

An Electric Idea: Problem Handouts



This work by Ruth Lawrie is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).

As an open educational resource, feel free to modify and distribute this work under the conditions stated by the Creative Commons license. Originally developed as a part of the [PBL Clearinghouse](https://pblclearinghouse.org/) at the University of Delaware.



An Electric Idea

Problem Statement



Ms. Livewire's chemistry students are very interested in today's cool demo. A coil of copper wire placed in a solution of silver nitrate. Tiny bits of silver fuzz collect on the copper wire while the solution gradually turned blue. Ms. Livewire explains that this is a redox reaction and the class learns about electron transfer. Tony is convinced that he can use this process to make some extra money.

"Stands to reason," he says to the others after class, "if you put a piece of cheap copper jewelry in the silver solution you could silver-plate it. Maybe I could even get a solution of a gold salt. An easy way to make some cash."

Jenny is less certain. "The silver didn't settle on the surface of the copper," she argues. "It was just a fuzz, and it fell off as soon as I tapped the test tube. Your jewelry won't make much money if the plating just flakes off."

"Jewelry doesn't interest me," says Ethan. "That reaction involves a transfer of electrons, which means an electric current, right? I wonder if I could find a way to make my own batteries for my MP3 player. That would save me some money."

"I think we need to find out more about the process," says Jenny. "Let's meet at the library this afternoon and see what we can find out."

Questions

1. What is redox reaction and how does electron transfer occur? Write equations for both the half reactions and the overall redox process occurring in the demonstration.
2. Can Tony use this process to plate jewelry? How does Ms. Livewire's demonstration differ from the process used in electroplating? What advice will you give Tony?
3. Will Ethan be able to use this reaction to make a battery? What equipment will he need and what questions does he need to consider?