

**Title:** Oxidation-Reduction

**Subject:** Chemistry

**Grades:** 10-12

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**Lesson Plan Summary:** In this lesson plan, students will learn about the chemical processes of oxidation and reduction by viewing a PowerPoint, performing a creative demonstration of the process using balloons and labels, and conducting an experiment in which a penny is placed in a mixture of copper sulfate for 30 minutes.

**Objectives:**

The student is expected to:

- Identify oxidation-reduction processes **§112.45 Chemistry (10)(A).**
- Demonstrate and document the effects of a corrosion process and evaluate the process of electroplating metals **§112.45 Chemistry (10)(B).**

**Materials:**

- 6 V battery
- 2 M copper sulfate solution
- 2 alligator clips
- 1¢ coin
- A 250 ml beaker
- A clip (an iron nail may be used)

Examples of metal oxidation on TIDES:

<http://tides.sfasu.edu:2006/cdm4/results.php?CISOOP1=all&CISOBOX1=&CISOFIELD1=CISOSEARCHALL&CISOOP2=exact&CISOBOX2=&CISOFIELD2=CISOSEARCHALL&CISOOP3=any&CISOBOX3=sfm88%20163%20146%20sfm66%2045%20sfm79%20sfm52%20sfm110%20sfm6%20padlock&CISOFIELD3=CISOSEARCHALL&CISOOP4=none&CISOBOX4=SFM9%20SFM98%20glass%20clay%20rifle%20cradle%20stone%20churn%20&CISOFIELD4=CISOSEARCHALL&CISOROOT=/StoneFort&t=a>

**Procedure:**

Introduction

- Start the class by asking the students to place any pennies they might have on their desks. Allow the students to display their coins and vote on which coin is the shiniest.
- Show the PowerPoint presentation “Oxidation-Reduction.”
- Ask the students to describe the differences between the coin on the first slide and the one in your own hand.
- Explain the process of corrosion by chemical means.
- Explain the processes of oxidation and reduction.
- Allow students to complete the following experiment, which will reinforce and demonstrate the oxidation-reduction process.

**Experiment 1**

- **Oxidation-Reduction Demonstration**

- Create five big labels: battery, anode, anion, cation and cathode. Choose five students and ask them to each paste a different label with masking tape on themselves.
- Label four balloons with “electrons” in each one.
- Give the student labeled “battery” all four balloons.
- The battery student will give a balloon to the anode, who will pass it to the anion, who will pass it to the cation, who will pass it to the cathode, who will return it to the battery. The pattern will then begin again.
- Explain to the students that this pattern mimics the way electricity flows and the way Oxidation-Reduction occurs – there is always an atom that takes electrons (balloons) from another atom that gives them.

## **Experiment 2**

- **Laboratory Demonstration practice: Oxidation-Reduction**

**Objectives:** Identify oxidation-reduction processes.  
Observe electroplating process.

**Procedure:**

- Pour into the beaker 100 ml of copper sulfate.
- Place one alligator clip on the (+) side of the battery and the other on the (-) side of the battery. Tell the students to take care that they do NOT take both clips from the metallic section at the same time, or they will electrocute themselves.
- Place the 1¢ coin in the positive electrode and place it in the solution.
- Place the clip in the negative electrode and place it in the solution.
- Wait about 30 minutes.
- CAREFULLY disconnect the alligator clips.
- Remove the clip from the solution and observe its copper coat.