

John Savage
UC Berkeley
ETP Type: Create a New Lesson
Subject Area: Honors Chemistry
Stephanie Ruzicka
6/23/16

Using Electroplating to Study Properties of Metals

0. Abstract

Students will compare the strengths of oxidizing and reducing agents, and determine resistance to different etching solutions. Students will work in small groups, developing laboratory skills while conducting a lab on electroplating. Students will present their findings in a formal abstract writeup.

I. Standards/Skills/Objectives/Assessment

1. Focal Standard or Skill:

NGSS HS-PS-2-6
Communicate scientific and technical information about why the molecular-level structure is important to the functioning of designed materials.

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2. Measurable Objective(s):

Students will measure mass differences in different samples of metals when they are exposed to different voltages and currents.

Students will communicate their results in a formal lab abstract writeup.

3. Assessment:

Students will write up an abstract of their laboratory work. Their work will be graded using a rubric.

II. Fellowship Connections

1. 21st Century Skill(s):

Develop, implement and communicate new ideas to others effectively

2. 21st Century Skill(s) Application:

These skills will be used following the lesson as students will write up their findings in a formal abstract. In the abstract, the students will be summarizing their work in the lab, succinctly explaining the purpose, outlining their procedure, and summarizing their results and analysis.

3. Fellowship Description:

In this fellowship, we prepared different metal alloy samples to study under different forms of microscopes to determine their microstructure. To do so, we grined and polished the samples, then etched them. We used a variety of laboratory skills. Dr. Hosemann is interested in structural materials for nuclear applications.

4. Fellowship Connection to School/Classroom:

I plan on showing my students how simple lab techniques can be used to understand the microstructure of metals, and how those microstructures can lead to significantly different structural properties of the metals. This will be discussed when we are studying the different types of chemical compounds and how we can plate different metals in the electrochemistry unit.

III. Instruction

1. Instructional Plan:

One 90 minute block.
Students will conduct a lab studying how different metals react to different solutions.

Students will work in small groups answering warm up questions asking them to draw a basic galvanic cell, labeling appropriate parts, and then determine the voltage under standard conditions.

Details on drawing: Electrodes: aluminum and copper, solutions: aluminum nitrate and copper nitrate, must include salt bridge, expected voltage, direction of current.

I will outline the purpose of electrolysis, how it works and why it was pertinent to my summer work (see fellowship description above). Helps identify metals, removing of small amounts of metal allows for further imaging work to be done.

Teacher will review in small groups the work the students have done.

Students will complete lab, working in groups of 3 or smaller.

Assessment: Students will complete a laboratory abstract in addition to filling out their lab notebook during the activity. The abstract will be graded as described within the rubric.

2. Additional Instructional Context:

Within this unit, the students will be studying electrochemistry. They will construct simple batteries, learn how to plate metals, and understand how electrons can flow from different substances. The unit will culminate in the study of modern batteries and students will be able to explain why and how modern batteries work.

3. Supply List:

Lab materials (list found in lab)
Lab abstract rubric
Lab procedure
Standard Reduction Potential Table

4. Bibliography:

Tang, Gabriel. "Lab 10: Honours Chemistry." *High School Chemistry and Mathematics*. N.p., n.d. Web. 05 July 2016

5. Keywords:

Electrochemistry, abstract, batteries, electroplating, laboratory, hands-on, lab report, high school, chemistry, honors.

IV. Attachments

Lab
Lab Key
Lab Abstract
Lab Abstract Rubric
Standard Reduction Table