

Acids, Bases, and pH

5E Lesson

The 5E model is a scientifically proven method to improve student engagement and learning in your classroom

- ✓ Engagement
- ✓ Exploration
- ✓ Explanation
- ✓ Elaborate
- ✓ Evaluate



Complete Teacher Instructions

Acids, Bases, Neutralization, and pH 5E Lesson

Grades 9-11	Acids, Bases, Neutralization, and pH	Ongoing
Lesson Objective: Students will learn about: - The use of hydrochloric acid - pH - Acid examples and properties - Acid precipitation - Effects of acid precipitation - Base examples and properties - Indicators - Neutralization reactions - Salts - Cleaning up chemical spills - Heartburn		
Possible Student Misconceptions: - Acids are more dangerous than bases - Bases are not harmful - Substances are only acidic, basic, or neutral. Most students bases come in degrees of severity		
Materials: 1 device (smartphone, Chromebook, laptop, tablet, or computer) - A means of projecting a PowerPoint presentation - Internet access - Common, household and lab materials for the pH and neutralization reactions		
Teacher Notes: - All videos can be accessed directly from the PowerPoint. To view them, click on the video icon while in slideshow mode and it will automatically open for you. If they don't open, right-click on the image and click Edit Hyperlink or something similar. - I've created a video walkthrough if needed. It can be accessed here - https://youtu.be/oCIKIP9SaDQ - I don't believe in long lessons. If you feel your students are bored, stop the PowerPoint and give them a 5-minute break. If you recommend my video collection here - http://www.teachwithfergy.com/coke-cans-in-acid-and-base/		

Acids, Bases, Neutralization, and pH – 5E Lesson

Engagement Phase

In the engagement phase, your students will watch a brief video that compares the damage that can be done by acids and bases.

The video can be accessed here - <http://www.teachwithfergy.com/coke-cans-in-acid-and-base/>

Prior to watching the video, have your students answer the following question. Which substance do you think will do more damage to the aluminum can, the acid or the base? Explain your answer.

Start the video. While they're watching the video, have your students answer the questions in the file – [Engagement – Video](#).

Teacher Notes:

- The video is two and a half minutes long
- If the video link doesn't work, go to www.youtube.com and type in "Coke cans in acid and base – Periodic Table of Videos"

Exploration Phase

Exploration – Lab Station Activity

- In groups of 2-3, have your students complete [Exploration – Lab Station Activity](#). Once they're done, they will submit their passport to you.

Teacher Notes:

- The complete instructions for my Lab Station activity can be found in the [START HERE – Instructions](#) file.

Explanation Phase

PowerPoint Lesson

- There are two lessons found in the folder – "Explanation – Lessons"
- These lessons are designed to be completed over two days
- There are multiple embedded videos and plenty of opportunity to engage, interact and check for your students' understanding throughout the lessons
- The lessons cover the following topics:
 - The use of hydrochloric acid
 - pH
 - Acids examples and properties
 - Acid precipitation and its effects
 - Base examples and properties
 - Indicators

Duration: 10 - 15 minutes

Teacher Role – Facilitate learning and guide understanding

Goals

- Connect student experiences
- Create interest
- Ask questions
- Understand the of the lesson

Duration: 1 hour

Teacher Role – Facilitate learning and guide understanding

Goals

- Students receive experience with
- Students use an creative thinking
- Students make observations, results, and make connections

Duration: 2 hours

Teacher Role – Explain concepts by presenting material found in the presentation.

- Neutralization reactions
- Salts
- Cleaning up chemical spills
- Heartburn

Goals

- Students develop understanding of the content
- Observations and experiences are discussed and critiqued
- Students develop vocabulary
- Students are able to connect the content presented to previous experiences

Teacher Notes:

- All videos can be accessed directly from the PowerPoints. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If they don't open, right-click the image and select Edit Hyperlink or something similar.
- I've created a video walkthrough if needed. It can be accessed here - <https://youtu.be/oCIKIP9SaDQ>
- I have also enclosed a .PDF version of both the teacher and student versions

Elaborate Phase

There are TWO Elaborate activities. Choose to do one or both.

1) Scavenger Hunt Activity

Your students will complete – [Elaborate – Scavenger Hunt Activity](#). This activity will require your students to move beyond what was covered directly in the lesson and allow them to demonstrate why what they're learning is so applicable and important.

Teacher Notes:

- Students will work in groups of two or three
- Each group will only require a single device (smartphone, tablet, Chromebook, laptop, etc.).

2) Reading

- Your students will complete – [Elaborate – Cleaning Up Acid Spills Reading](#)
- This activity will require your students to move beyond what was covered directly in the lesson and allow them to develop a deeper understanding of the topic and it's applicability

Teacher Notes: Students will work individually or in groups of two

Evaluate Phase

Quiz

- Have your students complete - [Evaluate – pH and Neutralization Lab](#)

Teacher Notes:

- This lab will give your students hands-on experience with pH and neutralization as well as provide you with evidence of their learning

Duration: 1 hour

Teacher Role – Distribute and collect evaluation

Goal

- Students are given the opportunity to demonstrate their understanding and evaluate their own progress

Each phase is clearly described

Two Complete Lessons

Neutralization Reactions

- When an acid reacts with a base
 - pH moves towards 7
 - Double displacement reactions
 - E.g. $\text{HCl}_{(\text{aq})} + \text{NaOH}_{(\text{aq})} \rightarrow \text{HOH}_{(\text{li})} (\text{H}_2\text{O})_{(\text{li})} + \text{NaCl}_{(\text{aq})}$
 - Produces a salt and water
- Acid + Base → Water + Salt

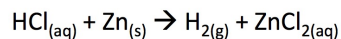
Make sure your students are on track

Student copies with blanks

Videos embedded right into your slideshow

Acids

- _____
- Kills microorganisms that make food go bad
- React with metals to produce Hydrogen
 - Hydrogen is highly combustible!!



Application – Heartburn



Chemistry

Acid and Base Chemistry

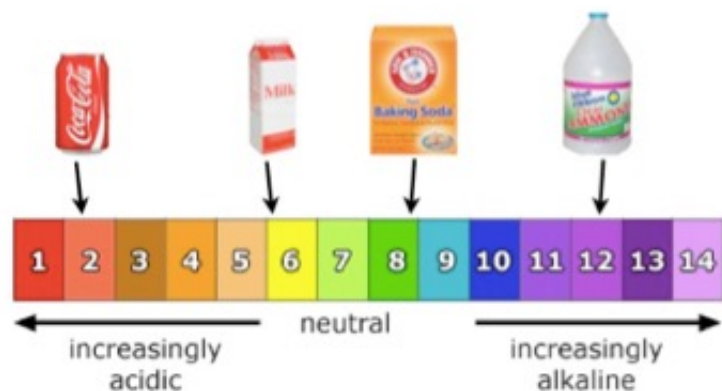
Neutralization Reaction

Chemistry

Acid and Base Chemistry

Includes my Interactive and Engaging Science Reading and Lab Station Activities

Acids, Bases and Neutralization Lab Station Activity



7 Lab Station Activities to get your kids out of their seats and engaged in their learning

Device-Based Scavenger Hunt Acids, Bases and pH

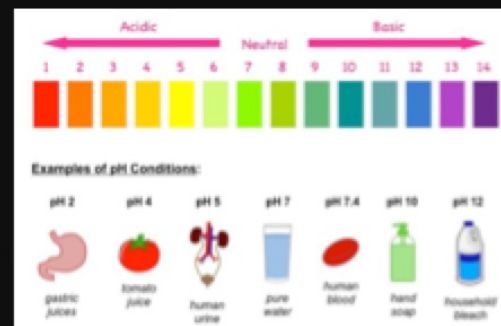


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