

Making the Chemistry of the NARA Project Visible

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Introduction

Students often times shy away from chemistry because it is a hard subject to visualize. The NARA project examines the complex conversion of woody biomass to biofuel. The purpose of this lesson was to help students see what is happening during the pretreatment of woody biomass and where in the woody biomass is the cellulose that needs to be extracted to be turned into biofuel.

Objective

For students to be able to visualize and comprehend the chemistry in the pretreatment process that NARA has from converting woody biomass to biofuels. In addition, their energy literacy skills will greatly improve by actively reading a NARA Newsletter regarding the conversion of sugar to biofuel.



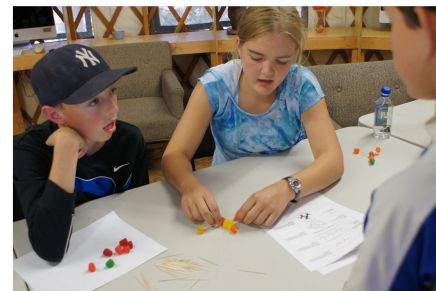
Students read NARA Newsletter regarding the conversion of biomass to biofuel.

Methods

1. Students read the NARA Newsletter given to them that give them the background of the NARA project.
2. Using the given gumdrops, toothpicks, and mini marshmallows, students built key molecules in the pretreatment process which were given on a separate worksheet.
3. After, students answered questions to demonstrate the knowledge they gained about woody biomass and what it was that needed to be extracted to turn it into biofuel.
4. Once they learned all the molecules involved, they were able to explain how they interact with each other and their locations in a plant cell. These molecules being cellulose, lignin, calcium bisulfite, and isobutanol.
5. To conclude the lesson, students had a discussion regarding if the NARA project was a good idea or not and why.



A student looks at the worksheet provided that details the pretreatment process and has pictures of the molecules they were to build.



Students built important molecules out of gumdrops to demonstrate the pretreatment process.

Discussions

In high school, students usually are only exposed to introductory chemistry that might not be enough to fully grasp the complexity of the project. By giving students background information and an activity that demonstrates the chemistry, they proved great comprehension of the project. Using all the knowledge they gained, students were able to make an informed decision about whether the NARA project is beneficial both environmentally and economically and why. Overall, this lesson will help students be able to visualize chemistry for an important real world issue.

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