



# Cool Chemistry



**Grade Level:** 9<sup>th</sup> – 12<sup>th</sup> Grade

**Approximate Length:** 125 – 180 minutes

## **Objectives:**

- Understand the importance of chemistry in people's lives
- Discuss the importance chemistry in the agriculture industry and how technology plays a role
- Learn about the main elements important for plant growth
- Understand how reactions occur and the relationships with the nutrient cycles

## **Science Standards Available (Teacher will identify which standards to bundle):**

- PS1-1 Valence electrons and properties of elements
- PS1-2 Simple chemical reactions
- PS1-4 Total bond energy change in chemical reactions
- PS1-5 Collision theory and rates of reaction
- PS1-6 Increased products design solution
- PS3-2 Macroscopic energy due to particle position and motion
- PS3-4 The second law of thermodynamics

## **Outline for Program:**

- **Interest Approach (5-10 min):** Students will start the lesson by discussing the main purpose of agriculture... Producing food, fiber and fuel for the world. They will then watch a demonstration, where cutting an apple a certain way shows the usable land on Earth to feed people.
- **Opening Activity (15-20 min):** During this time, students will work as a team in small groups to look at a periodic table and decide which elements are needed for plant growth. Student will circle the needed primary, secondary micronutrients. Then as a whole group we will come together to share our answers.
- **Presentation (45-60 min):** The students will learn about the requirements of plants and how the periodic table plays a key role in their healthy development. The process begins in the soil with cation exchange capacity, pH and mineral formation/ transformation. Students will learn about the Haber-Bosch process, the 4 Rs initiative and even how to balance a fertilizer calculation. Finally, we will explore the Nitrogen cycle together and show the students how important these cycles in nature truly are. This presentation will open the student's eyes to the possibilities in chemistry, making a difference as a consumer or even a career choice.
- **IQhub Scavenger Hunt (45-60 min):** The IQhub is an interactive museum, that will help the students build on topics they have already learned and grab their attention for some new ones as well. Students can work individually or in small groups to explore the IQhub and learn about agriculture and the environment. This museum incorporates Science, Technology, Engineering and Math (STEM) to give students a well-rounded and fun learning experience.
- **Closing Activity (15-30 min):** Depending on the time of the year, student will be able to enjoy a chemistry lab tour at AgroLiquid. This a good way for students to see some chemistry lab equipment and make the connection to the real-world.

## **Additional Resources on YouTube:**

- <https://www.youtube.com/watch?v=0RRVV4Diomg&list=PL8dPuuaLjXtPHzzYuWy6fYEaX9mQQ8oGr&index=5>
- <https://www.youtube.com/watch?v=p1eG2y2mn54>