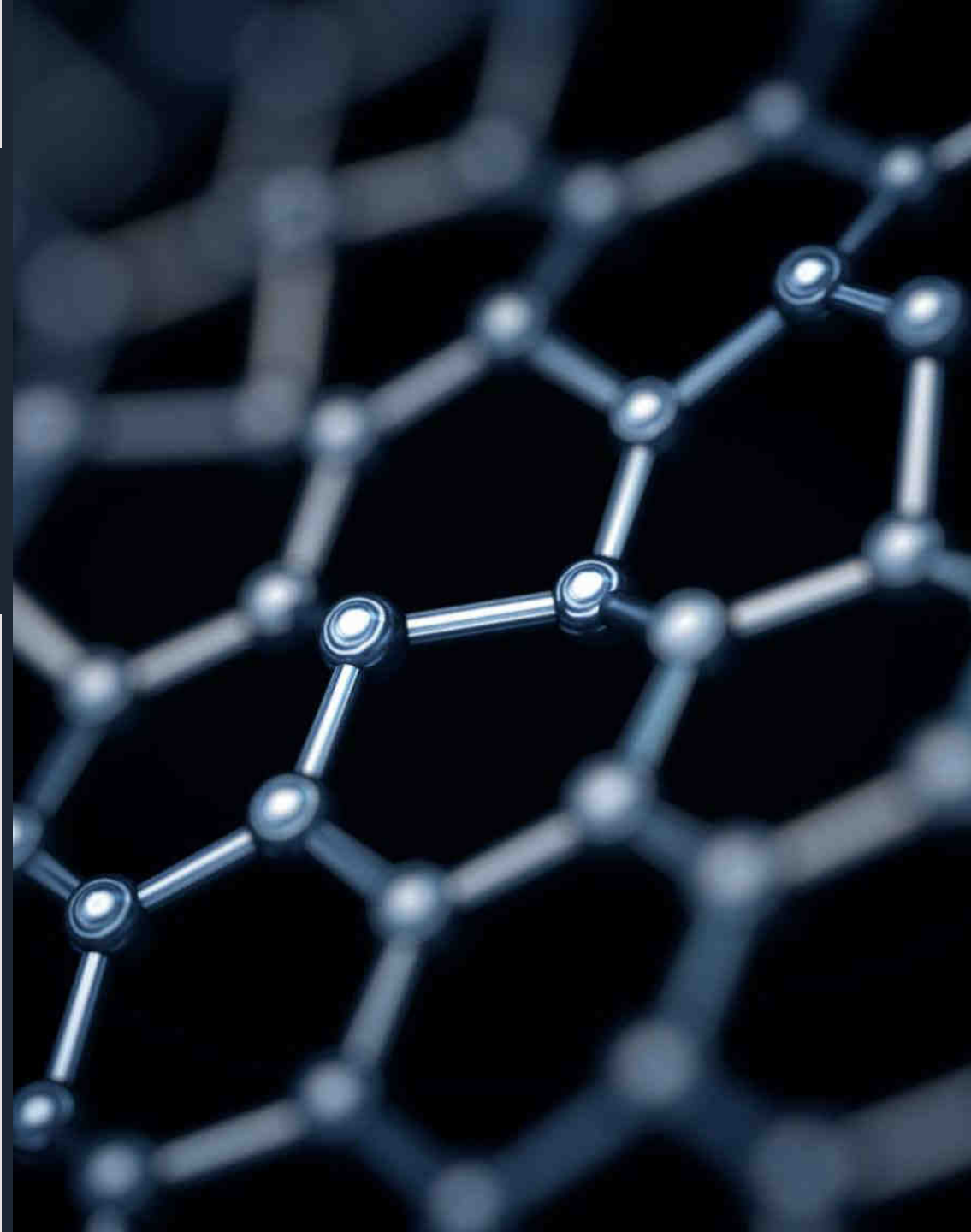


CHEMICAL SAFETY

Demonstrations &
Outreach Activities





Rainbow Fire Halloween Jack-o-Lantern ...
m.youtube.com



12 Cool Halloween Jack o Lante...
pinterest.com



Rainbow Flames Halloween Ja...
sciencenotes.org



Rainbow Flames Halloween Jack o' ...
sciencenotes.org



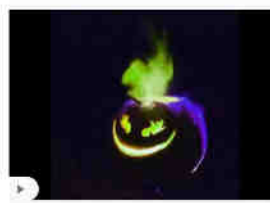
Flaming Halloween Jack o Lantern ...
m.youtube.com

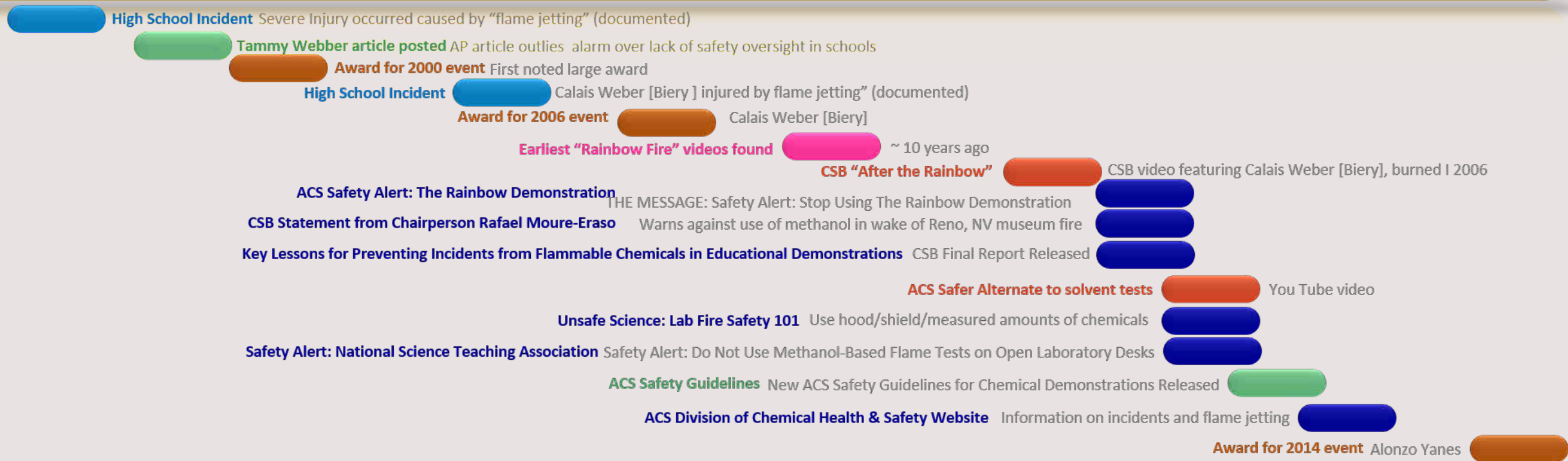
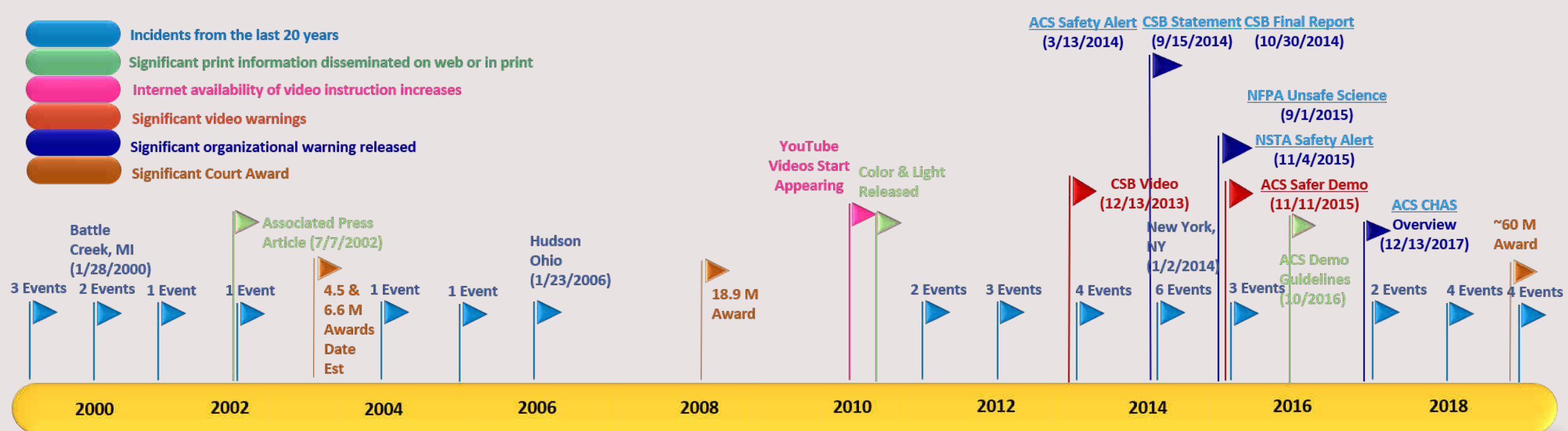


Cool Halloween Pumpkins and Jack o Lan...
thoughtco.com



5 Extremely Flammable Jack-O'-Lanterns ...
halloween-ideas.wonderhowto.com





“Hi! I have a strange question for you. Do you have any calcium carbide we could use next Monday and next Thursday? We are doing some science experiments and one of them is blowing up a pumpkin. Figured you might have some laying around since you are a chemistry professor, ha! Thanks”

Request from 1st grade teacher

Never supply chemicals for demonstrations to teachers!

Look for a well planned demonstration procedure

Concepts

- Chemical reactions
- Combustion reaction
- Thermochemistry

Materials

- | | |
|---------------------------------------|---------------------------------|
| Calcium carbide, CaC_2 , 2 g | Forceps |
| Water, 50 mL | Piezoelectric igniter |
| Carving tool | Plastic cup |
| Beaker, plastic, 100-mL | Pumpkin, approx. 10×10 |
| Electronic Balance | |



Safety Precautions

When calcium carbide is exposed to water or moisture it evolves flammable acetylene gas that is corrosive to eyes and skin. Perform this demonstration in a well-ventilated area only. Make sure there are no flames in the area. Use only a piezoelectric igniter to ignite the acetylene in the pumpkin. Keep a fire extinguisher on hand and do NOT scale up the demonstration. Since this reaction does produce a small explosion, make sure students are wearing safety goggles and are at least 15 feet away from the pumpkin at the time of the demonstration. Warn students to “cup” or cover their ears. Wear safety goggles, chemical-resistant gloves and a chemical-resistant apron. Wash hands thoroughly with soap and water before leaving the laboratory. Follow all laboratory safety guidelines. Please review current Material Safety Data Sheets for additional safety, handling, and disposal information.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding. After calcium carbide has reacted with the water, a basic solution is produced. Neutralize solution with 3 M hydrochloric acid and check with pH paper according to Flinn Suggested Disposal Method #10. Decant the neutral solution and flush it down the drain with at least a 20-fold excess of water. Dry any precipitate in the beaker and place in the trash according to Flinn Suggested Disposal Method #26a.

Tips

- This experiment works best with a medium- to large-sized pumpkin. A small pumpkin often creates too small of a work space and an excessively large pumpkin will take longer to “carve itself.”
- Use only a piezoelectric igniter with an 8” cord for this experiment. NEVER use matches or small pocket lighters—they pose serious risk to the demonstrator.
- Do not scale-up this demonstration. This could pose serious danger to the presenter as well as the observers.

Discussion

Calcium carbide, CaC_2 , is primarily used to produce acetylene gas. Acetylene gas is a product of reacting calcium carbide with water. This reaction was utilized in carbide (miners’) lamps where water dripped on the carbide producing acetylene gas that was ignited (see Equation 1). These lamps were commonly used in slate, copper, and tin mines. Since acetylene gas is highly flammable, the carbide lamps were not used in coal mines, where they would be a serious hazard. Most carbide lamps have been replaced today by electric LED lamps.



Acetylene consists of two hydrogen atoms and two carbon atoms attached by a triple bond (see Equation 2). Acetylene is often found as the fuel in torches as it burns brilliantly in air with a very sooty flame. It has a very high heat of combustion (1300 kJ/mole) and burns with a very hot flame.



**Many sites
and
materials
minimize
necessary
information**

ThoughtCo.com

Science Notes

Chemical Demonstrations
Volumes



Watch at <https://www.youtube.com/watch?v=aTEqpooVlPo>

Club Demo Shows on Campus

Before:

Read [ACS Demonstration Guidelines](#)

Each demonstration should be chosen as appropriate for the venue and audience

Have faculty mentor and CHO preapprove demonstrations

Students must complete some basic training

Students should write the procedure and perform a simple risk assessment

Practice the full show

Premeasure reagents and prepare waste containers with labels for the event

Check emergency response equipment (train if needed)

Notify security when and where the demo show will be occurring

Club Demo Shows on Campus

During:

Do not seat audience in first two rows of seating; provide PPE if needed

Keep audience engaged and alert to upcoming hazards

Do not put volunteers at risk

Have a staging area; presenters should know their script

Have assigned people for things like breakdown; lights; entertaining the audience between demos

Do not attempt to retry failed demos; debrief/troubleshoot

Presenters must wear all PPE

Club Demo Shows on Campus

After:

Cleanup/collect waste

Don't provide instructions to reproduce demos at home

Decontaminate surfaces



Watch at <https://youtu.be/WDJ0MOGIN0o>



HOW NOT TO PRESENT A DEMONSTRATION

Poorly staged outreach demo with ethanol and salts. This led to injury using the previous video.

OUTREACH



Club Demo Shows on Campus

Before:

Pack your chemicals for travel – prepare kits for common demonstrations or experiments

Take all the required PPE and emergency response equipment (portable eyewash, spill kit, etc.) needed

Review your institutions policies for transporting students

Obtain written permission from the venue for any fire demonstrations

Think about sound system; electricity?





ADDITIONAL RESOURCES

- [ACS - Safer Experiments & Demonstrations](#)
- [NSTA Minimum Safety Practices and Regulations for In-Person and Virtual Sessions](#)
- [Safety with Chemical Demonstrations](#)