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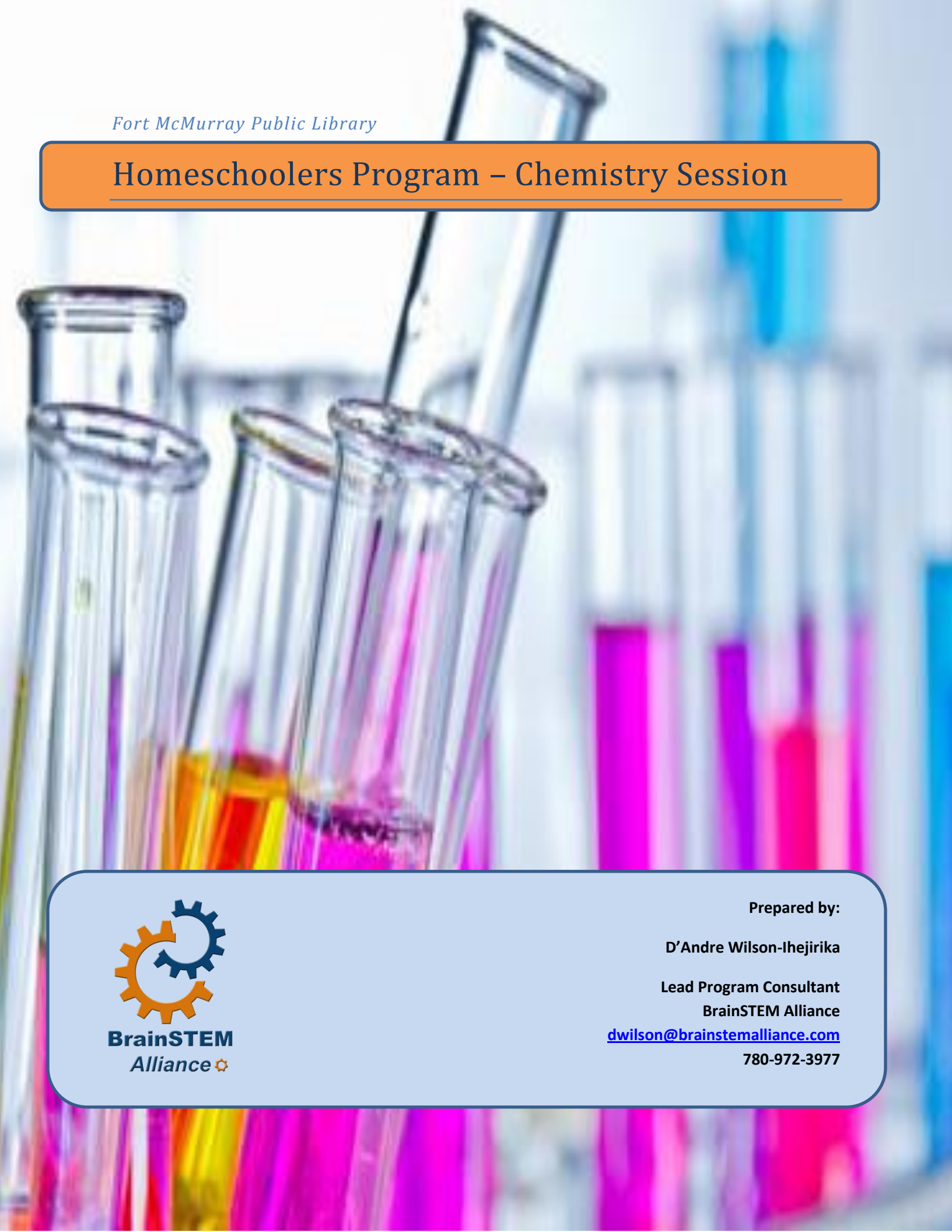
Homeschoolers Program – Chemistry Session



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Acids & Bases

The program is planned to be a total of 2 hours long and will contain 4 individual activities along the theme of Acids and Bases. Target audience is students aged 6-12.

Activity 1 –pH Litmus Test

Time Allotted: 30 minutes

Materials:

- Litmus paper strips (10 per station)
- Vinegar
- Orange juice
- Water
- Baking Soda
- Milk of Magnesia (liquid)
- Plastic cups (5 per station)
- Stirrers/Plastic Spoons
- Paper towels

Method:

1. Before the class, instructor will set 5 cups at each station containing the following:
    a. ¼ cup Water
    b. ¼ cup Vinegar
    c. ¼ cup Milk of Magnesia solution (or if using powder milk of magnesia mix ¼ cup water with 1 tbsp of powder)
    d. ¼ cup of Orange Juice
    e. ¼ cup Water mixed with 1 tbsp of baking soda
2. Place 10 litmus strips at each station
3. Give each student a pH Litmus Test handout
4. Explain to students the difference between acids and bases
5. Allow them to test each cup to see which contains and ACID or a BASE
6. Record findings on handout

Activity 2 – Volcano Reaction

Time Allotted: 20 minutes

Materials

- Plastic Cups (1 per student)
- Stirrers/Plastic Spoons (1 per student)
- Vinegar
- Baking Soda
- Water
- Dish soap
- Food Coloring

Method:

1. Give each student a plastic cup and Volcano reaction handout
2. Measure ½ cup of water and place into cup
3. Add ¼ tbsp. of baking soda to each
4. Add a few drops of dish soap
5. Add food coloring, if desired
6. Mix together in cup
7. Place down newspaper or paper towels because it is going to get a little messy!
8. Add a tbsp. of vinegar
9. Record what happens on the handout

Activity 3 – Marshmallow Molecules

Time Allotted: 30 Minutes

Materials:

- Assorted colored marshmallows (one 10-oz pack per station)
- Toothpicks (approx. 30 per student)
- Marshmallow Molecules Handout

Method:

1. Review the acid-base reaction for volcanos
2. Explain atoms and molecules
3. Using the handout, build models of the molecules in the volcano reaction using marshmallows and toothpicks.

Activity 4 – Microwave Honeycombs

Time allotted: 30 minutes

Reference: http://www.aliciasrecipes.com/Recipe/8237/Microwave-Sponge-Toffee.htm

Materials:

- Sugar
- Corn Syrup
- Vinegar
- Baking Soda
- Food Coloring
- Microwave-Safe Mixing bowls – (one 16 oz bowl per station)
- Stirrers/Plastic Spoons
- Measuring Cups and spoons
- Microwaves (2 or 3 for the class to share)
- Thermometers (1 per station)
- Aluminum foil cupcake trays (1 per station)
- Chocolate syrup - optional

Method:

- Measure ½ cup of sugar and place into mixing bowl
- Measure ½ cup of Corn Syrup and place in mixing bowl
- Measure ½ tbsp. of vinegar and place in mixing bowl
- If desired, add food coloring.
- Mix the ingredients together
- Place bowl in microwave for 2 minutes
- Remove and mix thoroughly
- Repeat twice or until mixture is 300 degrees F (approx.. 150C)
- Pour into cupcake trays and allow to cool
- Remove honeycomb from tray and look at the bubbles inside. Explain that they were formed by carbon dioxide
- Drizzle chocolate syrup on top and enjoy your scientific treat!

Acid – Base pH Litmus Test Handout

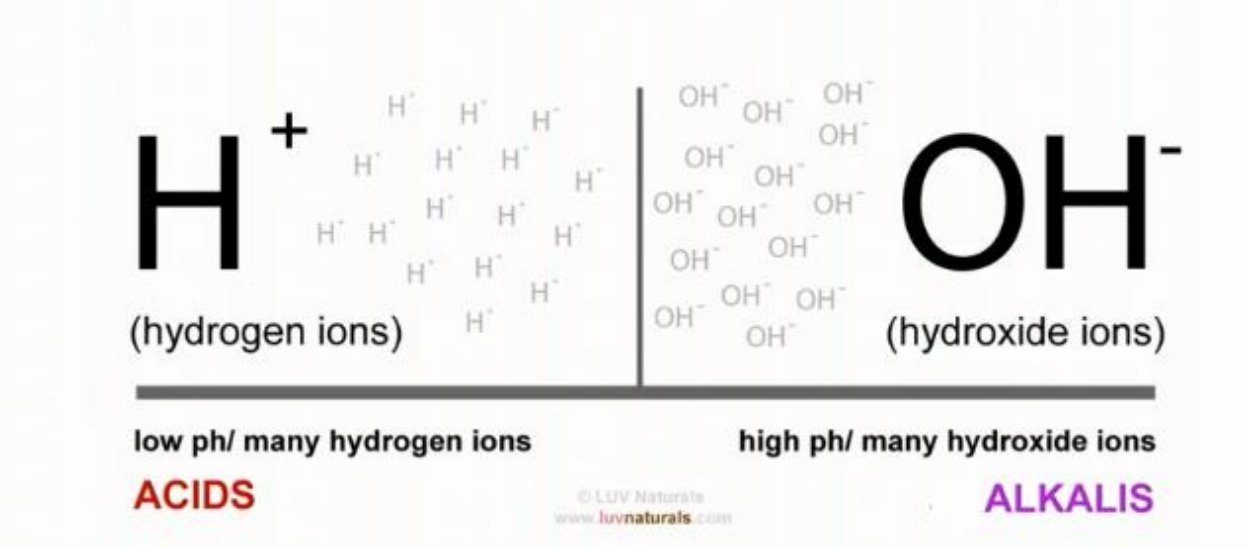
ACIDS and **BASES** are types of chemicals that are reactive.

Acids and Bases have **IONS** which are **ATOMS** that have a positive (+) or negative (-) charge.

The more ACIDIC a substance is the more **H^+ Ions** it has

The more BASIC a substance is the more **OH^- Ions** is has.

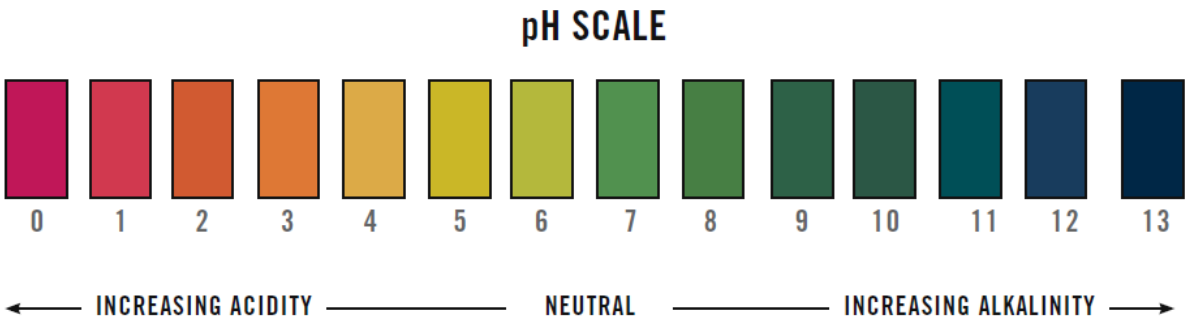
*Bases are also known as ***Alkalis***



When an Acid and a Base are mixed, the H^+ Ions and the OH^- Ions combine to form Water H_2O which is NEUTRAL.

To measure how Acidic or Basic a substance is, we use **pH**.

We can use **Litmus** strips to show us the pH of a substance.



A high pH number (above 7) means the substance is **BASIC.**

A low pH number (below 7) means the substance is **ACIDIC.**

A substance with a pH of exactly 7 is **NEUTRAL**.

Test your substances to see if they are Acidic or Basic.

Substance	**Color of Litmus**	**pH**	**Acidic or Basic?**
Water			
Vinegar			
Milk of magnesia			
Orange Juice			
Baking Soda-water mixture			

Which substance is the MOST Acidic? _____

Which substance is the MOST Basic? _____

Volcano Reaction Handout

What do you observe about the Vinegar?

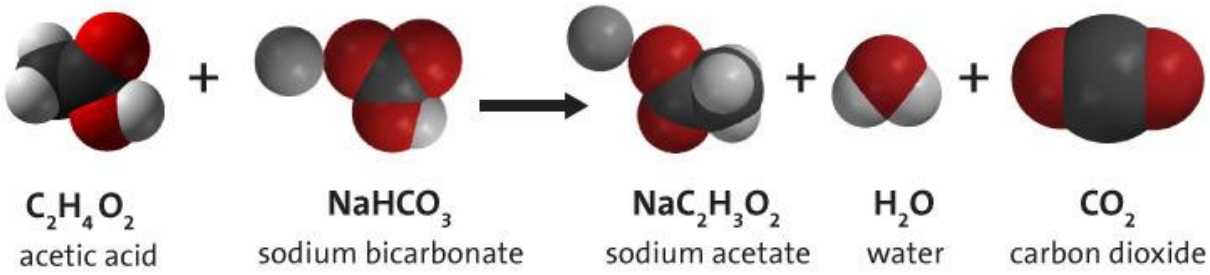
Is it Acidic or Basic?

What do you observe about the Baking Soda?

Is it Acidic or Basic?

What happened when they were mixed together?

Chemical Reaction for Baking Soda and Vinegar



Vinegar (Acetic Acid) is an **ACID**.

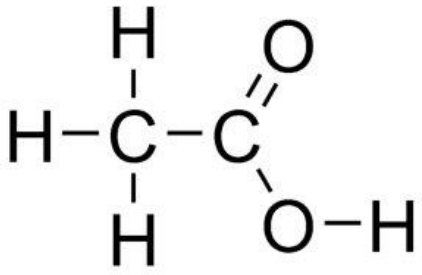
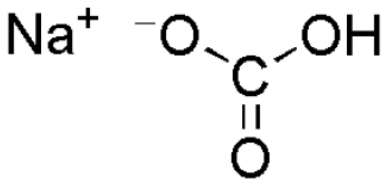
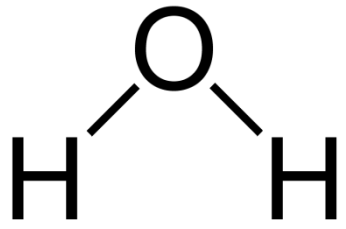
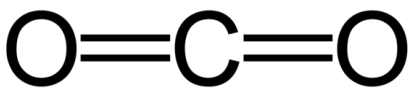
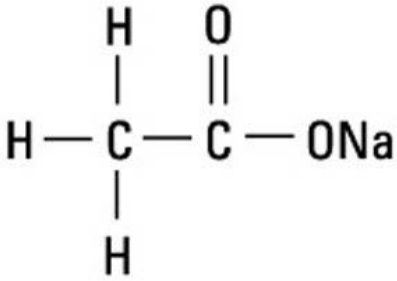
Baking Soda (Sodium Bicarbonate) is a **BASE**.

When they combine they **NEUTRALIZE** each other to form a WATER molecule.

They also produce CARBON DIOXIDE molecules which forms **bubbles**!!

The reason why baking soda is used in baking is because of these bubbles. Which foods do you think need bubbles in them?

Chart of Chemical Formulas

Substance	Chemical Formula	Molecule Diagram
Vinegar (Acetic Acid)	$C_2H_4O_2$	
Baking Soda (Sodium Bicarbonate)	$NaHCO_3$	
Water	H_2O	
Carbon Dioxide	CO_2	
Sodium Acetate	$NaC_2H_3O_2$	

Marshmallow Molecules Color Chart

ATOMS are tiny particles that make up everything around us.

MOLECULES are made up of individual ATOMS which have **BOND**ED together. These molecules can form all kinds of chemicals and substances.

Marshmallow Color	Atom Name	Chemical Symbol
 Yellow	Hydrogen	H
 Orange	Oxygen	O
 Pink	Carbon	C
 Green	Sodium	Na

Using the Marshmallow Color Chart and Chemical Formulas, build the Molecules in the reaction for ***Baking Soda*** *and* ***Vinegar***. Use your toothpicks to form the **BOND**S.

Recap Questions

1. An ACID has a pH _____ 7

2. A BASE has a pH _____ 7

3. An ACID has which IONS in it?

4. A BASE has which IONS in it?

5. When you mix an ACID and a BASE they _____ each other.

6. What do you produce when you mix an ACID and a BASE?

7. When you mix Baking Soda and Vinegar which MOLECULE causes the bubbles to form?

8. What are Molecules made out of?

9. What is the Chemical Formula for a molecule of Water?