

Barbeque spark lighter "gun"**INTRODUCTION:**

I first saw this demonstrated decades ago by Alan Slater at a STAO conference in Toronto. It has many uses in the classroom AND it reuses an "empty" lighter device.

CHEMICAL CONCEPTS:

Combustion, Explosive mixtures, Activation energy

MATERIALS:

A spent (empty) butane spark lighter, a plastic 35 mm film container, Epoxy glue, Methanol in a plastic dropper bottle.

PROCEDURE:

Cut a small hole in the lid of a plastic 35mm film can and slide it 2 or 3 cm down the barrel of a spent butane BBQ lighter. Epoxy it into place with enough glue to seal the hole. Now fit the empty plastic film can onto the lid, enclosing the spark device. When the glue dries, it is ready for use.

To demonstrate the amazing amount of chemical energy available from fuels, drop one or two drops of methanol into the film can and fit it on the gun, snapping the lid into place. You may need to roll the device around and warm the can with your hand, but soon, the methanol vapour will form an explosive mixture with the air inside. **Aim it in a safe direction** and pull the spark trigger. The plastic can is shot off the sparker with enough speed to go across a typical classroom.

SAFETY PRECAUTIONS:

[These suggestions are NOT intended to be a complete review of all the safety issues involved with this activity. Professional judgment and practices are essential. If you are unsure of the safety precautions that should be taken, seek experienced assistance.]

Test this device in an empty room first!

BE VERY CAREFUL where you aim it in a populated area.

Do not use excess alcohol. If too much alcohol is used, it continues to burn inside the can as the can flies through the air. This is a dramatic effect in a darkened room, but could result in burns if it struck someone. Methanol has a relatively cool flame, but it is invisible in a lighted room.

Never use it without proper warning. The loud sound is startling even when you expect it. The projectile hits the wall with some force and thus may bounce back at students. The plastic in the can is soft and should not cause injury as it bounces, but students must be aware that it might come their way.

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DISCUSSION:

The gun is handy to satisfy the explosion fanatics in a class. Demonstrate the gun first. Then ask students to react quickly to protect their eyes. The can will hit a side-wall of the room before they can even flinch:

even when they know what will happen and when.

Students gain a proper respect for the speed and the intensity of an explosion caused by just two drops of fuel. It is one more dramatic argument for always wearing safety glasses in the lab.

*Do you really want to entrust your eyesight to a lab group
on the other side of the room?*

I have had good class discussions about why the chemical reaction doesn't happen without the spark, and how a tiny spark can cause so much energy to be released. The concepts of activation energy and exothermic reaction are easy to reinforce with this example.

HINT: You can still find some drugstores or large box-store photo departments that will give you these very useful plastic containers for free. Get as many as you can as soon as you can. They may soon be as rare as slide-rules!

ACKNOWLEDGMENT:

Thanks to Alan Slater for introducing me to the device.