

Blank Activity Template

Yellow highlight = required component

Subject Area(s) Physics
Associated Unit Circuits
Associated Lesson Capacitors
Activity Title Build Your Own Capacitor

Header

<p>Image 1 Image file: ___? ADA Description: ___? Source/Rights: Copyright © ___? Caption: ___?</p>
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Grade Level 12 (9-12)

Activity Dependency

Time Required 45 minutes

Group Size 2

Expendable Cost per Group US \$ 5

Summary

Students work to build a basic capacitor by using day-to-day materials. They will learn how an electrolytic capacitor works and how to measure capacitance.

Engineering Connection

Capacitors are one of the most widely used circuit component used by electrical engineers for circuit design. They are used in designing circuit applications ranging from large devices such household appliances to small device such as cell phones. The students need a strong understanding of the working principles behind capacitors.

Engineering Category =

Engineering design process

Keywords

Capacitance, Capacitor, Salt-Water Capacitor, Dielectrics.

Educational Standards

National and State

Texas Science: Subchapter C. High School (9 - 12), Physics (9 - 12):

- (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: (9 - 12)

ITEEA Educational Standard(s)

[ITEEA](#) (provide standard number, grade band, benchmark letter and text):

Pre-Requisite Knowledge

Learning Objectives

After this activity, students should be able to learn about:

- How to build a capacitor.
- To measure capacitance using multi-meter.

Materials List

Each group needs:

- Warm water
- Salt
- Non-metallic vessel (paper cup or plastic bottle)
- Aluminum or tin foil
- Metal object (knife or nail)
- Volt-ohm meter (optional)
- Battery
- To share with the entire class:

Introduction / Motivation

We are surrounded by electricity, electric and electronic devices. Capacitors are necessary components in electronic circuit. Day-to-day electronic devices such as clocks, timers, alarms, cell phones and computers would not be able to function without capacitors. Capacitors are mainly used for energy storage. In this activity, you will have the opportunity to build your own capacitor and measure its capacitance.

Vocabulary / Definitions

Word	Definition

Procedure

Background

Before the Activity

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With the Students

1. Fill a non-metallic vessel (such as a paper cup, or a plastic bottle) with warm saltwater. Use warm water to dissolve the salt.
2. Wrap the outside of the vessel with aluminum foil, or tin foil.
3. Place a metal object (such as a knife, a nail, etc) in the saltwater. Do not allow this metal object to touch the foil. The foil is one terminal, and the nail is the other.
4. You can measure the capacitance of this device with a volt-ohm meter, if you have one.
5. Charge it up, by connecting an electrical current from an ordinary household battery, to both terminals.
6. You have a working capacitor, capable of holding an electric charge.
7. Repeat your experiment but this time increase the salt concentration.

Attachments

Safety Issues

- Do not touch a capacitor after it has been charged by a power source, because it will shock you.

Troubleshooting Tips

Investigating Questions

Assessment

Pre-Activity Assessment

Descriptive Title: Question: Ask the students about possible uses of capacitors.

Activity Embedded Assessment

Descriptive Title: None

Post-Activity Assessment

Descriptive Title: Question: Ask the students to describe what happened to the capacitance when the salt concentration was increased, and why it is happening.

Activity Extensions

Activity Scaling

- For lower grades, ___?
- For upper grades, ___?

Additional Multimedia Support

References

Other

Redirect URL

Contributors

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Supporting Program

National Science Foundation GK-12 Program, University of Houston

Acknowledgements

Classroom Testing Information