

TEACHER GUIDE for Demo/Lab: Rusting Wool

(Please read comments throughout and teacher notes at the end)

***Note:** This can be done as a teacher demonstration or a lab, depending on how much time you and what you want your students to experience.*

Purpose

This demo/lab is designed to allow students to “observe” the process of oxidation (in this case, iron rusting due to oxygen).



Materials Needed

- Steel wool (size 0000, soap free)*
- Petri dish or small shallow bowl with a flat bottom
- 3 equally sized bottle caps
- Plastic 400ml (or so) graduated cylinder (or plastic bottle with label taken off)
- Bendable straw or rubber tube
- Dry erase marker or wax pencil

*Steel wool of this size can be most easily found at a hardware or paint store – just make sure it doesn't have any added cleaners, and the finer the better (try for the kind that looks like fine hair)

Background

Steel is a metal alloy, made up of a mixture of iron and carbon. This combination makes it stronger than pure iron and its applications are many. Steel wool, used primarily for cleaning and polishing, is made up of small steel filaments and is made with even less carbon than industrial steel. This makes it ideal for this kind of demonstration.

Oxidation occurs in many different ways, but often happens on a timescale that is hard to see in the classroom. The process is defined by the loss of at least one electron when two substances interact. In this particular experiment, water oxidizes the steel wool to produce rust (on a timescale students can appreciate).

Hypothesis

When the steel wool is placed in the graduated cylinder and inverted over water, the steel wool will rust and the water level will rise, indicating that the oxygen from the water has been used in the oxidation reaction (the rusting).

Procedure

1. Pull the filaments of the steel wool apart so that more of the steel surface is exposed.
2. Run the wool under tap water and shake off any excess water.
3. Push the steel wool to the bottom of the graduated cylinder or bottle, making sure it will stay in place when the cylinder is inverted. Try to make sure the wool stays as “fluffy” as possible.
4. Fill the petri dish (or shallow bowl) with tap water (you can choose the amount based on the size of the dish).
5. Place the bottle caps in a triangle formation in the water.
6. Invert the graduated cylinder onto the bottle caps in the petri dish, and make sure it is balanced. The end of the graduated cylinder should be under water. If the level of the water in the graduated cylinder doesn't match that of the water in the bowl, use a bendy straw or rubber tube to adjust the level (either by removing air from inside the bottle or by adding water- removing air is easier!).
7. Use your wax pencil or dry erase marker to mark the level of the water in the cylinder (or just note the volumetric marking on the cylinder).
8. Let your demo run for 48 hours, marking the change in water level as often as you wish.