



Classroom Teacher Preparation

Chemistry 6: Acid-Base Titration

Please use the following to prepare for the next SfS lesson.

Description:

In this lesson, students will be introduced to the Brønsted-Lowry theory of acids and bases (acids donate a H^+ ion and bases accept the H^+ ion). They will perform a simple titration to neutralize a base with an acid, using a color indicator to determine the endpoint. This lesson is intended for older (7th & 8th grade) students.

Lesson Objectives – SWBAT (“Students Will Be Able To...”):

7th-8th

- Understand that pH is a way to measure the concentration of H^+ ions in solution
- Understand the fundamentals of a titration experiment
- Follow a multi-step, detailed protocol
- Know how to use a pipet

Disciplinary Core Idea (DCI)

PS1 Matter and its Interactions – PS1.B Chemical Reactions

- (6rd-8th) Reacting substances rearrange to form different molecules, but the number of atoms is conserved. Some reactions release energy and others absorb energy.

Science & Engineering Practice (SEP)

Using Mathematics and Computational Thinking

Preparation:

Prior to this lesson, students should know that all matter is made of molecules, and that charged molecules are called ions. In addition, students should understand what a solution is, and should know that in a chemical reaction, matter is conserved such that all atoms present before the reaction are still present after the reaction.

Room Set Up for Activities:

Students will work in pairs or groups of three and will need flat desk space.

Safety:

The reagents are not dangerous, but students should wear gloves to keep the indicator off of their hands.

Related Modules:

This lesson may be taught as part of a sequence or group of related modules on **Chemistry**. Other modules in this sequence include:

Chemistry 11: States of Matter - Students will learn about the three commonly-observed states of matter (solid, liquid, and gas), the most commonly-occurring one (plasma, which makes up the stars), and will observe many of the transitions between them. For older students, this topic is connected to heat transfer and the flow of energy.



Chemistry 14: Viscosity - Students investigate viscosity by using falling sphere viscometers to examine the speed at which a marble drops through tubes of common household liquids with varying viscosities.

Physics 17: Density - The concepts of density and buoyancy are explained, and the students are challenged to construct boats out of aluminum foil that are capable of supporting a heavy load.

For other module sequences and groups, look here: www.sciencefromscientists.org/sequences

Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state:

<http://www.sciencefromscientists.org/standards/>

Lessons are matched to both national NGSS and local state standards.

After Our Visit:

Extend this lesson by making a universal indicator from red cabbage, and then titrating to find out which is more acidic: cream of tartar or vinegar.

Access this Extension activity by visiting the Classroom Post found on our website at sciencefromscientists.org/cohorts. Use the name of your school/cohort and password to log in.

To help Evaluate, check out our Open Response questions online at sciencefromscientists.org/open-response-questions. They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

Additional Resources:

- Crash Course Chemistry #8: Acid Base Reactions in Solutions (video, 11:16):
<https://www.youtube.com/watch?v=ANi709MYnWg>
- SciShow, "Acid, Poop, and Barf: Vultures' Secret Weapons" (video, 3:47):
<https://www.youtube.com/watch?v=ieBhJICxnt8>