

Firefighter Chemistry

Lesson Title: Firefighter Chemistry Grade Level: 2-5

Purpose: Teach age appropriate skills for fire and life safety while teaching to statewide learning standards.

Materials Needed (Optional):

~~For Demonstration:~~ For Experiment

pH Scale pictures pH experiment supplies

Containment Zone Pictures Water Changing supplies

Standards:

~~Next Generation Science Standards:~~

Science:

[PS1.A: Structure and Properties of Matter](#)

~~—Measurements of a variety of properties~~ can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)

[PS1.B: Chemical Reactions](#)

~~When two or more different substances~~ are mixed, a new substance with different properties may be formed.

Washington State Health and PE Standards

Health:

[H1.Sa1.Ka](#) Identify safety hazards in the home.

Objectives: The students will demonstrate understanding of:

~~—Hazardous Materials~~

Detection

Containment

Neutralization

Prevention/Protection

Safety:

~~Haza~~ Hazards in the Home

Poison and Burn Prevention

Vocabulary:

~~Hazardous Materials-~~ dangerous materials or poisons

~~Neutralization-~~ making something neither negative or positive

Acid- a sour liquid that can burn

Base- a slippery, bitter liquid that can burn

pH- a way to measure if a liquid is safe by seeing how much hydrogen is in it.

Time: 35-45 minutes for presentation and demonstration.



Instructional Content:

Use this bulleted list to guide you and keep you on track and meeting all objectives for lesson. Everyone has their own style for teaching, the most important thing is to make it fun and engaging for the kids.

Warm up Activities: (5-7 Minutes)

o Bell Ringer:

Chemistry Bell Ringer

Have students complete the top portion of the Chemistry Bell Ringer.

o Entrance Ticket:

Ask students to try to define:

Hazardous Materials, Acid, and Base

o Mini KWL:

Ask students to individually make a mini KWL chart about Acids and Bases.

K-What do you already know about Acids and Bases?

W-What do I want to know about Acids and Bases?

Video:

o Follow the link:

http://www.snofire7.org/preparedness_education/home_education_lessons/index.cfm?video_id=8&omo=1_1

Watch Video:

Run time: 25:27

o Have students fill out the worksheet as they watch.

Closure Activities: (5-7 Minutes)

Chemistry Bell Ringer:

Have students complete the exit ticket activity on the Chemistry Bell Ringer Worksheet.

o Exit Ticket: On the bell ringer activity at the top of the first page, see if you connected the terms with the correct picture. If not, draw a line in a different color to the correct picture.

Mini KWL:

Ask students to finish the last column for the KWL chart about Acids and Bases.

L-What did you learn?

Exit Ticket:

Ask students to use what they learned to add more detail to the definitions they wrote at the beginning of class for the following words:

o Hazardous Materials, Acid, and Base

Homework and Enrichment Activities:

Acids and Bases Homework

Mr. Yuk Home Checklist Homework

Mr. Yuk Word Search Homework

Volcano Experiment

Handouts:



Curriculum developed by: Snohomish Regional Fire and Rescue

Firefighter Chemistry Bell Ringer

KWL Chart



NAME: _____

DATE: _____

SCORE: _____

FIREFIGHTER CHEMISTRY

BELL RINGER

Directions: Answer the following questions before watching the video. If you don't know the answer, use your best guess:

Draw a red line from the the vocabulary word to the picture that best matches with the word.

*Hint: some words match with two pictures.

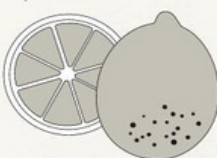
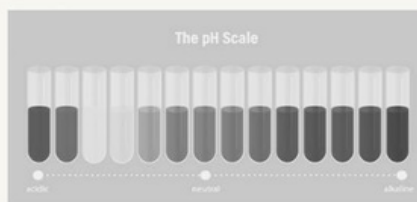
HAZMAT

BASES

DETECTION

PH

ACIDS



Vinegar



Directions: While watching the video, fill in the blanks and answer the questions:

Vocabulary:

_____ refers to hazardous materials, or materials that are really dangerous.

List two types of hazardous materials:

- 1.
- 2.



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Vocabulary:

The process of making something neither positive nor negative is _____.

Some examples of _____ are vinegar and lemons. These are generally sour.

Some examples of _____ are cleaning products like soap, drain cleaner and bleach. These are generally slippery.

The _____ scale shows how acidic or how basic a liquid is.

Hypothesis for pH Experiment: I think...

Hypothesis for the Magic Trick: I think

Describe three ways the Hazmat team stays safe when dealing with hazardous materials:

1. _____
2. _____
3. _____

How can you stay safe from Hazardous Materials?

Exit Ticket: On the bell ringer activity at the top of the first page, see if you connected the terms with the correct picture. If not, draw a line in a different color to the correct picture.



MINI KWL CHART



NAME OF STUDENT:

SUBJECT:

LESSON:

**WHAT I
KNOW:**

**WHAT I
WANT TO
KNOW:**

**WHAT I
LEARNED:**





NAME: _____

pH Scale Coloring Worksheet

Directions: Label each number and item on the scale using the words from the word bank. Write the label by the number then color the scale using the colors listed next to the words in the word bank.

WORD BANK

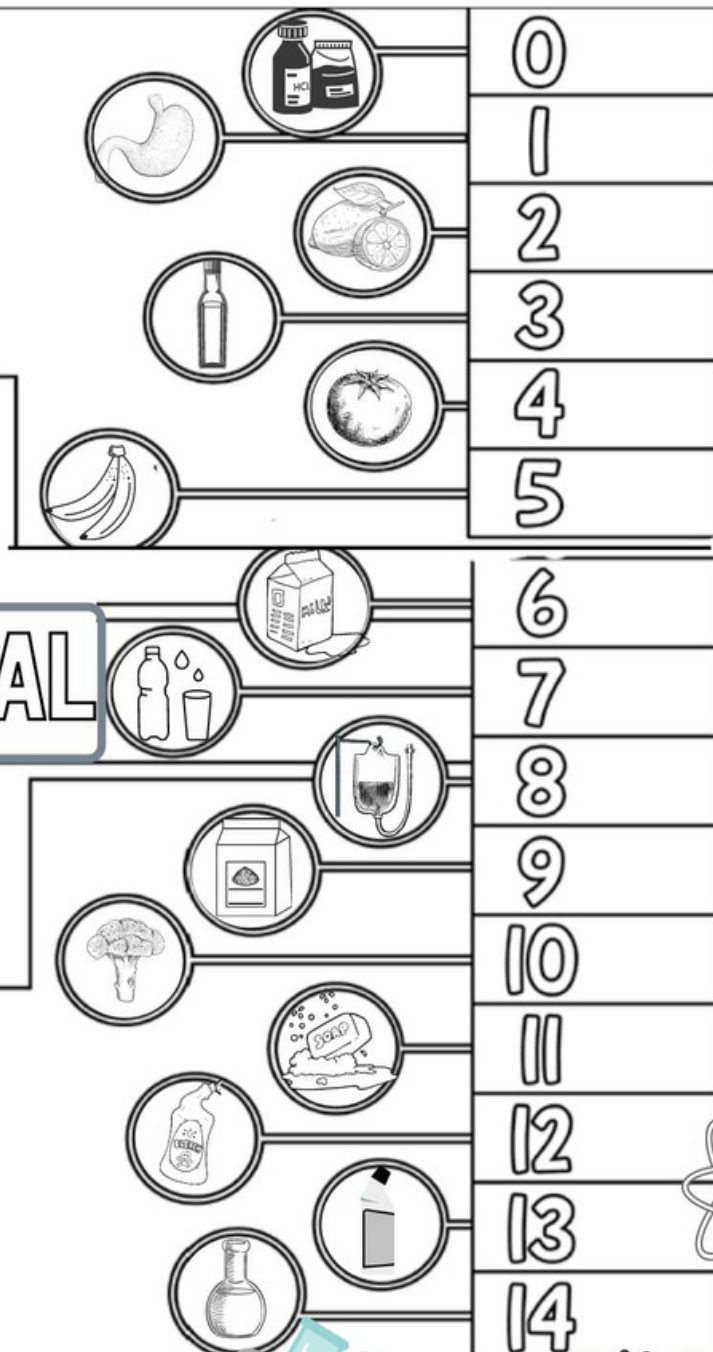
Baking Soda-Teal
Banana-Light Green
Bleach-Light Purple
Broccoli-Light Blue
Drain Cleaner-Purple
Human Blood-Teal
Lemon-Dark Yellow
Milk-Green
Pure Water-Green
Sodium Hydroxide-Dark Purple
Hydrochloric Acid-Red
Stomach Acid-Orange
Tomato-Lime Green
Vinegar-Light Yellow
Soap-Dark Blue

Did you know? Acids turn litmus paper red and bases turn litmus paper blue.

ACIDS

NEUTRAL

BASES



Volcanic Eruption Science Projects

From Home Science Tools

#1: Volcano in a Bottle (Baking Soda + Vinegar)

You can demonstrate the reaction between acids and bases and a volcanic eruption using some simple household items. Kids usually have a great time doing this experiment, and may want to repeat it several times!

To make a big eruption, use a small plastic bottle (the size 20-oz soft drinks come in works well). Fill the bottle halfway (1 to 1.5 cups) of vinegar. To start the eruption, drop a baking soda 'bomb' into the bottle—wrap one tablespoon of baking soda into a small piece of tissue paper, tying the ends with string.

You should see an instant eruption—'lava' will spurt out of the mouth of the bottle. The baking soda, a base, neutralizes the acid in vinegar. This releases carbon dioxide gas, which causes the fizzing action in your volcano.

If you want your volcano to look more realistic, use clay or playdough to make a 'mountain' around the bottle. Or, if you're working outside, you might want to use dirt and pebbles. You can also add red food coloring to the vinegar solution to make it look more like lava.

To learn more about volcanoes, take a look at our [Introduction to Volcanoes Science Lesson](#) (includes two more Volcano Science Projects).

#2: Volcano in a Beaker

You can create an erupting volcano using wax, sand, and water!

What You Need:

400 ml glass beaker

Wax candle (A red or orange candle works best!)

Sand, well rinsed (so as not to cloud the water)

Water

Alcohol burner or alcohol lamp

Matches

Safety goggles

Safety Note: Only use a high-quality glass beaker or liquid measuring cup (such as Pyrex) for this experiment! An ordinary glass jar or drinking glass will likely crack under this amount of heat. Never put a glass container directly onto the stovetop!



What You Do:

1. Light the candle wick and let it burn for about 20 seconds. Carefully tilt the candle over the beaker, dripping wax inside. You'll need 2-3 teaspoons of wax at the bottom of the mug. Blow out the candle.
2. Allow the melted wax to cool and harden. Then pour enough sand into the beaker to cover the wax in a thin layer (about an inch).
3. Carefully fill the beaker up with water, taking care not to disturb the sand. Allow the sand to settle until the water appears clear again (about 30 seconds).
4. Light the alcohol lamp using a wooden match (Or use an alcohol burner for more speedy results!) and wait for the flame to stabilize (about one minute).
5. Place the stand over the alcohol lamp and put the beaker on the stand. Wait for the contents of the beaker to be heated slowly. For the most dramatic results, heat slowly over low heat.
6. As the wax melts, you'll hear a faint hissing sound and see a bulge in the sand layer. Eventually the bulge will erupt, and hot wax will flow through the sand and the water to the top of the beaker.

What Happened:

Volcanoes erupt when red-hot magma seeps up through a vent in the earth's crust. In this experiment, the wax represents magma from the earth's mantle, and the sand represents the earth's crust. The water is where the crust and the air meet. Once a volcano has broken through the earth's crust lava can flow all over the earth, or it can even be forced out into an ocean. When the wax "magma" reaches the water, it becomes "lava." Just as the wax hardened once it reached the water in this experiment, real lava cools and hardens once it reaches earth's surface.

If you want to see the volcanic reaction again, melt a few drops of wax to stick the used wax to the bottom of a clean beaker. Cover with sand and water, then heat slowly as before. The kind of reaction you will get depends on the levels of sand and wax, as well as how slowly or quickly the alcohol lamp melts the wax. Try to keep the heat as steady as you can for a more dramatic result.

Visit the following website, [HomesScienceTools.com](https://learning-center.homesciencetools.com/article/volcanic-eruption-science-project/), for more experiments and activities for kids.

<https://learning-center.homesciencetools.com/article/volcanic-eruption-science-project/>



HOME CHECKLIST ✓

YES

NO



KITCHEN/HOUSEHOLD

1. No household products under the sink unless locked?
2. Medicines off counters and window sills?
3. Food and household products stored separately?
4. Furniture polishes, drain cleaners, lamp oil inaccessible and locked up?



BATHROOM

5. All medicines in a safe place?
6. Old medicines discarded regularly?
7. All safety closures secured properly?
8. Always read labels before using?
9. Bathroom vanity free of harmful products?
10. No beauty/hair care supplies on window sill or ledges?



BEDROOM

11. Medicines kept off dressers and bedside tables?
12. All perfumes, cosmetics and nail care products out of reach?
13. No flaking paint chips on woodwork or furniture?
14. Older child's cosmetics/grooming products safe from younger children?



LAUNDRY/
BASEMENT

15. Soaps, detergents, and cleaners out of reach or in safety-latched cabinet?
16. Disinfectants/deodorizers out of reach or locked up?



GARAGE

17. Carefully read instructions on bug sprays and pesticides?
18. Insecticides, weed killers, and fertilizers locked up?
19. Gasoline and anti-freeze inaccessible/locked up?
20. Paint thinner in original container and out of reach?

SCORE

ONE POINT
for
each
"YES"

19-20 - EXCELLENT - Stay Alert
16-18 - GOOD - But Keep Trying
10-15 - ROOM FOR IMPROVEMENT
0- 9 - ASKING FOR TROUBLE



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Curriculum developed by: Snohomish Regional Fire and Rescue



Mr. Yuk's Poison Word Search

T	S	Y	S	M	B	Q	B	S	P	H	C	I	N	J
W	L	O	V	E	D	U	E	R	Z	M	M	A	O	A
R	H	S	U	A	L	T	W	L	K	R	U	H	I	G
C	Y	U	N	T	O	B	O	N	E	Q	F	E	T	W
W	A	G	N	D	S	L	I	Q	U	I	D	S	N	C
A	E	K	I	M	M	C	S	S	Z	O	F	O	E	M
R	M	T	T	Z	E	Y	M	C	I	T	H	A	V	P
X	N	P	H	X	A	H	D	F	A	V	A	P	E	O
A	F	O	O	R	P	D	L	I	H	C	N	V	R	I
B	Z	F	P	V	J	Y	G	Y	N	C	E	I	P	S
N	F	S	C	Y	H	T	P	E	X	S	H	P	S	O
S	T	N	A	L	P	E	Q	I	Q	E	E	F	I	N
M	R	Y	U	K	B	F	M	P	L	D	K	C	I	S
L	L	I	I	Z	T	A	A	P	V	L	B	C	T	V
D	Z	V	Z	V	W	S	N	E	S	C	S	N	Q	S

Mr. Yuk hid the following words down, across, backwards and diagonally:

ANTIDOTES
 CHILDPROOF
 DANGER
 HELP
 INSECTS
 INVISIBLES
 IPECAC

LIQUIDS
 MRYUK
 PILLS
 PLANTS
 POISON
 PREVENTION
 SAFETY

SICK
 SOAP
 SPRAYS

