Fill Outer Shell | Oxidation Number |
|-----------|---------------|----------------------|------------------------|---|------------------|
| Chlorine  | Cl            | 17                   | 7                      | Gain 1  | 1-               |
| Potassium | K             | 19                   | 1                      | Lose 1  | 1+               |
| Magnesium | Mg            | 12                   | 2                      | Lose 2  | 2+               |
| Fluorine  | F             | 9                    | 7                      | Gain 1  | 1-               |
| Aluminum  | Al            | 13                   | 3                      | Lose 3  | 3+               |
| Sodium    | Na            | 11                   | 1                      | Lose 1  | 1+               |
| Nitrogen  | N             | 14                   | 4                      | Gain 3  | 3-               |
| Oxygen    | O             | 8                    | 6                      | Gain 2  | 2-               |
| Hydrogen  | H             | 1                    | 1                      | Gain 0  | 1                |
| Carbon    | C             | 6                    | 4                      | Gain 0  | 4                |
| Iodine    | I             | 53                   | 7                      | Gain 1  | 1-               |

Answer these

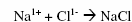
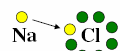
- An atom
- An atom
- An atom
- A positive

### Section B: Ionic Bonds

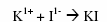
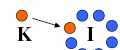
What is an ionic bond?

- Atoms will transfer one or more electrons to another to form the bond.
- Each atom is left with a complete outer shell.
- An ionic bond forms between a metal ion with a positive charge and a nonmetal ion with a negative charge.

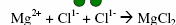
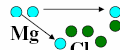
Example B1: Sodium + Chlorine



Example B3: Potassium + Iodine



Example B5: Calcium + Chlorine



Example B2: Magnesium + Chlorine



Example B4: Sodium + Iodine



Example B6: Aluminum + Chlorine



### Section C: Covalent Bonds

ANSWER KEY

What is a covalent bond?

- Atoms share one or more electrons with each other to form the bond.
- Each atom is left with a complete outer shell.
- A covalent bond forms between two nonmetals.

Example C1: Hydrogen + Hydrogen



Example C2: 2 Hydrogen + Oxygen



Example C3: Chlorine + Chlorine



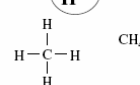
Example C4: Oxygen + Oxygen



Example C5: Carbon + 2 Oxygen



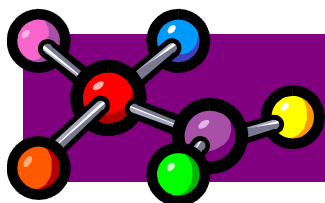
Example C6: Carbon + 4 Hydrogen



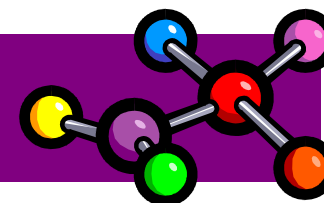
Challenge: What are some other ionic bonds that can be formed by the elements you see? Write the chemical formula for the compound and its name.

Answers will vary.





# Chemical Bonding



Explore ionic and covalent bonding to learn how common compounds are created.

**Bonding Basics - Ionic Bonds** Answer Key/Teacher Notes

Complete the chart for each element.

| Element    | # of Protons | # of Electrons | # of Valence Electrons | Oxidation Number |
|------------|--------------|----------------|------------------------|------------------|
| Sodium     | 11           | 11 → 10        | 1                      | 1+               |
| Chlorine   | 17           | 17 → 18        | 7                      | 1-               |
| Beryllium  | 4            | 4 → 2          | 2                      | 2+               |
| Fluorine   | 9            | 9 → 10         | 7                      | 1-               |
| Lithium    | 3            | 3 → 2          | 1                      | 1+               |
| Oxygen     | 8            | 8 → 10         | 6                      | 2-               |
| Phosphorus | 15           | 15 → 18        | 5                      | 3-               |

NOTE: I have the students use a red pencil to change the # of electrons to the amount it would be if the valence electrons were removed or added. They can see the difference between the number of protons (+) and electrons (-), which relates to the charge or oxidation number. If the ion has more protons (+), it would be a positive ion. If it has more electrons (-), it would be a negative ion.

Follow your teacher's directions to complete each ionic bond.

(1) Potassium + Fluorine

- Write the symbols for each element.
- Use Fruity Pebbles (or other cereal/candy with more than one color) to create the Lewis structure for each.
- Draw an arrow (or more if needed) to show the transfer of electrons and move the cereal to the new location.
- Determine the charge for each ion and write the formula.
- Make sure the sum of the oxidation numbers is zero and write the chemical formula.
- Have the students use a pencil or crayon to draw the electrons as they remove the pieces of cereal.

(2) Magnesium + Iodine

## Bonding Basics (2002 Version)

Students use small pieces of cereal or candy to model the transfer or sharing of electrons

**Candy Compounds** ANSWER KEY

Complete your gumdrop key based on the number and colors of gumdrops in your bag. Follow the directions to complete this worksheet.

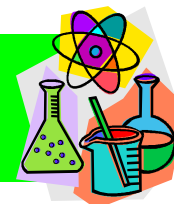
For each compound, you will need to:

- List the atoms and number of each.
- Identify the type of bond.
- Make and color the gumdrop model, and
- Draw the bond structure showing the transfer or sharing of electrons.

| Information<br>List the names of the atoms and number of each | Type of Bond<br>Is it ionic or covalent? | Gumdrop Model<br>Make the gumdrop compound and color the diagram. | Dot Structure<br>Show the electron dot diagrams and charge/oxidation numbers |
|---|--|---|--|
| H <sub>2</sub><br>H = Hydrogen = 2                            | Covalent                                 |   |  |
| NaCl<br>Na = Sodium = 1<br>Cl = Chlorine = 1                  | Ionic                                    |   |  |
| H <sub>2</sub> O<br>H = Hydrogen = 2<br>O = Oxygen = 1        | Covalent                                 |   |  |
| Na <sub>2</sub> O<br>Na = Sodium = 2<br>O = Oxygen = 1        | Ionic                                    |   |  |

## Candy Compounds

Students use gumdrops or jellybeans to create models of ionic and covalent compounds.



# Chemical Reactions

Explore the Law of Conservation of Mass and different types of chemical reactions as students learn how to balance equations.

**Balancing Act** Name \_\_\_\_\_

Atoms are not \_\_\_\_\_ or \_\_\_\_\_ during a chemical reaction. Scientists know that there must be the \_\_\_\_\_ number of atoms on each \_\_\_\_\_ of the \_\_\_\_\_. To balance the chemical equation, you must add \_\_\_\_\_ in front of the chemical formulas in the equation. You cannot \_\_\_\_\_ or \_\_\_\_\_ subscripts!

1) Determine number of atoms for each element.  $\square \text{Mg} + \square \text{O}_2 \rightarrow \square \text{MgO}$

2) Pick an element that is not equal on both sides of the equation. Mg = \_\_\_\_\_ Mg = \_\_\_\_\_

3) Add a coefficient in front of the formula with that element and adjust your counts. O = \_\_\_\_\_ O = \_\_\_\_\_

4) Continue adding coefficients to get the same number of atoms of each element on each side.

Try these:

$\square \text{Ca} + \square \text{O}_2 \rightarrow \square \text{CaO}$   
Ca = \_\_\_\_\_ Ca = \_\_\_\_\_  
O = \_\_\_\_\_ O = \_\_\_\_\_

$\square \text{N}_2 + \square \text{H}_2 \rightarrow \square \text{NH}_3$   
N = \_\_\_\_\_ N = \_\_\_\_\_  
H = \_\_\_\_\_ H = \_\_\_\_\_

$\square \text{Cu}_2\text{O} + \square \text{C} \rightarrow \square \text{Cu} + \square \text{CO}_2$   
Cu = \_\_\_\_\_ Cu = \_\_\_\_\_  
O = \_\_\_\_\_ O = \_\_\_\_\_  
C = \_\_\_\_\_ C = \_\_\_\_\_

$\square \text{H}_2\text{O}_2 \rightarrow \square \text{H}_2\text{O} + \square \text{O}_2$

**Balancing Equations Online** Name \_\_\_\_\_  
Go to the *Matter & Atoms* page of the KidZone at <http://sciencepot.net> to find the links on this page.

**SITE #1: Chemical Equations**

1. What three things does a balanced equation show you?  
1. The \_\_\_\_\_ which enter into a reaction.  
2. The \_\_\_\_\_ which are formed by the reaction.  
3. The amounts of each substance \_\_\_\_\_ and each \_\_\_\_\_ produced.

2. What two things must we remember when balancing equations?  
1. Every chemical compound has a \_\_\_\_\_ which cannot be \_\_\_\_\_.  
2. A chemical \_\_\_\_\_ must account for every \_\_\_\_\_ that is used, which is an application of the Law of \_\_\_\_\_ of \_\_\_\_\_.

3. What does the  $\rightarrow$  mean? \_\_\_\_\_

4. What does the  $\leftarrow$  mean? \_\_\_\_\_

\_\_\_\_\_ each type of reaction.

\_\_\_\_\_

\_\_\_\_\_

Remember → List the atoms, count, and solve!

$\text{Na} + \text{O}_2 \rightarrow \text{Na}_2\text{O}$

$\text{C} + \text{H}_2 \rightarrow \text{CH}_4$

$\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2$

$\text{CaCl}_2 \rightarrow \text{CaSO}_4 + \text{NaCl}$

**Balancing Equations Challenge** Name \_\_\_\_\_

Part A: Parts & Pieces  
(1) Circle each subscript in each chemical formula.  
(2) Draw a square around each coefficient.  
(3) Answer the questions related to each chemical formula.

$\text{O}_2$                        $\text{CO}_2$                        $5\text{H}_2$

What element does the O represent? \_\_\_\_\_ How many atoms of each element are in the formula shown? C = \_\_\_\_\_ O = \_\_\_\_\_ How many atoms of Hydrogen are in this formula as shown? \_\_\_\_\_

$2\text{C}_2\text{H}_6$                        $2\text{Na}_2\text{SO}_4$

How many atoms each element are in the formula shown? C = \_\_\_\_\_ H = \_\_\_\_\_ How many atoms each element are in the formula shown? Na = \_\_\_\_\_ S = \_\_\_\_\_ O = \_\_\_\_\_

Part B: Label the chemical equation using PRODUCT, REACTANTS, SUBSCRIPT, COEFFICIENT, and YIELDS.

$2 \text{Mg} + \text{O}_2 \rightarrow 2 \text{MgO}$

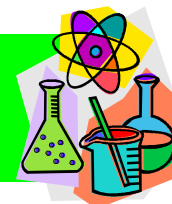
T. Trimp 2006 <http://sciencepot.net>

**Balancing Act**  
I use this lesson to help my students learn how to balance chemical equations.

**Other worksheets are available for classroom lessons or online activities.**



# Chemical Reactions



Put your students' knowledge of balancing equations to the test with the Snowman Challenge or Equation Egg Hunt!

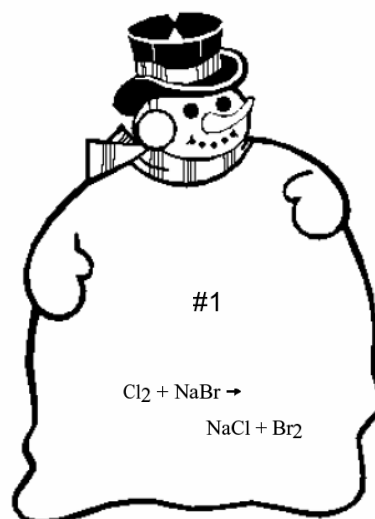
**Equation Challenge** Name(s) \_\_\_\_\_

**Game Rules:**  
(1) If you touch it, you have to complete it! Teams are not allowed to put an egg back if they don't like the problem in that egg. Teams are not allowed to peek inside before choosing to take an egg!  
(2) Your team can only work on one egg or problem at a time! Teams must finish the problem and get the answer approved by the teacher before looking for another one.  
(3) Teams must stay together! All team members must be together when working on the problems and checking answers.

**Directions:**  
Pick an egg and solve the problem inside! Some problems only require an answer, while others require you to balance an equation. Write the number and your answer in a box below and have your teacher check it. If the answer is correct, put the problem back in the egg and put it in your bag. You can then pick another egg. If you do not get the correct answer, keep trying until you get it right!

|         |         |
|---------|---------|
| # _____ | # _____ |
| # _____ | # _____ |
| # _____ | # _____ |
| # _____ | # _____ |

Student Worksheet



Two Versions  
Snowman Challenge  
or  
Equation Egg Hunt

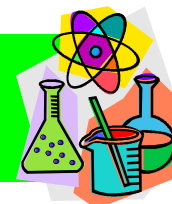


Equation Challenge Problems

|   |  |   |
|---|--|---|
| #1<br>$\text{Cl}_2 + \text{NaBr} \rightarrow \text{NaCl} + \text{Br}_2$ | #2<br>Give the name and # of atoms for each element.<br>$2\text{H}_2\text{SO}_4$ | $\text{HCl} + \text{CaCO}_3 \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$ |
|---|--|---|



# Chemical Reactions



## Use chemistry to solve a mystery!

Name \_\_\_\_\_

### North Pole Bureau Of Investigations Case #1225: Case of the Christmas Cookie Mystery

Mrs. Claus needs your help! Each Christmas, Mrs. Claus makes a batch of her special sugar cookies to give Santa all the energy he needs to deliver presents to all the good little boys and girls around the world. A bad little elf has snuck into the kitchen and messed up all the special baking powders.

He has left a note with three mystery bags of white powder. The North Pole Bureau of Investigations has provided samples of six white powders found at Santa's house and the three mixtures left by the elf.

Without your help, Mrs. Claus will not be able to make her cookies and there will be no Christmas! Help Mrs. Claus save Christmas!



I'm a bad little elf,  
That's plain to see;  
There will be no cookies  
for Santa this year,  
Which means more  
presents for me!

Part 1: Follow the directions to test each sample (# 1-6) with water, vinegar, iodine, and heat. Record your observations in the top part of the chart on the back of this page.

Part 2: Follow the same procedure to test the three Mystery Mixtures (A, B, and C). Record your observations in the bottom portions of the chart. Use your results from Part 1 to determine which mixture is the special sugar cookie mix!

#### Mrs. Claus' Special Sugar Cookies

Mix 15 cups of flour, 6 teaspoons of baking powder, 5 cups of powdered sugar, 3 pounds of butter, and 10 eggs in a large red bowl. Add lots of tender loving care and a bit of magic dust, then bake until golden brown.

T. Trimpe 1999

### North Pole Bureau of Investigation Case #1225: Case of the Christmas Cookie Mystery

#### Teacher Directions

#### Materials Needed:

For each group:  
6 small containers with different white powders labeled 1, 2, 3, 4, 5, 6.  
(Baking soda, baking powder, corn starch, flour, powdered sugar, and baby powder)  
6 small dropper bottles filled with testing liquids  
(Water, vinegar, and iodine solution)  
Box of toothpicks  
Strips of wax paper  
Squares of aluminum foil (for heating samples)  
Tweezers or tongs  
Small candle (with aluminum foil as holder)  
Matches

#### Mystery Samples

You will need to prepare 3 mystery samples by mixing equal amounts of each listed below. Each group should be given a small amount of each mixture to test.

Mystery Sample 1: Flour, corn starch, and powdered sugar  
Mystery Sample 2: Flour, baking soda, and powdered sugar  
Mystery Sample 3: Flour, baking soda, and baby powder

#### Expected Results:

Students should discover that Mystery Sample 2 is the correct mixture to Mrs. Claus' special cookies. Her recipe calls for flour, baking soda, and powdered sugar. This sample will fizz in vinegar, turn black in iodine, and bubble when heated.  
The two other samples would not be used for her special cookies. Mystery Sample 1 does not fizz in vinegar, so it would not contain baking powder (or baking powder). Mystery Sample 3 has a distinctive odor (from the baby powder) and would not be used for her special cookies.

#### Tips:

Divide students in groups of 3 - 4 students. Each student is responsible for testing at least one of the 6 powder samples. They will need to share their results with other group members. The group will need to decide their procedure for testing each Mystery Sample. I stress the need to keep samples separate to prevent contamination and poor results. My 7th graders also need to review proper safety procedures.

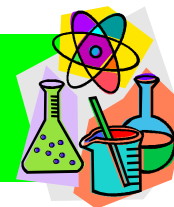
T. Trimpe 1999

Students test 6 different white powders to determine their physical and chemical properties and then use that information to identify the "Special Sugar Cookie" mixture.

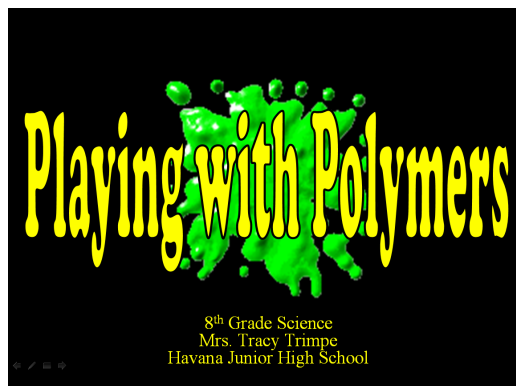




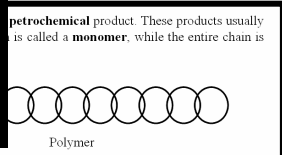
# Chemical Reactions



Explore the world of polymer chemistry!



Students create five different types of slime or polymers and complete a series of tests on each one. They use that information to identify mystery slimes.



- 8. Cotton, silk, wool, and natural rubber are all **natural polymers**. A polymer is an essential ingredient in living matter and is made up of **acids**.
- 9. **Polymerization** is the process of chemically bonding monomers. Polymers made from petrochemicals are called **synthetic polymers**. Polymers are natural **rubber**, plastic wrap, and fabrics such as **nylon**. The most important synthetic polymers we use everyday is **plastics**, which range from kitchen utensils to rocket engines.
- 10. Polymers are also used in medicine as substitutes for **human tissues** and **arteries**.

**Playing with Polymers**

**Slime Tests**

**Description** – How does your slime look like, feel, smell (waft), etc.?

**Slime Rating** – Rate it from 1 = not very slimy to 5 = very slimy

**Slow Poke Test** – Roll the slime into a ball and slowly poke your finger into the slime. What happens? Does your finger go into the goop?

**Quick Poke Test** – Roll the slime into a ball and quickly poke the slime with your finger. What happens? Does your finger go into the goop?

**Slow Pull Test** – Roll the slime into a ball and slowly pull on the ends with your fingers. What happens? Write your observations on your worksheet.

**Quick Pull Test** – Roll the slime into a ball and slowly pull on the ends with your fingers. What happens? Write your observations on your worksheet.

**Bob Test** – Grab a timer. Roll your slime into a ball and sit it on your plate or the table. How long does it take for it to flatten out?

**Hang Test** – Grab a timer and a ruler. Roll your slime into a ball and hold it at a height of 30 cm above the table. Time how long it takes for the slime to reach the table.

**Bounce Test** – Roll your slime into a ball and drop from a height of 30 cm above the table. What happens? Write your observations (how high it bounces) on your worksheet.

NOTE: If you cannot do a test, indicate this in the box on your data chart!

T. Trimpe 2002. http://www.teachmeanchemistry.com



**Hands On Plastics™**  
A Scientific Investigation Kit

American Chemistry Council

**Lesson Plans and Background Information on Plastics for Teachers**

Getting Started  
Introduction to Plastics  
Activities

Lesson plans and animated multimedia examples of classroom activities.

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Helps meet  
• Develops  
NMLSTA

Playing with Polymers PowerPoint Available Online

Visit the Hands-On Plastics website at [teachingplastics.org](http://teachingplastics.org) and click the Getting Started link to learn how to get a free kit!





# Chemical Reactions



## Ignite your students interest in chemistry with fireworks!

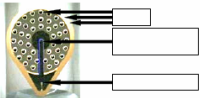
**Design a Firework!** Name \_\_\_\_\_

Watch the video *Fireworks! Making Color* video in class and complete the following information.

- Using metal \_\_\_\_\_, not metals, allow fireworks to burn in different colors.
- What color does each metal salt turn?
 

| Element (Metal Salt) | Color when burned |
|----------------------|-------------------|
| Copper               |                   |
| Strontium            |                   |
| Barium               |                   |
|                      |                   |
|                      |                   |

Watch the video *Fireworks! Lifting Charge* video in class and complete the following information.

- The gunpowder recipe is \_\_\_\_\_% potassium nitrate, \_\_\_\_\_% charcoal and \_\_\_\_\_% sulfur.
- Today, black powder is compressed into marble-sized balls, called \_\_\_\_\_ Stuns are loaded into \_\_\_\_\_ to create fireworks displays.
- Label the parts of a firework.
 
- Types of fireworks made from round shells include \_\_\_\_\_ and \_\_\_\_\_.

L. Bygner 2009

**Fire Quiz**

Go to [one and follow the links "ChemistryMater & Atom" -> "Fireworks" -> answer questions 7 & 8.](#)

Go to page, click on the "Name that Shell" link in the center of the page. Now click on the right hand side of the page "Go to Name that Shell using Quick Time" from the different types of fireworks by clicking on the different video clips. Try to figure out which one is which. When you are finished, exit out of this page.

Go to page, click on the "Anatomy of a Firework" link in the center of the page. Watch a copy of a Firework! flash version. Use your answer to explore the different parts of a firework. An accompanying text for information, and complete the diagram below with the answers you are finished, exit out of this window only.

After viewing video clips and exploring websites, students use their knowledge of elements and compounds to design their own firework.

**Design a Firework!**

Knowledge of fireworks, design a firework that you would like to see made!

Draw a picture of your firework in the air (during explosion). Label the following parts:

- 1) height your firework goes to from the ground to when it explodes
- 2) shape of the explosion (parab? roman candle? waterfall?)
- 3) colors of the firework explosion (copy down in color)

L. Bygner 2009

When you are finished, check your paper with your teacher. After checking, you may visit The Science Spot Edit Zone -> ChemistryMater & Atom -> Chemistry Games and Puzzles to play a game or puzzle of your choice.

L. Bygner 2009

teachers' domain Multimedia Resources for the Classroom and Professional Development

Advanced Search Search User: My Folders My Groups My Courses My Profile Help

Lesson Plan: Igniting Chemistry in Fireworks Recommended for: Grades 6-12

Lesson Standards

**Overview**

Fireworks capture our attention with their beautiful colors and controlled explosions, both of which link directly to fundamental concepts taught in basic chemistry classes. The media resources featured in this lesson provide a visually rich way to tie together spectral chemistry, combustion, and the nature of fire. Students watch a video segment and read text about the color of fireworks (particularly useful when following a chemistry lab in which powders of elements are placed over a flame to observe their spectral emission). They also watch a video segment and do an interactive activity on the mechanics of a firework, which leads to optional interactive activities for those wanting a slightly more advanced chemistry lesson involving chemical reactions. They wrap up by viewing video segments of many different types of fireworks and explaining the principles of chemistry and pyrotechnics that create all their glory.

**Objectives**

- Learn that the specific colors in a firework display are created when atoms of a particular element or a combination of elements are energized by the firework's heat
- Learn that the shape of the firework display is determined by the shape and structure of one particular component inside the firework
- Discover that each component of a firework has a role in the timing, sound, and visual display that make up a firework

Multimedia Resources Used in this Lesson:

- Anatomy of a Firework Flash Interactive
- Fireworks! Lifting Charge QuickTime Video
- Fireworks! Making Color QuickTime Video
- Name That Shell HTML Interactive
- On Fire Flash Interactive
- Pyrotechnically Speaking HTML Document
- Pyrotechnics: It's Elemental HTML Interactive

Save this lesson plan as a Folder

Visit the Teachers' Domain website at <http://www.teachersdomain.org/> for a wealth of resources!



# Chemistry Resources

## Areas to Explore

### Science Classroom

Lessons & activities from my classroom

### Science Club

Project ideas for clubs or classrooms

### Daily Science Trivia

Test your students' science IQ!

### The Nature Center

Learn about our schoolyard garden program

### Reference Desk

Find new resources for your classroom

### Puzzle Corner

Click the link for the Science Classroom on my homepage to explore all my lessons for General Science, Physics, Biology, Forensic Science, and much more!

You'll find a link for Chemistry on the Science Classroom page where you'll find the lessons, resources, and worksheets I've discussed during this presentation.

**The Science Spot**

Home: Science Classroom, Science Club, Nature Center, Science Trivia  
Reference Desk: Puzzle Corner, Idea Factory, Tech Corner, Kid Zone

### The Science Classroom

Cruise through a sampling of my favorite science activities aligned with the Illinois Learning Standards for Science (middle school level). The lessons have been created for use in my middle school classroom with the Prentice Hall science series. You will also find some great lessons submitted by other teachers.

### Topics to Explore

|                 |                 |                  |              |                  |                      |
|-----------------|-----------------|------------------|--------------|------------------|----------------------|
| General Science | Ecology         | <b>Chemistry</b> | Physics      | Astronomy        | Earth Science        |
| Biology         | Adopt-An-Insect | Eagle Days       | Metric Mania | Forensic Science | Digging Into Science |

**The Science Spot**

Home: Science Classroom, Science Club, Nature Center, Science Trivia  
Reference Desk: Puzzle Corner, Idea Factory, Tech Corner, Kid Zone

### Chemistry Lesson Plans

Lessons

- [Case #1225: Christmas Cookie Mystery](#) (Worksheet provided)
- [Christmas Chromatography - Deck the Halls With Science](#) (Worksheet provided)
- [Adopt-An-Element](#) - Internet project (Sites from the [Kid Zone](#)) (Worksheets provided)
- [Atoms Family](#) (Worksheets provided)
- [Element Trading Cards](#) - Internet project (Sites from the [Kid Zone](#)) (Worksheets provided)
- [Periodic Table Basics](#) (Worksheets provided)
- [Bonding Basics](#) (Worksheets provided)
- [Bond with a Classmate](#) (Worksheets provided)
- [Balancing Act - Balancing Equations](#) (Worksheets provided)
- [Playing with Polymers](#) (Worksheets provided)
- [Amazing Marshmallows - Boyle's Law](#) (Worksheet provided)
- [Bursting Balloons - Charles' Law](#) (Worksheet provided)
- [Tasty Solution](#) (Worksheet provided)
- [Messing With Mixtures](#) (Worksheets provided)

Also available ... [Metric Mania](#) - an assortment of lessons and links for the metric system!

Internet & Other Lessons

- [Chemistry Scavenger Hunt \(pdf\)](#) - Internet lesson using the sites listed on the [Chemistry page](#) of the [Kid Zone](#).
- [Periodic Tables Online \(pdf\)](#) - A worksheet I use to review the basics of the periodic table. The sites for this worksheet are listed on the [Chemistry links page](#) of the [Kid Zone](#). NOTE: This is the optional page 2 mentioned in the BrainPOP Periodic Table link below.

# Chemistry Resources

The Science Spot

Home  
Science Classroom  
Science Club  
Nature Center  
Science Trivia

Reference Desk  
Puzzle Corner  
Idea Factory  
Tech Corner  
Kid Zone

### Lesson Plan Links

|                 |                  |           |
|-----------------|------------------|-----------|
| General Science | <b>Chemistry</b> | Biology   |
| Astronomy       | Forensic Science | Genetics  |
| Earth Science   | Physics          | Earth Day |
| Weather         | GPS & GIS        | Ecology   |
|                 | Technology       |           |

A red circle highlights the word "Chemistry" in the Lesson Plan Links section, with a red arrow pointing to it from the right.

Want more resources? Click the link for the **Reference Desk** on my homepage to find a link for the **Lesson Plan Links** area.

Click **Chemistry** to find a collection of links for websites with lesson ideas, activities, and other resources.

The Science Spot

Home  
Science Classroom  
Science Club  
Nature Center  
Science Trivia

Reference Desk  
Puzzle Corner  
Idea Factory  
Tech Corner  
Kid Zone

### Chemistry Lesson Plan Links

[Alka-Seltzer Student Experiments](#) - Five experiments to explore chemical reactions with Alka-Seltzer tablets.

[Amazing Chemistry Teacher Resources](#) - Visit this webpage for a great listing of activities organized by topic. This website also provides management tips, games, puzzles, links, and more!

[Armchair Chemistry](#) - Explore this site for a variety of [activities](#) that can be used to explore topics in chemistry in a middle-school classroom!

[Ask-A-Scientist Archive](#) - Have a chemistry question? Visit this site for an assortment of Q&A's about topics in chemistry.

[AskERIC - EduRef - Chemistry](#) - Visit this site for an assortment of lessons for physical science.

[A To Z Home's Cool Homeschooling - Chemistry Experiments](#) - A fantastic collection of links for great chemistry experiments and sites with brief descriptions!

[Blue Web'n Chemistry](#) - A collection of links for chemistry lessons and activities.

[Cavalcade Publishing](#) - Check out the FREE resources section for labs and lots of great chemistry worksheets! Don't forget to sign up for the [Free Worksheet of the Month!](#)

[Center for Chemistry Education](#) - Visit the [Lesson Exchange](#) area for great ideas for elementary, middle school, and high school!

[Chemical Heritage Foundation](#) - Visit this site for a wide variety of resources to help you incorporate the history of the chemical sciences into your classrooms.

Need links for your students? Visit the [Kid Zone](#)

Click here to support this website [Amazon Honor System](#)

Visit the [Science Classroom](#)

Lessons and activities from my classroom plus ideas shared by other teachers

A red arrow points from the text "Click Chemistry" to the "Chemistry Lesson Plan Links" page.

Alka-Seltzer

Bayer HealthCare

Home Products Effervescent Alka-Seltzer on Español Acid Indigestion & Heartburn Facts Symptoms/Treatments Frequently Asked Questions Student Science Experiments

### Student Science Experiments

Not only does Alka-Seltzer help you to feel better fast, it's also pretty cool to watch!

The familiar fizzing you hear when you drop an Alka-Seltzer tablet into a glass of water is the result of a chemical reaction. It's also the perfect tool for demonstrating some very nifty science principles; things like the factors affecting the rates of **chemical reactions**, or the colors produced by a chemical reaction. The following are some science experiments appropriate for in-school or at-home use.

*All of the experiments must be done in the presence of a parent or teacher.*

**Experiment 1:** [The Effect of Temperature on Rate of Reaction](#)

**Experiment 2:** [The Effect of Particle Size on Rate of Reaction](#)

**Experiment 3:** [The Effect of Concentration of the Reactants](#)

**Experiment 4:** [Factors which effect the rate of chemical reactions](#)

**Experiment 5:** [Chemistry Colors - Mix and Match](#)

**Experiment 6:** [It's Chemical!](#)

**Experiment 7:** [Why does Alka-Seltzer make your upset stomach better?](#)

**Experiment 8:** [Alka Rockets](#)

Alka-Seltzer Plus  
Bayer Global  
Bayer US  
Bayer Consumer Care  
General Conditions of Use  
Privacy Statement  
Imprint

WHERE'S SPEEDY?  
NOW!!

A red arrow points from the text "Click Chemistry" to the "Alka-Seltzer Experiments" page.

Alka-Seltzer Experiments

# Chemistry Resources

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Physics Articles | Physics Projects | Physics News | Physics Links | About PhysicsCentral

**Physics Projects**

- Adopt-a-Physicist
- A New World View
- Century of Physics Timeline
- Color Me Physics
- Einstein@Home
- Einstein's Miracle Year
- Physics@Home
- PhysicsQuest
- PhysicsQuest 2007
- About PhysicsQuest
- Past Projects
- Volunteer
- Physics Talks
- Physics to Go
- Reduced Gravity
- World Year of Physics

### PhysicsQuest 2007: Marie Curie's Floating Classes

Marie Curie was a brilliant scientist who received two Nobel Prizes. She had to fight hard to become a scientist because she was a Polish female growing up in Russian-controlled Warsaw – some of her classes had to constantly change locations to avoid being detected by the police.

This fall take your middle school students back in time to the Warsaw of the late 1800s. Their mission: keep the police from finding Marie's classes by correctly completing four physical science challenges. The challenges center on heat, temperature, and energy.

**Update: 04/03/08**

The kits are in the final assembly stages and will hit the UPS and USPS delivery trucks on December 10.

New timetable for contest:

- 12/12/07: Kits Begin Arriving
- 12/15/07: Results Submission Opens
- 04/14/08: Results Submission Deadline
- 04/18/08: Winners Announced
- 04/21/08: Registration for PhysicsQuest 2008: Nikola Tesla and the White City begins

Downloads (PDF):

- [Materials List](#)
- [PhysicsQuest 2007 Manual](#) (1.2 M) (includes teacher and student guides)
- [Warsaw Map](#)
- [Map Grid Overlay](#)

2007 Resource for Middle School Classrooms

# PhysicsQuest

## Marie Curie's Floating Classes

Sign up for the 2008 Physics Quest Competition at  
<http://www.physicscentral.com/physicsquest/>.

Each year the American Physical Society sponsors this challenge and provides experiment ideas and materials for classrooms.



# Contact Information

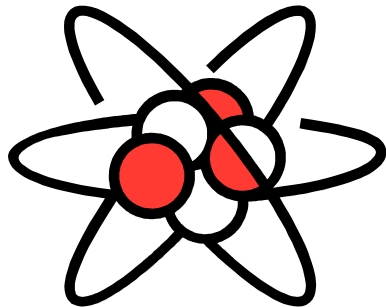


**The Science Spot**

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**Reference Desk**  
**Puzzle Corner**  
**Idea Factory**  
**Tech Corner**  
**Kid Zone**

Visit my website at <http://sciencespot.net/> ➡



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[ttrimpe@sciencespot.net](mailto:ttrimpe@sciencespot.net) ➡