

Hydrogen Knowledge Assessment

Student Objective

The student:

- will know their level of knowledge of hydrogen technology
- will assess what areas to concentrate their studies.

Key Words:

biomass
fuel cell
photovoltaics

Time:

½ class period

Materials:

- Laboratory Manual

Procedure (Introductory Activity)

1. Have the students complete the first set of questions in their Laboratory Manual.
2. Read the correct answers to the class and have them correct their own answers.

Procedure (Follow-up Activity at the end of the unit)

1. Have the students complete the follow-up question set and turn them in. The students should not miss any questions.

Hydrogen Knowledge Assessment

1. A. Hydrogen
2. B. 25%
3. C. 55%
4. A. Water vapor and heat
5. D. Hydrogen and Oxygen
6. D. Burning fossil fuels
7. B. Protons
8. A. Electrolysis
9. C. Hydrogen will be used to provide our power needs
10. D. All of the above
11. B. Hydrogen can be used to create electricity cleanly—with only water and heat as by-products
12. T
13. F
14. F
15. T
16. T

Hydrogen Knowledge Assessment

			.1	.2	.3	.4	.5	.6	.7	.8
Nature of Matter	Standard 1	SC.A.1.4-	X				X			
	Standard 2	SC.A.2.4-								
Energy	Standard 1	SC.B.1.4-	X				X			
	Standard 2	SC.B.2.4-								
How Living Things Interact With Their Environment	Standard 1	SC.G.1.4-								
	Standard 2	SC.G.2.4-					X	X		
The Nature of Science	Standard 1	SC.H.1.4-								
	Standard 2	SC.H.2.4-								
	Standard 3	SC.H.3.4		X				X		

Benchmark SC.A.1.4.1 - The student knows that the electron configuration in atoms determines how a substance reacts and how much energy is involved in its reactions.

Benchmark SC.A.1.4.5 - The student knows that connections form between substances when outer-shell electrons are either transferred or shared between their atoms, changing the properties of substances.

Benchmark SC.B.1.4.1 - The student understands how knowledge of energy is fundamental to all the scientific disciplines.

Benchmark SC.B.1.4.5 - The student knows that each source of energy presents advantages and disadvantages to its use in society.

Benchmark SC.G.2.4.5 - The student understands that the amount of life any environment can support is limited and that human activities can change the flow of energy and reduce the fertility of the Earth.

Benchmark SC.G.2.4.6 - The student knows ways in which humans today are placing their environmental support systems at risk.

Benchmark SC.H.3.4.2 - The student knows that technological problems often create a demand for new scientific knowledge and that new technologies make it possible for scientists to extend their research in a way that advances science.

Benchmark SC.H.3.4.6 - The student knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account.

Hydrogen Knowledge Assessment

biomass - plant material, vegetation, or agricultural waste used as a fuel or energy source.

fuel cell - an electrochemical cell in which the energy of a reaction between a fuel, such as hydrogen, and an oxidant, such as oxygen, is converted directly and continuously into electrical energy

photovoltaics - the process of turning the energy of the sun into electricity by using a solar (photovoltaic) cell

Hydrogen Knowledge Assessment (Introductory Activity)

Multiple Choice. Circle the best answer.

1. Which element has the highest energy content by weight?
 - A. Hydrogen
 - B. Uranium
 - C. Carbon
 - D. Oxygen

2. How much of the global oil supply is consumed in the United States?
 - A. 30%
 - B. 25%
 - C. 15%
 - D. 20%

3. What percent of the oil consumed by the United States is used for transportation?
 - A. 30%
 - B. 10%
 - C. 55%
 - D. 25%

4. What are the by-products of hydrogen fuel cells?
 - A. Water vapor and heat
 - B. Carbon and oxygen
 - C. Exhaust
 - D. Hydrogen vapor

5. What two elements do hydrogen fuel cells combine?
 - A. Oxygen and carbon
 - B. Hydrogen and carbon
 - C. Water and vapor
 - D. Hydrogen and oxygen

6. Which of these cannot be used to produce hydrogen without releasing greenhouse gases?
(Circle all that apply)
 - A. Photovoltaics
 - B. Wind power
 - C. Biomass
 - D. Burning fossil fuels

7. Which particles pass through the fuel cell's membrane?
 - A. Neutrons
 - B. Protons
 - C. Electrons
 - D. Molecules

8. What process uses electricity to separate water molecules into hydrogen and oxygen?
 - A. Electrolysis
 - B. Fissure
 - C. Electrolytes
 - D. Fission

9. What is meant by the 'hydrogen economy'?
 - A. Stocks rise and are said to be "lighter than air"
 - B. Paper money can be produced using hydrogen as the main ingredient
 - C. Hydrogen will be used to provide our power needs
 - D. Shares of hydrogen will be traded on the stock market

10. How is hydrogen produced?
 - A. By using electricity to separate water molecules
 - B. Naturally, using certain types of algae
 - C. By extracting it from natural gas, coal, and other fossil fuels
 - D. All of the above

11. What are the benefits of using hydrogen as a form of energy? (Circle all that are true)
 - A. Hydrogen can be found in the U.S. in pockets concentrated in the Pacific Northwest
 - B. Hydrogen can be used to create electricity cleanly—with only water and heat as byproducts
 - C. Hydrogen powered fuel cells are currently being made out of inexpensive materials
 - D. Hydrogen is currently cheaper to produce than gasoline

Mark the following True (T) or False (F)

12. _____ Fuel cells have been used by NASA to provide power aboard the Space Shuttle.

13. _____ The Hindenburg crashed because the hydrogen onboard was ignited by static electricity.

14. _____ Hydrogen is the heaviest element on earth.

15. _____ Hydrogen can exist as a gas or a liquid.

16. _____ There are many kinds of fuel cells.

Hydrogen Knowledge Assessment (Follow-up Activity)

Multiple Choice. Circle the best answer.

- Which element has the highest energy content by weight?
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