Lesson Plans

Elementary School Students

Biodiesel and Ethanol

Corn in the Classroom

Lessons include the “Basics of Corn,” “Many Uses of Corn” and “Corn in the Environment.” While entertaining, these educational plans target grade level requirements for Missouri third graders in science, math, social studies and health.

Electric

Open and Closed Circuits

An Energy Ball is a hollow ball that contains a light and a sound device, both of which are attached by wires in series to two metal electrodes that are attached to the outside of the ball as shown in the diagram on the right. When both electrodes are touched by one person or by several people in contact with each other, the circuit is closed and the ball lights and makes a noise. An Energy Ball can be purchased from most science supply stores, by emailing NEED at info@need.org or by calling 800-875-5029.

Hydrogen and Fuel Cell

Hydrogen as Fuel

This lesson is a modular design that you can tailor to suit your class and your time. You can complete the entire lesson in one class period, or use it over several classes. You can also use this lesson in conjunction with the fuel cell lesson, *Fuel Cells for Transportation*.

Hydrogen Car Lesson Plan- *Requires Hydrogen Model Car*

This shows what a fuel cell is; changing chemical energy into electrical energy; electrolysis; and clean alternative ways to generate energy.

Natural Gas and Propane

It’s a Gas - Natural Gas

Students will learn that natural gas is a substance formed over millions of years from decaying ocean plants and animals.

Middle School Students

Biodiesel and Ethanol

Car of the Future

Student teams research and develop a proposal to decrease the carbon footprint of their city's public transportation system through the use of various new technologies and/or alternative fuels. Students prepare a report that explains why their transportation plan is the best one for their community.

Making Ethanol

Students will know that There are reasons why our society needs to consider the use and implementation of alternative fuels; When yeast cells ferment simple sugars (such as glucose), ethanol and carbon dioxide are produced; Ethanol is a renewable fuel and is considered to be “CO2 neutral”; Using ethanol as a fuel is not a new development in our society; it has been used since the late 1800’s on and off throughout history as certain situations have dictated.

Electric

Alternative Fuels Used in Transportation

The projects included in this section are designed to give students the opportunity to create their own investigation and test alternative fuels to discover how they influence transportation. The projects included will fit easily with regular classroom lessons surrounding scientific inquiry and the scientific method.

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Hydrogen and Fuel Cell

H2 Educate!

This school hydrogen unit is designed as a multidisciplinary curriculum with a hands-on science kit, fuel cell simulation equipment, element modeling materials, fuel cell car kit for demonstration, and language arts, social studies, and technology activities. The unit looks at the energy picture in the United States today, the challenges for the future, the role of hydrogen in meeting those challenges, and the scientific basis for hydrogen as a fuel, with an exploration of electrolysis as a method to generate hydrogen.

Car of the Future

Student teams research and develop a proposal to decrease the carbon footprint of their city's public transportation system through the use of various new technologies and/or alternative fuels. Students prepare a report that explains why their transportation plan is the best one for their community.

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High School Students

Biodiesel and Ethanol

Making Biodiesel – Virgin Olive Oil

Making biodiesel, exothermic reactions, products, and reagents

Making Biodiesel – Waste Oil

Utilizing waste cooking oil, titration (acid/base), neutralizing solutions

Biofuels Production and Use

Lessons to help students understand the magnitude of transportation energy use, the process and implications of biofuel production, and the energy displacement potential of biofuels.

Food or Fuel

Students will investigate the relationship between fuel properties and chemical structure by making their own batch of biodiesel from virgin olive oil. The suggested time frame for this lesson is three to four (3-4) 50-minute class periods.

Electric

Energy and Cars: What does the future hold?

Students will understand reasons for attitudes toward fossil fuel use; how these attitudes may affect vehicle technology; and types of alternative energy sources that are currently under research.

Hybrid-Electric Vehicles vs. Gasoline-Powered Vehicles

Students will be comparing hybrid-electric vehicles (HEV) versus gasoline-powered vehicles. They will research the benefits of owning a HEV while also analyzing the cost effectiveness.

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Course Manual on Hydrogen Fuel Cell Engines and Related Technologies

Hydrogen and fuel cell vehicle manual developed by SunLine and College of the Desert (among others) with funding from DOE. It covers hydrogen properties, use, and safety as well as fuel cell technologies, systems, engine design, safety, and maintenance. It also presents the different types of fuel cells and hybrid electric vehicles.

Fuel Cells in Transportation

This lesson is a modular design that you can tailor to suit your class and your time. You can complete the entire lesson in one class period, or use it over several classes. You can also use this lesson in conjunction with the hydrogen lesson, *Hydrogen as Fuel*.

Natural Gas and Propane

Fracturing with Jello

Shale is the most common type of rock found to hold fragments of organic material required to produce oil and gas. Since this material is locked in layers of rock, simply drilling through the formation is not enough to retrieve and release the liquid hydrocarbons. Instead, the rocks must be broken (or fractured) using a highly-pressurized water solution.

Natural gas and Pennsylvania's future

Students will be able to explain the role natural gas in their lives; Define what a hydrocarbon is and where it is found; Describe the difference been conventional and unconventional gas reservoirs; Explain why we frack and what it could mean for the future of Pennsylvania.