

# ICE Devices

---

## Baster Ball Cannon

Besides being an excellent attention getter (more surprising than a hurled eraser), the baster ball cannon demonstrates combustion, the fire triangle, and explosions.

---

**Disclaimer.** This publication is intended for use by teachers or other adults or by students with proper supervision. Users are expected to follow normal safety precautions when performing the activities described in this manual. Neither the authors nor the publisher assume liability for the use of information in this publication.

**Copyright** © 1994, 2015 by University of Wisconsin Board of Regents; ICE Publication: *ICE Devices*

**Creative Commons License Deed.** Attribution-NonCommercial-ShareAlike 3.0 Unported [<http://creativecommons.org/licenses/by-nc-sa/3.0/>] A portion of this document is below; see complete license online.

### You are free to

**Share**—copy and redistribute this material in any medium or format;

**Adapt**—remix, transform, and build upon the material.

### You may do so as long as you follow the license terms:

- **Attribution**—You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.
- **Noncommercial**—You may not use the material for commercial purposes.
- **Share Alike**—If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original.
- **No additional restrictions**—You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

**Permission to copy:** You have our permission to make as many printed copies as are needed for students in your classes of any or all of these activities.

---

## ICE Institute for Chemical Education

---

### Contact Information

**ICE, Institute for Chemical Education**

University of Wisconsin–Madison

Department of Chemistry

1101 University Avenue

Madison, WI 53706

**toll free** 888-220-9822 (toll-free number, U.S.)

**telephone** 608/262-3033

**fax** 608/265-8094

**email** [ice@chem.wisc.edu](mailto:ice@chem.wisc.edu) and [iceorders@chem.wisc.edu](mailto:iceorders@chem.wisc.edu)

(sorry, we cannot accept credit card orders by email)

### Visit the ICE Website

Information about all ICE Kits and Publications as well as our Order Form may be found on our web site at <http://ice.chem.wisc.edu>. The site also has information about our programs in Outreach, Education, and Research as well as the Nanoscience theme that runs through what we do and what we publish.

10 min

---

## Baster Ball Cannon

Shared by Mike Barondeau\*, author unknown

Besides being an excellent attention getter (more surprising than a hurled eraser), the baster ball cannon demonstrates combustion, the fire triangle, and explosions. (The name comes from a turkey baster, but most turkey basters no longer have bulbs large enough to accommodate a ping pong ball.)

### Materials

- 1 lantern lighter (e.g., Coghlan's No 503A; available at hardware or sporting goods stores)
- 1 battery filler syringe (a squeezable rubber bulb with a removable tube used to take up and release battery acid or other automotive fluids) (available at automotive supply stores or online)
- lighter fluid or other combustible, e.g., ethanol or methanol
- either hole punch or star leather punch, or 3/16" dia. cork borer and metal or wooden strip to fit inside the rubber bulb and act as a backstop
- 1 ping pong ball (must fit tightly in the opening of the rubber bulb)
- 2 small adjustable wrenches
- screwdriver

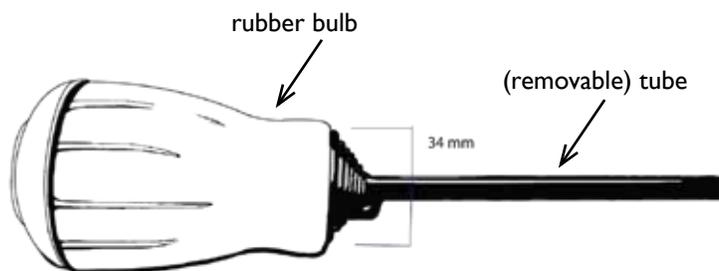


Figure 1. A battery filler syringe

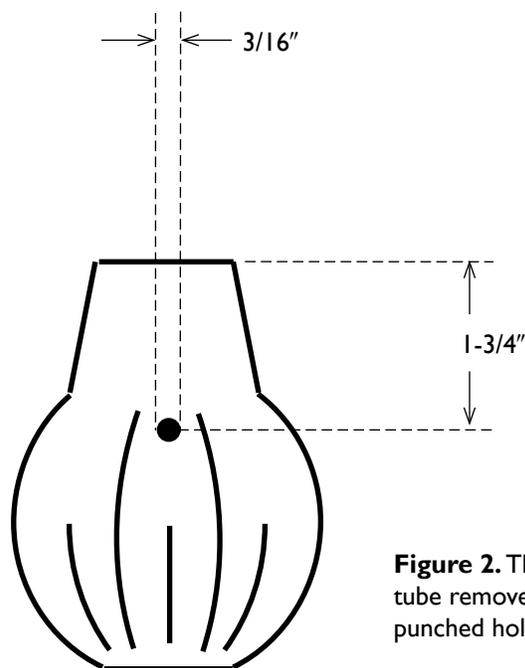
### Procedure

---

1. Remove the tube (Figure 1) from the battery filler syringe (it will not be used).
2. Make a 3/16" dia. hole in the side of the rubber filler bulb, about 1-3/4" from the open end of the bulb (Figure 2). You may need to "scrunch" the bulb to get a leather punch to the right position.
3. Next, examine the lantern lighter (shown in Figure 3). Notice the **striker wheel** that rotates and rubs against the vertical brass rod (the **flint magazine**) as you turn the **knurled knob** that is held in place by a **set screw**. If you rotate the **knob** very sharply, a spark should appear at the **striker wheel**.

---

\* ICE Supplements Workshop, University of Wisconsin 1987

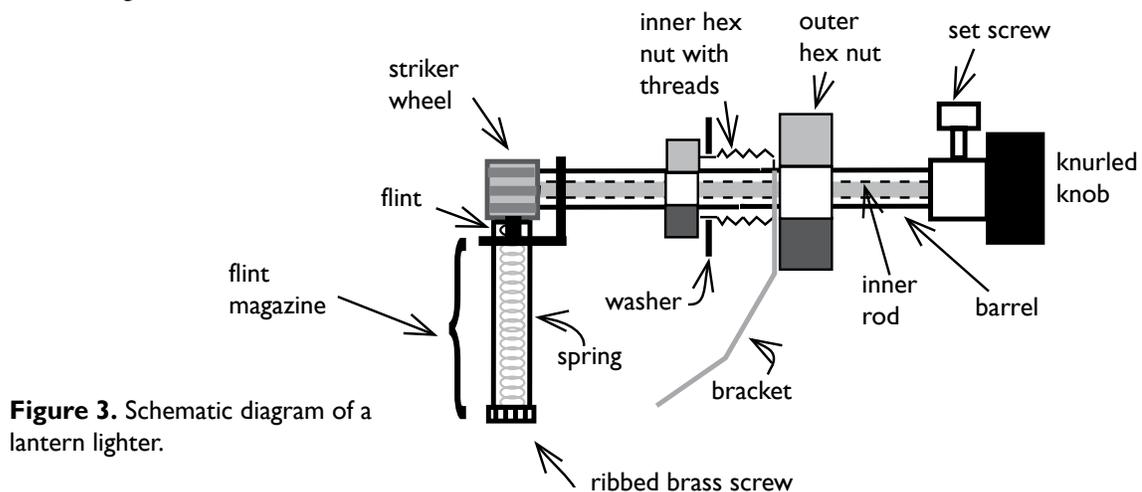


**Figure 2.** The rubber bulb of the filler syringe with tube removed showing the position and dimensions of punched hole (front view).

- If you look inside the **knurled knob** of the lantern lighter you will see a tiny *spare* flint that looks like a miniature rabbit-food pellet. *Very carefully* unscrew the **set screw** on the **knurled knob** and, cupping your hand around the knob to catch the spare flint, remove the knob. Remove the screw, the **outer hex nut**, the **washer**, and the **bracket**. Discard the bracket.

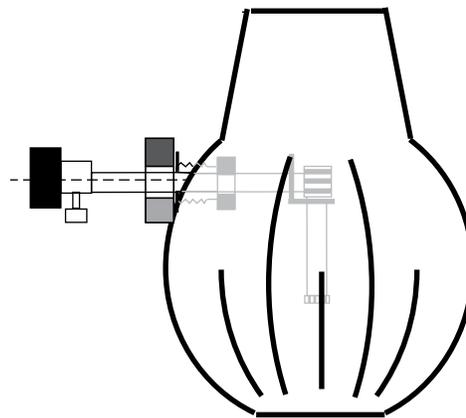
*Caution:* Removing the knob exposes the inner rod of the lighter. *It is important not to push the inner rod through the outer barrel.* If this happens, the striker wheel will be pushed out of position and will no longer make contact with the flint magazine.

What should you do if this happens? Slowly unscrew the ribbed brass screw from the top end of the flint magazine, cupping your hand to catch the spring that is inside. Remove the spring and the tiny flint from the magazine. Push the striker wheel back into position. Replace the flint, spring, and ribbed brass screw into and onto the flint magazine. Remember not to push the inner rod of the lighter through the barrel.



**Figure 3.** Schematic diagram of a lantern lighter.

- With your index finger holding the striker wheel in its proper position, insert the lighter into the rubber bulb, and push the rod of the lighter that holds the knurled knob through the hole, up to the inner hex nut (Figure 4).
- On the outside of the rubber bulb, replace the washer and screw the outer hex nut onto the rod. Also reattach the knurled knob with the set screw. Figure 4 shows the completed assembly.
- You may wish to practice striking the lighter without fuel in the bulb. Strike the lighter by turning the knurled knob *rapidly* and sharply between your thumb and index finger. (The best way to do this is to hold the knob and snap your finger.) It should spark.
- When you are confident in your striking technique, pour a milliliter of methanol, ethanol, or lighter fluid fuel into the filler bulb, *being careful not to wet the flint*. (Using too much fuel will cause a large flame to persist until all the fuel is consumed.) Allow the bulb to sit for a few minutes while the fuel vaporizes. Push a ping pong ball snugly into the mouth of the rubber bulb.



**Figure 4.** Completed cannon (side view) after lighter has been inserted.

- ⚠ Put on safety glasses.** Before striking the lighter, point the cannon away from the audience and any objects. To fire again, squeeze the bulb a few times to exchange the carbon dioxide and other combustion products with air.
- ⚠ Do not store your baster ball cannon with fuel in it.** The materials used in the ping pong ball will dissolve and become misshapen if exposed to alcohols and lighter fluid for a prolonged time. You can get replacement flints from a drug store, supermarket, or hardware store. They are displayed near cigarette lighters.

## How do you use this?

For the baster ball cannon (BBC) to work, there must be oxygen, vaporized fuel, and a spark from the striker within the bulb. The importance of oxygen to initiating and sustaining combustion, and the non-combustibility of carbon dioxide, can be demonstrated by attempting to explode the BBC immediately after an explosion: It won't work until the carbon dioxide is exchanged with oxygen. You might have to prove to your students that it is carbon dioxide that is produced in the combustion.

It might be interesting to compare the flight distances of ping pong balls when propelled by the explosion of equal quantities (volumes or masses) of different fuels such as ethanol, methanol, and lighter fluid.