



Lesson Plan for “Acids and Bases Experiment”

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Introduction/Background Info

Have you ever noticed that some liquids, like vinegar, taste sour, and some, like dish soap, taste bitter? Their taste can be explained through hydrogen ions.

A hydrogen ion is a molecule that is made when another molecule takes a hydrogen atom’s electron. By figuring out how many ions a chemical makes, we can find its acidity. In other words, acidity is a measure of how many ions a substance produces.

Many household products contain molecules that either create or take hydrogen ions. The amount of hydrogen ions that a material creates or takes is rated on a scale called the pH (**p**otential for **H**ydrogen ions) scale. If a material has a high pH value, the material is called basic, meaning that the material takes up a lot of hydrogen ions, and if it has a low pH value, the material is called acidic, which means that it gives off a lot of hydrogen ions.

Student Objectives

The students will learn about acids and bases by combining them with indicators to find out if a given substance is acidic or basic. The indicators they will be using are pH strips and red cabbage juice, both of which change color depending on the acidity.

Topics

- Acidity
- pH scale
- Physical properties of acids and bases

Overview of Lesson Process

Materials

Clear Plastic Cups (25 count)

Eyedroppers

Lemon Juice (32 oz)

Baking Soda (16 oz)

Vinegar (32 oz)

Water (can be tap water)

Don’t need to take the red cabbage to site; can make juice at planning session.

Red Cabbage

Procedures:

Preparing Solution

Create the red cabbage solution by cutting the cabbage into small pieces and combining them with boiling water. Let the solution sit until it cools to room temperature, then strain the cabbage pieces out.

Experiment Procedure:

1. Getting Materials

First get two empty plastic cups and an eyedropper. Pour red cabbage juice into one of them until it is about a quarter full. Pour water into the other one until it is also about a quarter of the way full. Next, mix enough baking soda into the water that there is a small amount that settles on the bottom.

2. Testing the pH of the water and baking soda.

Pour the red cabbage juice into the baking soda solution.

Does the red cabbage juice change color?

3. Testing the pH of the lemon juice

Next, pour about two ounces of lemon juice into the cup (it should be about one-eighth full).

Use the eyedropper to transfer the lemon juice to the red cabbage juice.

What color is the red cabbage juice solution now?

4. Testing the pH of the vinegar

Finally, get the same amount of vinegar. Use the eyedropper to transfer the vinegar into the red cabbage juice.

What color is the cabbage juice now?

Resources

Background information on lesson plan:

[http://www.mrsec.psu.edu/education/nano-](http://www.mrsec.psu.edu/education/nano-activities/paper/red%20cabbage%20ph%20paper/red%20cabbage%20ph%20paper.pdf)

[activities/paper/red cabbage ph paper/red cabbage ph paper.pdf](http://www.mrsec.psu.edu/education/nano-activities/paper/red%20cabbage%20ph%20paper/red%20cabbage%20ph%20paper.pdf)

<http://chemistry.about.com/od/acidsbase1/a/red-cabbage-ph-indicator.htm>

Videos:

http://www.youtube.com/watch?v=6fc8KBz_I9s

<https://www.youtube.com/watch?v=ni3XRxwTvWQ>

<https://www.youtube.com/watch?v=vrOUdoS2BtQ>

Prices:

Cups:

https://www.google.com/shopping/product/6264101225933158897?q=clear+plastic+cups&rlz=2C1CHWA_enUS0537US0537&es_sm=122&bav=on.2,or.r_cp.r_qf.&bvm=bv.65636070,d.aWw,pv.xjs.s.en_US.JZEkiwT_hsA.O&biw=1364&bih=683&tch=1&ech=1&psi=kJRgU8PIGsKgyAS-gYLoDA.1398838412762.3&ei=IJRgU7WUOcWvyATJ_YCQBQ&ved=0CJcBEKYrMAE

Vinegar: <https://www.google.com/shopping/product/3304603964919695058?q=vinegar+smart+and+final&ved=0CAcQkjA&ei=WZtgU7SnBKTuyQG3y4CQCw>

Lemon Juice:

https://www.google.com/search?q=lemon+juice&rlz=2C1CHWA_enUS0537US0537&oq=lemon+juice&aqs=chrome..69i57j0l5.2506j0j7&sourceid=chrome&es_sm=122&ie=UTF-8#q=lemon+juice&tbm=shop&spd=5229575151489703658

Baking Soda:

https://www.google.com/search?q=baking+powder&rlz=2C1CHWA_enUS0537US0537&oq=baking+powder&aqs=chrome..69i57j0l5.5449j0j7&sourceid=chrome&es_sm=122&ie=UTF-8#q=baking+soda+smart+and+final&tbm=shop&spd=12931024650317997119

Eyedroppers:

http://www.etsy.com/listing/61039480/pipettes-50-pack-eye-droppers-plastic?utm_source=google&utm_medium=product_listing_promoted&utm_campaign=supplies_low&gclid=CLH46aabs74CFQmDfgodkpoADw