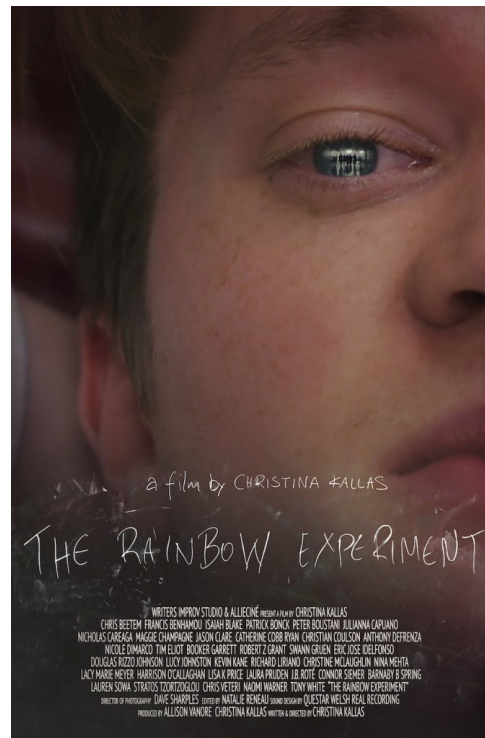


PLAYING WITH FIRE



Samuella B. Sigmann
Appalachian State University
Boone, NC

256th ACS National Meeting, Boston, MA



"The Rainbow Experiment" Movie Trailer
<https://vimeo.com/250541567>



Sister Patricia Wolf, president of St. Catharine's, a private school with annual **tuition rates near \$9,000**, said the teacher was conducting a flame experiment and the flame apparently got too large. Wolf said there were **no hazardous materials involved** and the teacher's actions were not believed to be reckless.

The teacher, a man who has been on the faculty for about three years, was **distraught after the accident** Wolf said.

<https://www.nbcnewyork.com/news/local/Burn-Accident-Catholic-High-School-St-Catherine-Academy-New-York-City-Bronx-459309453.html>

Chemistry experiment goes awry, injures students



Dane Neuberger
2011



Calais Weber [Biery]
2006

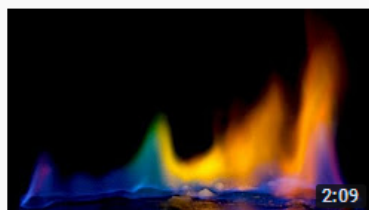
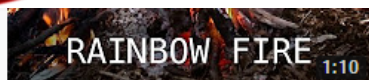


Autum Burton [Hearon]
2000



Alonzo Yanes
2014

"This was an experiment in a science book, so this is routine. She had been doing it (this experiment) all day in other classes," said district spokeswoman Diane Turner.



Rainbow Fire Halloween Jack-o-Lantern

Anne Helmenstine • 987K views • 5 years ago

Is a regular carved Halloween jack-o-lantern too tame for you? Or are you looking for the perfect **flame** test chemistry demonstration

5th grade science project rainbow flame

andybethify • 2.3M views • 6 years ago

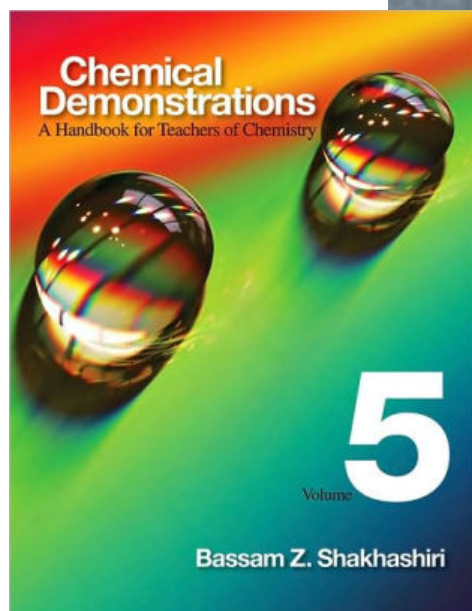
fun with chemicals.

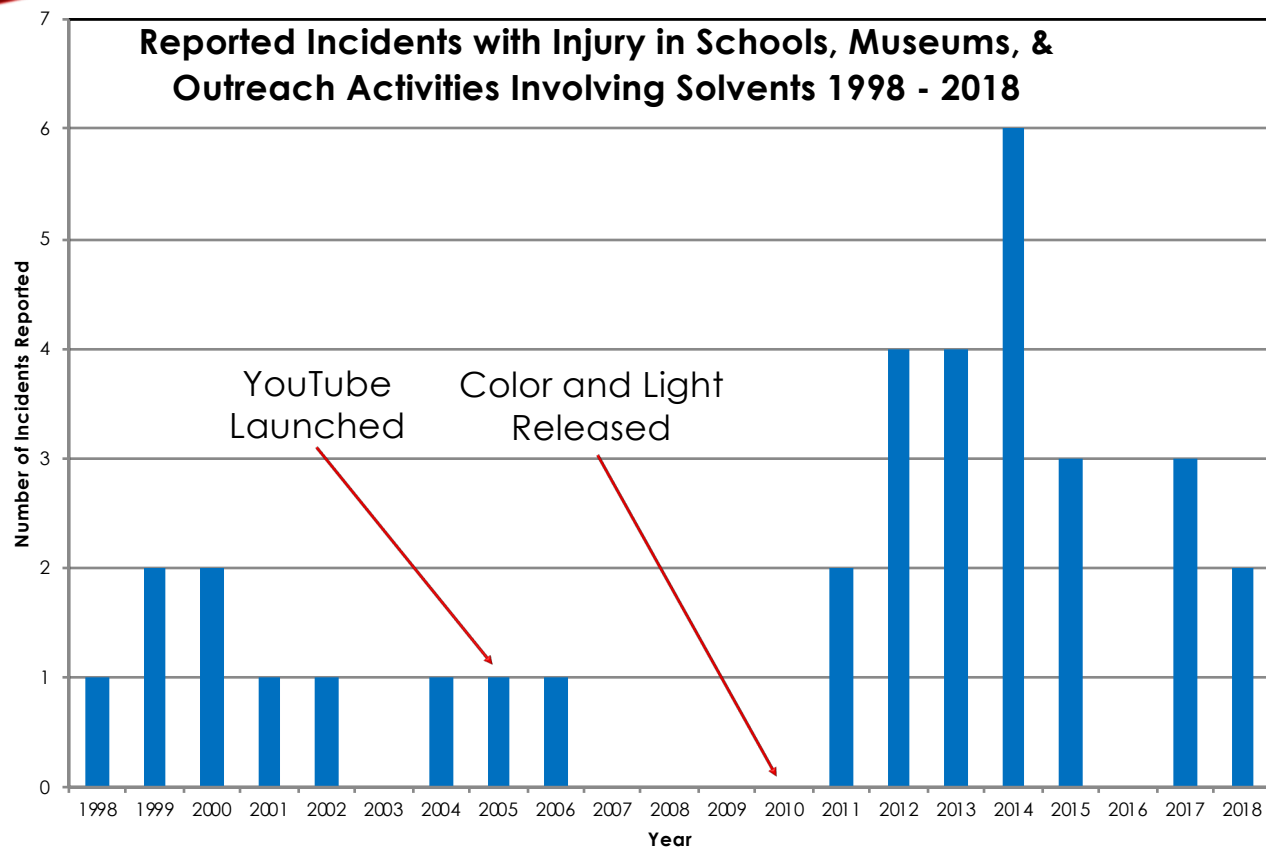
Colored Fire Rainbow

Anne Helmenstine • 60K views • 6 years ago

Use common household chemicals to make a colored **fire rainbow**. This is an easy home chemistry project that yields colorful results

How to Change the Color of Your Campfire







After the Rainbow CSB



That day, Mrs. Pratt brought her 11-year-old son, Sam, to class. After a short lecture, she asked everyone to gather around her desk.


Cecilia and Calais stood about 6 inches from the porcelain dishes where they would have the best view. Someone dimmed the lights and then Sam, with his mother's permission, dropped lit matches into each.

Red. Orange. Yellow. He moved from left to right and when he reached the third or fourth, Sam noticed the red flame wasn't burning as high. Mom, he said to Mrs. Pratt, the red one is going out.

Mrs. Pratt lifted a gallon-sized jug of methanol -- wood alcohol -- out of a nearby sink. Calais and Cecilia said Mrs. Pratt told the class she probably shouldn't pour the methanol into the dish because it could catch fire, but she did anyway.

Whoosh!

[From the Lab Bench](#)



To this day, Weber is unsure exactly how many people her story has influenced. She told of receiving a message on Facebook from a student who was a grade behind her at Western Reserve Academy at the time of her injury.

This student was seeking advice on how to approach a college chemistry professor about her concerns over lab safety, upset at having heard the professor excitedly tell the class, "Chemistry is fun! You can make things explode!" Weber said that, hopefully, in light of her story, people are "spreading the word of lab safety." [October 04, 2011](#)



Sean Breheny 4 years ago

I think that this exact type of accident is quite common. I had a chem teacher in high school who did the same thing (demo on the color of flames, done on her desk, she tried to pour a little bit more fuel into one of the burning bowls) except in her case, there was no explosion, she dropped the jug of fuel, which I think was ethanol, and fire spread all over her desk. She was able to put it out quickly. None of the students were very close to the desk during the demo. My teacher was very competent and generally extremely

[Read more](#)

👍 6 🗨️ [REPLY](#)



Kovarian 3 years ago

One of the very first things you learn in lab safety is that you pour from the smallest possible container. It's one of the most basic safety rules. Also, as the poor woman said, should have been under a fume hood, the crucibles should have been far apart, the jug of methanol should have been in the storage closet with a small amount in a beaker or bottle in case it was needed. Everyone should have been wearing all their PPE. You shouldn't be pouring any methanol at all, the amount you need should already be measured and

[Read more](#)

👍 8 🗨️ [REPLY](#)



John Maynard 2 years ago

This same accident just happened in Fairfax County VA this week. People never learn. What kind of training are these teachers getting in University????????????? Totally unacceptable.

👍 7 🗨️ [REPLY](#)

Duality - Brad & Autum



FLAME JETTING

NFPA JOURNAL The magazine of the National Fire Protection Association

NFPA Journal® Search:

JOURNAL HOME
ARCHIVED ISSUES
JOURNAL MOBILE APP
ADVERTISING
AUTHOR INDEX
SUBJECT INDEX
JOURNAL NOW
ARCHIVE
CONTENT
DISCLAIMER
ABOUT NFPA JOURNAL

NFPA.ORG
ADVERTISEMENT

GRADUATE ENGINEERING AT UNIVERSITY OF MARYLAND
MASTERS IN FIRE PROTECTION ENGINEERING
100% ONLINE

News & Research / Publications / NFPA Journal® / 2017 / September October 2017 / September October 2017 / Flame Jetting



Author(s): Adam St. John. Published on September 1, 2017.

The Science of Flame Jetting

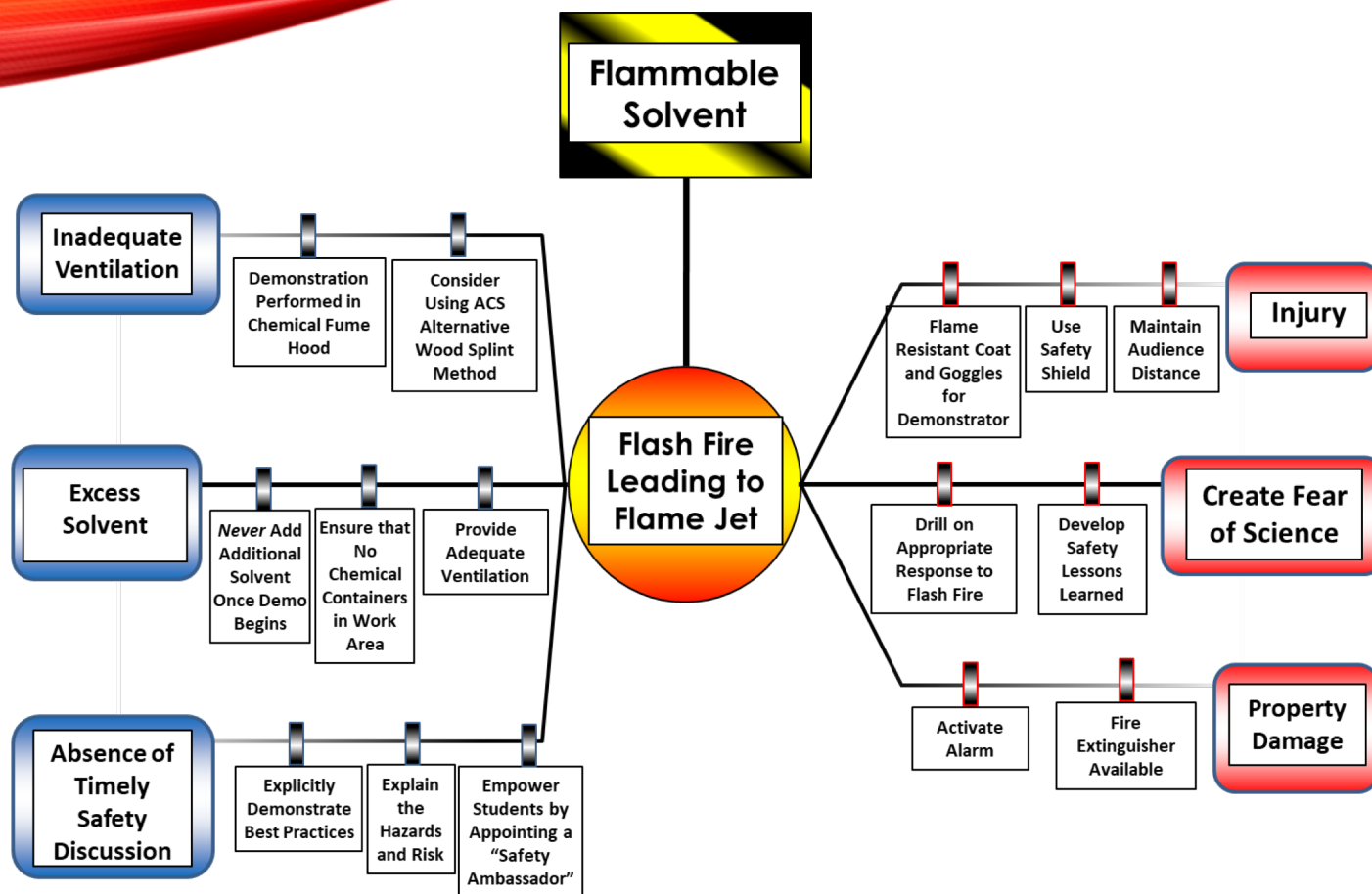
How can a container of flammable liquid suddenly jet flame like a blowtorch when it encounters an ignition source? Why do so many people, many of them children, continue to be injured in these incidents? And how can a simple, inexpensive device protect against this hazard?

BY ADAM ST. JOHN, P.E.



REENACTMENT OF METHANOL JET INCIDENT. ORIGINALLY UPLOADED AT
[HTTP://LEADERSINLAW.COM/WP-CONTENT/UPLOADS/2009/06/METHANOL-DEMO.JPG](http://leadersinlaw.com/wp-content/uploads/2009/06/METHANOL-DEMO.JPG)
AND SAVED BY THE WAYBACK MACHINE INTERNET ARCHIVE ON AUGUST 8, 2012.
REPRINTED WITH PERMISSION OF STEVEN H. WESTON, ESQ.

<https://www.acs.org/content/acs/en/pressroom/reactions/videos/2018/small-bottle-huge-fireball-how-flame-jetting-works.html>



Duality - Brad & Autum



https://www.youtube.com/watch?v=xFStAEt4_2o

Duality - Brad & Autum



https://www.youtube.com/watch?v=xFStAEt4_2o



If you are going to perform high risk demonstrations or experiments...

You might want to be prepared to answer that question


[Browse the Journal](#)
[Articles ASAP](#)
[Current Issue](#)
[Submission & Review](#)
[Open Access](#)

Article

Playing with Fire: Chemical Safety Expertise Required

Samuella B. Sigmann*

Appalachian State University, Boone, North Carolina 28608, United States

J. Chem. Educ., Article ASAP

DOI: 10.1021/acs.jchemed.8b00152

Publication Date (Web): July 13, 2018

Copyright © 2018 American Chemical Society and Division of Chemical Education, Inc.

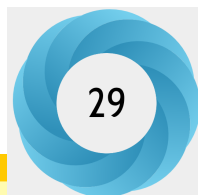
*E-mail: sigmannsb@appstate.edu.

Cite this: *J. Chem. Educ.* XXXX, XXX, XXX-XXX



RIS Citation

GO



About this Attention Score

In the top 5% of all research outputs scored by Altmetric

Mentioned by

39 tweeters

Readers on

5 Mendeley

MORE...

SUMMARY

Twitter

Title Playing with Fire: Chemical Safety Expertise Required
Published in Journal of Chemical Education, July 2018
DOI 10.1021/acs.jchemed.8b00152
Authors Sigmann, Samuella B., Samuella B. Sigmann

[View on publisher site](#)

[Alert me about new mentions](#)

TWITTER DEMOGRAPHICS

MENDELEY READERS

ATTENTION SCORE IN CONTEXT

This research output has an **Altmetric Attention Score of 29**. This is our high-level measure of the quality and quantity of online attention that it has received. This Attention Score, as well as the ranking and number of research outputs shown below, was calculated when the research output was last mentioned on **20 August 2018**.

ALL RESEARCH OUTPUTS

#433,773
of 11,630,900 outputs

OUTPUTS FROM JOURNAL OF CHEMICAL EDUCATION

#31
of 3,374 outputs

OUTPUTS OF SIMILAR AGE

#16,068
of 212,867 outputs

OUTPUTS OF SIMILAR AGE FROM JOURNAL OF CHEMICAL EDUCATION

#2
of 56 outputs

<https://pubs.acs.org/doi/10.1021/acs.jchemed.8b00152><https://pubs.acs.org/doi/10.1021/acs.jchemed.8b00152>



Chemjobber @Chemjobber · 23 Oct 2014

More people have been injured by **methanol fires** in American classrooms than have died of Ebola in the US in 2014.

1

9

7



Chemjobber @Chemjobber · 3 Sep 2014

Hey, look, more kids injured in a **methanol fire** demonstration: rgj.com/story/news/2014/09/03/methanol-fire-demonstration/75111 | **Now, can we stop doing it?**

2

10

2

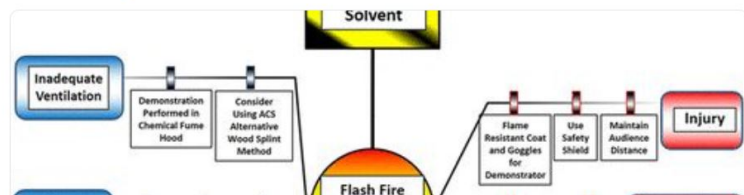


Chemjobber @Chemjobber · Jul 13

J. Chem. Ed article by Samuella B. Sigmann on the Rainbow Demonstration: pubs.acs.org/doi/10.1021/ac...

164 children injured over 20 years | **Maybe we can stop now?**

#chemsafety



Chemjobber @Chemjobber · 26 May 2017

Now can we stop doing alcohol fires in schools?

Via the DCHAS list, another alcohol accident:

abc7ny.com/education/stud...

#chemsafety



Student burned after chemistry lab experiment explodes

The incident happened during an outdoor lab session at Perth Amboy High School during an eighth period chemistry class.



PRE-SERVICE TEACHER EDUCATION

- A working knowledge of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which facilitates understanding all chemical hazards (physical, health & environmental).
- Ability to perform a risk assessment based on the RAMP principle – Recognize, Assess, Minimize, and Prepare for Emergencies.
- A working understanding of inventory management
- A thorough understanding of flammable solvents and combustion
- Ability to read and understand a SDS
- A working knowledge of PPE
- A fundamental understanding of hazardous waste management
- Hands-on experience with common demonstrations and experiments including practice with identifying hazards and assessing risk.



ADVOCACY

- American Chemical Society
- National Fire Protection Association
- Chemical Safety Board
- National Science Teacher's Association



REMINDERS ABOUT WORKING WITH FLAMMABLE LIQUIDS

- Flammable liquids can be handled safely if they are handled properly. Flammable liquids are dangerous when mishandled.
- Users do not deliberately cause fires and explosions. On most occasions users are unaware of the severity of the hazards. Miss-handling [sic] is typically the result of a lack of knowledge, not willful destructive intent.
- It is users' responsibility to continuously strive to become better informed, and more adept at identifying and controlling hazards.

Chemical Demc

COMING SOON: This section of our web site will be dedicated to stopping the use of chemical demonstration

These liquids with an almost invisible flame. If the instructor mistakenly believes the flame went out and then p
flaming liquid ten feet or more. The American Chemical Society (ACS) has released a video that explains flame

This ACS video was made in collaboration with a number of groups committed to helping prevent flame jetting
Congressman Mike Thompson, ATF Fire Research Laboratory, Fairfax County Fire and Rescue Department, Air
Fuel Container Manufacturers Association (PFCMA).

We have documented dozens of incidents involving over 100 injuries (some severe) to students from the elemen
globe. These are NOT accidents. They are a completely foreseeable outcome of using an outdated teaching tool
Here is some background to give you an idea of the scope of the problem:

- [CSB Releases Safety Message on Preventing Accidents in High School Chemistry Labs](#)
- [Safety Alert: The Rainbow Demonstration \(ACS seeks to prevent additional burn incidents\)](#)
- [School Experiment That Burned Boy Was Focus of Federal Warning](#)
- [This chemistry fire demonstration has repeatedly burned students](#)
- [Fire from rainbow demo injures five students in Virginia](#) [Safety Alert: Do Not Use Methanol-Based Flam](#)

Thanks to the efforts of the American Chemical Society (ACS) and other groups, the top hits on Google searche
make even a cursory attempt to look up the necessary safety precautions for such demonstrations. We need ever
demonstrations once and for all.

This page was last updated **Thursday, July 5, 2018** and is [copyright](#) 2018 by [Interactive Learning Paradigms Incorporated](#). All rights res

A DEDICATED WEBPAGE



<http://www.ilpi.com/safety/demosafety.html>



ACKNOWLEDGEMENTS

- Dr. Jennifer Bishoff (MAT Secondary Coordinator, Frostburg State University MD)
- Ms. Anna Sitek (Research Safety Specialist, University of Minnesota—TCEM),
- Mr. Ralph Stuart (CHO, Keene State College, NH)
- Dr. Robert Toreki (President, Interactive Learning Paradigms, Inc., ILPI)
- Mr. Steven H. Weston, Esq. (Varnum Attorneys at Law)
- Dr. Jyllian Kemsley, executive editor for policy at *Chemical & Engineering News*