

Lesson Plan 3

Maddy Oldham

Location: Garden City Park Elementary

Time of Lesson: 9:20

Time to Call: Sunday between 5-6

Cooperating Teacher: Mr. Contratti

Group Size: 6

Lesson Title: Coloring without Crayons

Grade Level: 4th

Unit: Chemical Reactions

Essential Question: How do acids, bases, and neutral solutions react with each other when combined?

Standards: NYSLs:
CH.S3.1- The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena
E.S1. 3- The central purpose is to develop explanations of natural phenomena in a continuing creative process.

Learning Objectives: Students will be able to:

1. Observe and note physical changes due to a chemical reaction
2. Compare and contrast acids, bases, neutrals
3. Create a hypothesis that draws a conclusion about acids and bases

Vocabulary: Acid: When a substance has a pH lower than 7
Base: When a substance has a pH greater than 7
Neutral: When a substance has a pH of 7
Chemical reaction/change: When a substance is changed into one or more new substances involving the rearrangement of atoms
Physical reaction/change: A usually reversible change in which the form of matter is altered but not transformed into another
pH: Measure of hydrogen ion concentration; less than 7 is acidic and more than 7 is basic
Natural Indicator: Something found naturally that can determine and show (through a color change) whether the substance is an acidic substance or a basic substance

Syntax: “When I combine (solution a) with (solution b) it changes because...”

Prior Knowledge:	<i>For Students:</i> The small group chosen for this lesson have previously sat with me and had an open discussion about acids, bases, neutrals, and pH in general. We watched an informative video for kids explaining acids and bases and had a group discussion to come to terms with the vocabulary. Therefore, they will use their understanding of the concept of acids and bases in order to understand the relationship they share. <i>For Teachers:</i> Teachers should keep in mind that the substances being tested don't have physical properties visible to the eye that indicate whether they are an acid or a base. Therefore, when grouping objects into acid and base categories, the teacher must put great emphasis on the chemical reaction found by the natural indicator as what is bringing them together.
Context for Learning:	Garden City Park Elementary School is part of the New Hyde Park-Garden City Park Union Free School District. It is a part of the suburban community that is not of low economic status. There are 20 students with a variety of levels in the classroom. Several students are pulled out of the room for extra help sessions in reading and math up to 3 times a week. Students are given differentiated homework based on their level of ability. Science is taught 2 periods a week for 40 minutes with an additional STEAM period for 40 minutes (as a special) once a week.
Anticipated Difficulties:	Students may spill solutions and the classroom could get very messy. Teachers must make it clear to students that they need to be careful with the different materials being used. Furthermore, the concept of acid and base is very abstract, so students may have a difficult time conceptualizing it. Teachers should emphasize the use of patterns, how they interact with the substances, and what they notice about them that are similar.
Common Misconceptions:	Acids are incredibly dangerous Bases are safe Indicators are not chemicals
Materials:	-red cabbage juice -vinegar - coffee filters -qtips - liquid droppers -water -windex -orange juice -soap -toothpaste -1 oz. cups and lids -pH scales

-worksheets

Motivation:
(Obj. 1)

First a worksheet is handed out and students are asked to read and make a prediction based on the questions on the worksheet before the lesson begins. The teacher should then ask a student to read the question aloud. Take a tally on the board for all the students to see what each of them thought. This worksheet will be covered again at the end of the instructional activity where students will be asked if they want to change their answer. After students have made a prediction, the teacher will display her cabbage juice and vinegar. She will combine the two into a new cup and the students will observe the change. Then she will do this again, however, she will have window instead of vinegar. After both have been observed, the teacher should tell the students they had two different liquids. Students will then discuss what happened.

1. What happened?
2. Why did the reaction occur as it did?
3. What did we learn about these two liquids?
4. What is the purpose of the red cabbage juice?

Focus:

Now that we've made our predictions and made preliminary observations, let's experiment together to further understand how these different substances mix together. By the end of the lesson, we should be able to understand how acidic, basic, and neutral solutions react with one another.

Instructional Activity:

Students are paired up and presented with 7 cups of different solutions and 8 cups of cabbage juice (1 cup used to compare color), and a worksheet where they can track their results. First, they will predict what color will result from the mixture and if it is an acid or a base. Then, the students will go through each solution and combine it with the red cabbage juice (indicator). They will fill in the box labeled "color" and then compare the solution to a cabbage-indicator pH chart in order to mark down the pH. This will allow students to determine which solutions are acids and which are bases. Teachers may lead students to the discovery of which solutions are acidic and which are basic by asking them:

1. The combined solutions that are now the same color, what did they have in common?
2. How is (solution a) similar to (solution b)?
3. What properties do the solutions share?

Finally, before the assessment, the teacher should circle back to the motivation worksheet. Ask if any students would like to change their answer and if so why?

Assessment:

After completing their artwork, students will be given a reflection sheet and asked to write about their experience in the experiment using a specific group of scientific vocabulary.

Follow Up

Students will then be given coffee filters that are soaked in red cabbage juice. They will be instructed to paint on the filters using the different liquids they were given. In order to get the pictures they want using specific colors, they will need to refer back to the pH chart and their observation sheet.

Why is it important to know what solutions are acids and what solutions are bases?

Sources:

Brooks, J. G., & Fromberg, D. P. (2011). *Big science for growing minds: Constructivist classrooms for young thinkers*. New York: Teachers College Press.

CrashCourse. (2013, April 9). *Acid-Base Reactions in Solution: Crash Course Chemistry #8* [Video file]. Retrieved from

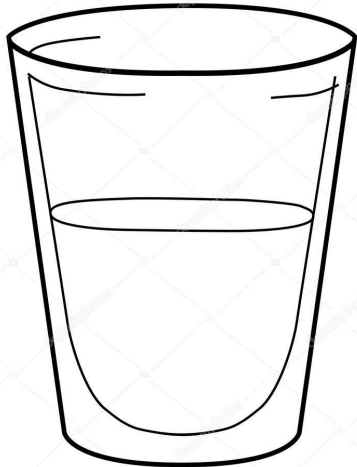
<https://youtu.be/ANi709MYnWg>

MakeMeGenius (2015, March 28) *Acids and Bases- Differences and Definitions* [Video file]. Retrieved from https://youtu.be/WRBcKEkBj_8

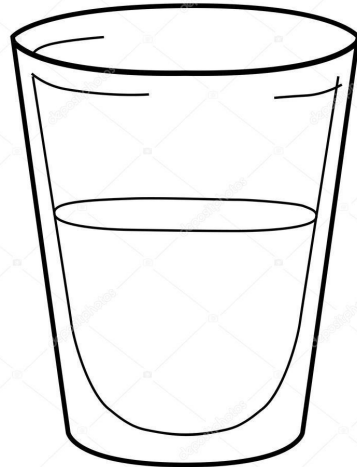
Madeline Oldham and Rebecca Pisano Coloring without crayons lesson plan

HAPPY ACCIDENT?

Marissa had two cups of red cabbage juice and accidentally spilled a clear liquid into one cup. Incredibly, not a moment later, she spilled a different clear liquid into the other cup of cabbage juice. What is going to happen to the mixtures in each of the cups?



Glass 1



Glass 2

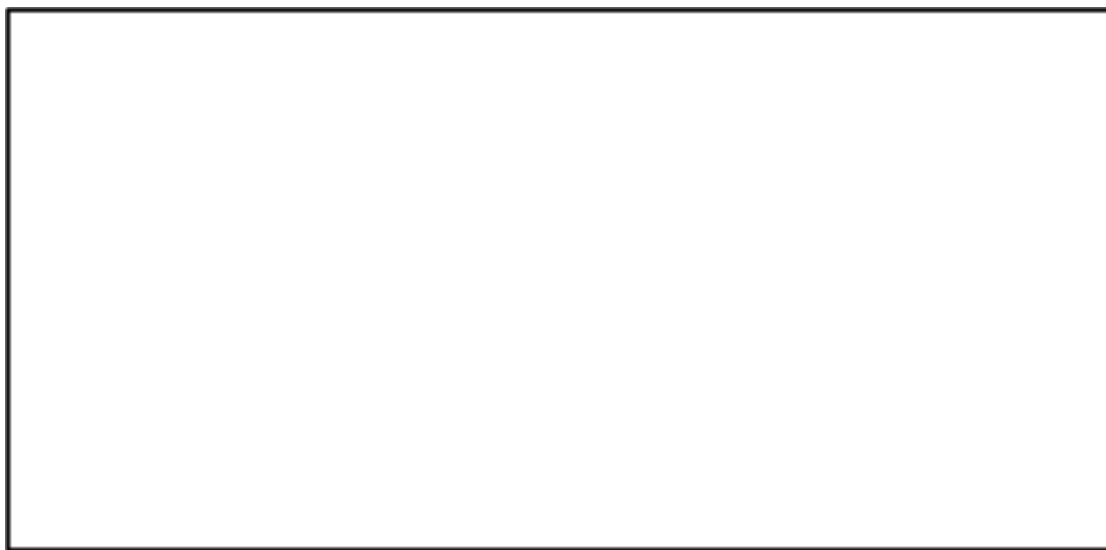
- a. They will change to the same color since they both are clear.
- b. No color change will occur.
- c. They will both turn the color of the cabbage juice
- d. They will change to different colors

Name:-----

Date:-----

Color Without Crayons: Reflect

Wow! What an exciting experiment! Take some time now to reflect upon what happened and what you feel you've learned now. Explain to me why it was important that we did this experiment, what was most interesting, or what was most surprising to you. In your response, make sure to use the word **acid, base, change, neutral, pH, react, change**. Feel free to use the blank space to draw a color and example of what you are discussing.



Name:_____

Date_____

Color Without Crayons: Reflect

Wow! What an exciting experiment! Take some time now to reflect upon what happened and what you feel you've learned now. Explain to me why it was important that we did this experiment, what was most interesting, or what was most surprising to you. Use vocabulary we discussed in today's class throughout your writing.

[illegible]