

Hand Blasters

Activation Energy



Introduction

Hand Blasters are two coated ceramic balls that produce a loud bang when they collide. They can be used in a science class to illustrate the process of inquiry. This activity will require one to several pairs of Hand Blasters and a selection of other balls and objects.

Concepts

- Friction
- Exothermic reactions
- Scientific method

Materials

Hand Blasters, pair

Optional striking surfaces:

Wooden ball	Steel ball
Billiard ball	Sandpaper
Concrete	Brick
Rubber ball	

Safety Precautions

We strongly recommend that students and teachers wear eye protection during this demonstration. Hand Blasters produce loud cracking sounds. Students should not detonate Hand Blasters near the faces or ears of other students. Wash hands thoroughly with soap and water before leaving the laboratory. Follow all laboratory safety guidelines.

Procedure

1. It is a good idea to practice using the Hand Blasters before demonstrating in front of the class.
2. Throw one of the balls into the air and catch it with the hand holding the other ball, causing the two balls to collide. A loud cracking sound is produced.
3. Pass a set of Hand Blasters around the class and allow students to examine them.
4. Encourage students to use all of their senses (excluding taste) to observe the Hand Blasters.
5. As students are using the Hand Blasters, ask them to explain how the noise is produced.
6. Pose several questions to the students or have them ask questions.
7. Ask them to form a hypothesis and experiment with the other objects to determine how the sound is produced. Below is a list of possible factors to investigate.
 - How hard must the balls hit each other in order for a blast to occur? Try a gentle tap followed by increasingly harder impact or try dropping one ball on another from different heights.
 - Will a blast occur if the balls are rubbed together? Rub the balls together, gently at first, increasing the pressure and rate of rubbing over a period of time.

- What happens when a Hand Blaster hits other balls (rubber, wood, steel, or billiard balls)? The extremely hard surface of the steel ball should detonate the blaster.
- Will a Hand Blaster detonate on other surfaces (sandpaper, concrete)? Try rubbing one ball against different surfaces; smooth, such as a desk top or tile floor; and rough, such as sandpaper or concrete.
- Have students summarize the results of the Hand Blaster investigation and try to explain the chemical make-up of the Hand Blasters.

Disposal

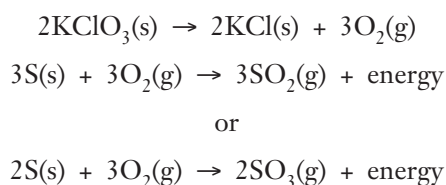
Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures governing the disposal of laboratory waste. Save Hand Blasters for use in future demonstrations. Hand Blasters may be disposed of in the trash according to Flinn Suggested Disposal Method #26a.

Tip

- Hand Blasters can be used in your science classes to illustrate the process of inquiry (the scientific method).

Discussion

Hand Blasters are ceramic balls that are coated with a variation of the same materials used to make caps for cap guns. A thin layer of potassium chlorate, sulfur, glue and powdered glass (silica) covers each Hand Blaster. When the coated surfaces of the two balls collide, a blast is produced at the point of impact. The potassium chlorate and sulfur are activated by the friction produced when the sand on the two balls collides. When the balls are struck, it is presumed that the oxygen released from the potassium chlorate causes a rapid oxidation of sulfur which releases energy and causes the resulting “blast.”



The blast is accompanied by a distinctive sulfur odor, like that of a lit match. The same blast can be produced if a single ball hits a substance containing a sufficient amount of silica, such as certain types of concrete, and produces enough friction and heat to detonate the chemical mixture. Hand Blasters can produce more than 200 blasts.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12

Evidence, models, and explanation
Form and function

Content Standards: Grades 5–8

Content Standard A: Science as Inquiry
Content Standard B: Physical Science, properties and changes of properties in matter, understanding of motions and forces, transfer of energy

Content Standards: Grades 9–12

Content Standard A: Science as Inquiry
Content Standard B: Physical Science, chemical reactions and motions and forces

Acknowledgments

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Park, J. C., Inquiry Is a Blast, *Science Scope*, April 1992, pp 24–27.

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Hand Blasters* activity, presented by Steve Long, is available in *Activation Energy* and in *Teaching With Toys*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

Hand Blasters are available from Flinn Scientific, Inc.

Catalog No.	Description
AP8735	Hand Blasters

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.