

- 1) Topic: Electrochemistry
- 2) Time Allotted for Lesson: One 41-minute class
- 3) Materials Needed: Zn, ZnO, 3M NaOH, hot plates, beakers 0.3 M HCl (for cleanup), copper pennies (washed in vinegar), tongs, bunsen burner, worksheets
- 4) Prior Knowledge Students Will Need:
 - a. Basic chemistry, compounds, elements, charges, electrons,
 - b. Balancing equations
- 5) Learning Goals/Objectives – Students will be able to:
 - a. Be familiar with ionic solutions, and flow of electrons in ionic solutions
 - b. Become familiar with electrolytes, be able to recognize differences between strong and weak electrolytes
 - c. Be able to state conditions that allow flow of electrons in a solution
 - d. Be able to understand how heat makes unfavorable processes/reactions favorable or slow processes/reactions fast
- 6) NJCCCS Addressed:
 - a. 5.1.8.C1-2; 5.1.8.D.1,3; 5.2.8.A.1-4; 5.2.8.B.1-2
- 7) Activities and Procedures:
 - a. Warm-up Discussion (15 minutes)
 - i. Ask students what are electrons, protons and what charges they carry
 - ii. Discuss with students what are ions, electrolytes (strong vs. weak)
 - iii. Discuss with students what are ionic solutions and how they allow electrons to flow
 - iv. Ask students what is electricity, what is current
 - b. Zinc plating of copper pennies activity (20 minutes)
 - i. 3M NaOH should be made prior to class and the pennies should be washed in vinegar (soak them over night in vinegar) to remove contaminants that will prevent even plating
 - ii. Split class into groups of 3 or 4 students
 - iii. Each group will receive a penny for each member to turn into GOLD!!!
 - iv. Read instructions out loud and demonstrate an example. Caution students about fire safety!
 - v. Have students proceed with activity assisting them throughout the duration of the activity.
 - c. Wrap-up (6 minutes)
 - i. Ask students why the zinc covered the surface of the penny.
 - ii. Relate the electrochemistry to the human body, neurotransmission etc.
 - iii. Discuss with students why the solution was heated
 - iv. Discuss safety. Reduced zinc oxide is safe when wet but can spontaneously ignite when dry
- 8) Accommodations Made for Students with Disabilities and/or ELLs:
 - a. Translate worksheets if needed for ELLs
- 9) Assessment: Observe in-class response, evaluate worksheets, evaluate experimental techniques