

Activity Series Laboratory: Tom Pratuch

Teacher's Guide

Goals

- To learn about the activity series of metals
- To make small scale batteries which give off currents

The Laboratory

The students make little batteries from metals immersed in their ionic solutions, and connected by salt bridges. They measure which connections yield electricity and construct from this the electrochemical series, which they compare to the literature.

Materials for Each Group

- Well plate
- Filter paper and scissors
- Pieces of solid metals: Cu, Pb, Mg, Al, Ni, Zn, Fe, and carbon
- Ionic solutions of these metals (~0.5 M is sufficient)
- Quinone in 1M HCl for the carbon electrode
- Ampermeter/multimeter and crocodile wires

SAFETY

Wear goggles, aprons, and gloves at all times.

Some of the metals are harmful—do not touch with bare hands.

Dispose of all metal solutions into appropriate chemical waste container for safe removal.

Lecture Notes

Make sure that you use all safety supplies.

Make sure that you don't put metals in solution before you start measuring.

Compare your results to the potential list in your textbook and see whether you got the electrochemical series correct.

Conduct a discussion of the results: their meaning and causes for discrepancies.

Teaching Tips From Mr. Pratuch

We saw two classes. One class nailed the activity series perfectly. The other botched the activity series.

We found out from talking with some of the students that it's the wires they made the connections with. That's the only way that we could interpret the results that they got.

But the point is that it's an explanation that we could look for, it was something we could talk about, which made sense.

To me that was important on two levels: one, that we could establish that there was not the flaw of the chemistry, which students are all the time willing to say. But equally important, we got them away from judging if it's right or wrong on their part...and to look for a systematic error.

Activity Series Laboratory: Teacher's Guide, page 2

Discuss with the students the activity's discrepant results.

Even if the results are not always consistent, try to make sense out of it. Which metal appears to be the most reactive one? Which is the least reactive?

When getting into sources of errors, try to stay away from right and wrong.

Emphasize that you are doing right so long as you are taking your data the way it occurs and you are recording your data.

The chart that we have created from this data in this class is completely reversed.

Today, some things contributed to a regular error, no matter which group it was.

You are trying to get away with right and wrong and I'm trying to go with: Are the instructions to this lab adequate?

References: Links

<http://chemed.chem.purdue.edu/genchem/topicreview/bp/ch20/electroframe.htm>
Excellent resource on electrochemical reactions, with classroom activities.

References: Readings

Schmidt, M.H. (1997) "Using 'Household Chemistry Projects' To Develop Research Skills and To Teach Scientific Writing," *Journal of Chemical Education*, Vol. 74, No. 4, pp: 393-395.