Gun Cotton

Combustion Reactions

Introduction

While objects may appear to be identical when their physical properties are compared, a dramatic demonstration of their chemical properties shows them to be worlds apart!

Concepts

- Combustion
- Chemical vs. physical properties

Materials

Butane safety lighter
Ceramic pads, 2
Cotton balls, several
Gun cotton ball, nitrocellulose, one

Safety Precautions

Gun cotton is extremely flammable. Keep this solid away from all open flames. Nitrocellulose is stored wet so it cannot accidently be lit or explode. Do not store gun cotton at school. Keep only enough on hand to complete all current demonstration requirements. Wear chemical splash goggles, chemical-resistant gloves, and a chemical-resistant apron. Please consult current Material Safety Data Sheets for additional safety, handling, and disposal information.

Procedure

1. Show the students the cotton ball and the gun cotton ball. Ask them to list as many physical properties of the balls as they can. You may want to recruit a volunteer to come up and handle the two objects.
2. Place the cotton ball on the ceramic pad. Tell the class they are to make observations of each ball's chemical properties as they are lit.
3. Light the cotton ball. They students should observe the cotton slowly burning, turning black, and finally burning out after a few seconds.
4. Now place the gun cotton ball on the ceramic pad. Light this ball and watch the brilliant flash that occurs!

Disposal

Safely burn off all unused gun cotton. Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures governing the disposal of laboratory wastes.

Tip

Gun cotton is available in some magic stores.

Discussion

Nitrocellulose, also known as gun cotton, is a highly flammable compound formed by nitrating cellulose through exposure to nitric acid.

Nitrocellulose is made by combining concentrated sulfuric/nitric acid with cotton.

The nitric acid converts the cellulose into cellulose nitrite and water:

$$3HNO_3 + C_6H_{10}O_5 \rightarrow C_6H_7(NO_2)_3O_5 + 3H_2O \qquad \textit{Equation 1}$$

After the cellulose has finished nitrating, it is washed and dried. Nitrocellulose is stored wet so it cannot be accidentally lit or explode.

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Connecting to the National Standards

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

Unifying Concepts and Processes: Grades K–12
Systems, order, and organization
Evidence, models, and explanation
Content Standards: Grades 5–8
Content Standard B: Physical Science, properties and changes of properties in matter
Content Standards: Grades 9–12
Content Standard B: Physical Science, structure and properties of matter

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Gun Cotton* activity, presented by Lee Marck, is available in *Combustion Reactions*, part of Flinn Scientific—Teaching Chemistry eLearning Video Series.

Materials for *Gun Cotton* are available from Flinn Scientific, Inc.

Catalog No.	Description
FB0680	Cotton Balls, 300/Pkg
AP8960	Butane Safety Lighter

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