Hydrocars





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The Hydrocar kit offers hands-on STEM learning by exploring hydrogen fuel cell technology. Students build and test hydrogen-powered vehicles, developing skills in engineering, chemistry, and renewable energy. This kit encourages creativity, problemsolving, and critical thinking through hands-on projects.



Grade Level

6th - 12th grades

Group Size

Up to 4 students per group

Time Duration

60 - 90 minutes

Content of Kits

Components

4 Hydrocar kits (each with components for assembly)

- Reversible fuel cell
- Small solar panel
- Complete car assembly kit



Usage

Getting Started

1. **Assemble the Car:** Follow the included instructions to assemble the Hydrocar using the kit components.

2. **Generate Hydrogen:** Use the solar panel to power the electrolysis process and produce hydrogen from water. 3. **Power the Car:** Use the produced hydrogen to fuel the car's operation, converting it back into electricity.

4. **Observe and Discuss:** Monitor the car's performance and discuss the implications of hydrogen and solar power in automotive technology.

Storage

Store the kit and all components safely when not in use, preferably in a dry and organized space.

Troubleshooting

- Check that all electrical connections are secure.
- Ensure the solar panel is adequately exposed to sunlight for optimal energy production.
- Inspect for leaks or blockages in the hydrogen fuel system.



Activity Guide

Beginner

Basic Assembly

Students follow step-bystep instructions to assemble the Hydrocar, learning about its components and their function. This activity introduces basic engineering principles and renewable energy concepts.

Intermediate

Hydrogen Production

Students explore the electrolysis process by using solar power to separate water into hydrogen and oxygen. They will analyze how energy is converted and stored, reinforcing key concepts in chemistry and sustainable energy.

Advanced

Efficiency Optimization

Students test variables—such as light intensity, water purity, and temperature—to optimize hydrogen production and fuel efficiency. This hands-on experimentation strengthens problem-solving and analytical skills.

Extension Activities:

Comparative Analysis

Students research and compare the efficiency, emissions, and environmental impact of hydrogen-powered vehicles versus traditional gasoline-powered cars. They will present their findings in reports or presentations, discussing real-world applications of hydrogen fuel technology.



Learning Extensions

STEAM Connections: Engineering - Environmental Science

Learning Objectives:

- Understand the mechanics and benefits of hydrogen fuel cells
- Explore the role of solar energy in producing clean fuel
- Consider the environmental impacts of various fuel sources

Career Connections:

- Alternative Energy Explores renewable energy sources and hydrogen fuel technology, foundational for careers in clean energy development and sustainability.
- **Automotive Engineering** Introduces principles of hydrogen fuel cell technology and vehicle design, relevant to careers in automotive innovation and engineering.
- Environmental Science Develops an understanding of energy efficiency and emissions reduction, essential for careers in environmental research and policy.
- **Sustainable Technology –** Encourages problem-solving in green technology, preparing students for careers in sustainable infrastructure and energy solutions.

Essential Employability Skills:

- Critical thinking,
- Problem-solving,
- Technical skills
- Environmental awareness.





Resources and Accessibility

Safety Guidelines

- Supervise all experiments closely, particularly those involving electrical components and hydrogen.
- Provide safety goggles and gloves to protect against potential splashes during the electrolysis process.

Library Catalog



Library Resources



Feedback

QR to feedback survey



Accessibility

- Modify the assembly process or provide adaptive tools to accommodate students with physical disabilities.
- Ensure that all students have equal opportunity to participate in the assembly and operation of the Hydrocar.