

STAO 2011: Rusty iron balls

Those who attended STAO 2011 might remember the smashing rusty iron balls at the STAO Committee booth. In fact, several hundred pounds of rusty iron balls were given out with money raised going towards Toronto's Hospital for Sick Children. Only at a science conference would distribution of rusty iron balls be so well-received.

The balls started off as a donation by Goldcorp Inc. Red Lake Gold Mines, Balmertown in northern Ontario. Kaila Erb drove these balls 1,925 km to southern Ontario. Then Dan Eberwein and Herman Proper stored and brought them to hand out at their STAO booth with additional help from Karen Dodds and Stan Taylor.

The demonstration is easy. Smashing the balls together with one wrapped in aluminum foil creates a thermite reaction that can be done safely and easily indoors. With sparks flying, students will be motivated to ask "How does that work?"

The reaction is a highly exothermic, single displacement reaction. The rust reacts with the aluminum foil to produce aluminum oxide, elemental iron and heat. The demonstration can be used at almost every grade level in high school. Possible teaching concepts would include

- exothermic reaction
- single displacement
- balanced chemical equations
- activation energy
- oxidation and reduction

This is a great demonstration for many reasons. Not only do the sparks fly, it has to be one of the easiest demonstrations to prepare — and these balls can be used repeatedly.

STAO has helpful demonstration notes available online. <http://www.STAO.ca/scienceworks/survival-optics/StoreResources/RustyIronBallDemonstration.doc> These notes cover the procedure, possible teaching concepts and safety precautions. For example, safety goggles are recommended as sparks can shoot metres away. The notes also review how to "treat" the balls to ensure they remain rusty and ready to go.

Flinn Scientific Inc. sells this type of rusty iron ball. A posted ChemFax called *Smashing Thermite Reaction* also offers a good description of the demonstration. On Flinn notes, the smashing iron ball is strictly recommended as a teacher demonstration. <http://www.flinnsci.com/Documents/demoPDFs/Chemistry/CF10503.pdf>

Note: This demonstration was first presented at BCCE 2000, University of Michigan, Ann Arbor MI by Larry Peck, Texas A&M University, College Station TX. [JLH]



Brent Brook-Allred took this photograph capturing the sparks of the reaction. Pictured is Karen Dodds, Annprior District High School, Annprior ON.

An unusual and simply prepared compound of copper, photo from pages 6-7

The yellow compound is the copper(I) product synthesised. The black material is the *product* after it has been heated in a dry test tube.

