

#9664

OXYGEN

LANDMARK MEDIA, 2001

Grade Levels: 9-12

14 minutes

DESCRIPTION

Lab experiments test for oxygen and show its reaction to iron and carbon.

Academic Standards

Subject Area: Science – Physical Sciences

- ★ Standard: Understands the structure and properties of matter
 - Benchmark: Know that substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties (See Instructional Goals #2, 4, and 6.)
 - Benchmark: Understands that chemical reactions either release or consume energy (i.e., some changes of atomic or molecular configuration require an input of energy, others release energy) (See Instructional Goals #1, 4, 5, and 6.)
 - Benchmark: Knows that chemical reactions can be accelerated by catalysts (e.g., metallic surfaces, enzymes) (See Instructional Goal #3.)

Subject Area: Science – Nature of Science

- ★ Standard: Understands the nature of scientific inquiry
 - Benchmark: Designs and conducts a scientific investigation (e.g., strong beliefs about what should happen in particular circumstances can prevent the detection of other results) (See Instructional Goals #2 and 3.)

INSTRUCTIONAL GOALS

1. To demonstrate the glowing splint test for oxygen.
2. To demonstrate that oxygen is formed when hydrogen peroxide decomposes.
3. To point out the role of manganese dioxide as a catalyst.
4. To demonstrate how iron and carbon burn in oxygen.
5. To point out the difference between an oxidizing agent and a reducing agent.
6. To demonstrate how hydrogen peroxide reduces potassium permanganate.

VOCABULARY

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| 1. apparatus | 6. decomposition |
| 2. carbon | 7. density |
| 3. catalyst | 8. disinfect |
| 4. charcoal | 9. hydrogen peroxide |
| 5. conical flask | 10. iodine |

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|-----------------------|----------------------------|
| 11. manganese dioxide | 15. potassium nitrate |
| 12. oxidizing agent | 16. potassium permanganate |
| 13. petri dish | 17. reducing agent |
| 14. potassium iodide | |

BEFORE SHOWING

- Display a test tube of water and a test tube of hydrogen peroxide.
 - Note that the two liquids have similar physical properties and cannot be distinguished easily.
 - Note what happens when a few drops of hydrogen peroxide is added to a cut or scrape.
 - Explain that although two compounds look the same and are made up of the same elements, their chemical properties can be different.
- List several compounds that contain oxygen.



DURING SHOWING

- View the video more than once, with one showing uninterrupted.
- Pause at the section showing the oxygen being produced in the larger apparatus. Identify the substance at the bottom of the large beaker and explain its purpose.
- Pause at the section showing the glowing splinter being lowered into the beaker to test for oxygen. What does this method reveal about the density of oxygen as compared with air?
- Pause at the section in which the burning charcoal is thrust into the test tube of oxygen. Identify the liquid in the test tube and explain its purpose.

AFTER SHOWING

► Discussion Items and Questions

- What test is used in the chemistry laboratory to test for the presence of oxygen?
- Why wasn't the presence of oxygen detected when the hydrogen peroxide was at room temperature?
- What two compounds are formed when hydrogen peroxide is heated?
- What are chemicals that release oxygen called?
- What is the purpose of the manganese dioxide in this experiment? What happens to the manganese dioxide at the end of the experiment?
- What happens when iron burns in a test tube of oxygen?
- What happens when crystals of potassium nitrate are heated?
- What happens when carbon burns in a test tube of oxygen?
- What happens when hydrogen peroxide is added to a container of potassium iodide?
- What happens when hydrogen peroxide is added to a solution of potassium permanganate? In what way does hydrogen peroxide act as a reducing agent in this reaction?

► Applications and Activities

- Make a chart about oxygen. Include information such as its discovery, physical properties, chemical properties, preparation in the lab, and commercial uses.
- Write a summary of what was observed in each of the experiments in the video.

3. Research other methods of producing oxygen in the laboratory.
4. Report on the discovery and uses of hydrogen peroxide.
5. Research lab experiments in which hydrogen peroxide is used as a reducing agent.
Research experiments in which it is used as an oxidizing agent. Explain oxidation and reduction reactions in terms of gaining and losing electrons.
6. Report on other catalysts used in chemistry labs.

RELATED RESOURCES



- [Carbon Dioxide / Chemical Reaction Rates #9654](#)
- [Hydrogen #9658](#)
- [The Oxygen Story #3279](#)



World Wide Web

The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and "kid safe" sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

• HYDROGEN PEROXIDE (H₂O₂)

<http://www.h2o2-4u.com/>

Contains information about hydrogen peroxide, especially its antiseptic properties.



• OXYGEN

<http://www.webelements.com/webelements/elements/text/O/key.html>

Includes information about oxygen as an element.

• LINKS TO CHEMISTRY EXPERIMENTS

http://www.chemistrycoach.com/Links%20to%20chemistry_experiments.htm

Includes a long list of sites that contain lectures, demonstrations, and experiments related to topics in chemistry.

