



**An Educational Hands-On Demonstration Program
for Groups of 25 Students in Grades 2-6**

Prepared by the

National Chemistry Week Planning Committee
of the
American Chemical Society

Cleveland Section
for
National Chemistry Week 2024

Overview

Note: After Sept. 28, 2024, please see our Cleveland Section web site (p. 3) for an Errata sheet.

Note: An assistant is required for this demonstration. Either bring one along or enlist the library to help you!

Photographic techniques have come a long way since the invention of the daguerreotype method in 1839. Nominally the story “developed” during this year’s NCW Program is about this progression of photography from the earliest forms to modern digital images, often via cell phones. But the students will be surprised to find that the use of photography ultimately leads them down a very different path resulting in a surprise conclusion.

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Acknowledgments

The National Chemistry Week (NCW) program of the Cleveland Section of the American Chemical Society (ACS) began in 1994 with an idea to put together a scripted program that could be performed at any local school or library. It is a fun and educational program designed to interest students in grades 2-6 in chemistry and science. This idea has expanded to become the centerpiece of the Cleveland Section's NCW activities. On numerous occasions it has received national recognition from the American Chemical Society, including several ChemLuminary Awards the last of which was in 2012. In 2024 the Cleveland Section's volunteers will perform at least 10 demonstrations at libraries, schools, and other public sites involving up to 250 students.

Our NCW efforts reach many students each year because of various sponsors who have donated money, materials and/or services to the Cleveland Section specifically for National Chemistry Week. We would like to especially thank our partners at the Cuyahoga County Public Library (CCPL) for creating and distributing flyers, registering students, and providing the facilities for this program. We further extend our sincere thanks to John Carroll University for hosting GAK Day (**G**rand **A**ssembly of **K**its Day) and to our Cleveland ACS Section for its financial support.

Last and most importantly, we thank all the volunteers who have donated their time and expertise. This library/school program and other NCW events are the result of the hard work of many dedicated and talented volunteers. It all starts with our local section NCW Planning Committee. The Committee recommends, tests, and reviews activities & experiments; writes this script including a story line intended to hold the attention of children; collects supplies and materials; prepares the kits; recruits sponsors and volunteers; contacts libraries and schools; and schedules demonstrations. Committee members include Katie Arendt, Genevieve Crane, Mason Kruger, Helen Mayer, Shermila Singham, Susan Wang, Bob Williams, Shaowei Yang, Joe Yurko and Bob Fowler. Special thanks to Joe Yurko for creating this year's theme and storyline and for inspiring our Planning Committee and to Helen Mayer, our Editor-in-Chief. Additional credit and thanks are given to the many GAK (**G**rand **A**ssembly of **K**its) Day volunteers including professors and students from Baldwin Wallace, Case Western Reserve, Cleveland State and John Carroll universities who gave up a Saturday in September to help count, measure and assemble all of the necessary materials for our demonstration kits. A final thank you goes out to the many dedicated chemistry professionals and scientists who lead the presentations and activities in schools, libraries, and other public locations. Without them there would be no Cleveland Section NCW program.

List of Experiments

<u>Experiment/Item</u>	<u>Type</u>	<u>Time (min)</u>
Introduction		3
1. Image using Halides	Group	4
2. Coffee Developer	Grpup/Demo	15
Finishing the Halides experiment	Group	
3. Diazo Photography	Group	8
4. Digital Photography	Individual	15
Finishing the Diazo Photography experiment		
Finishing the Coffee Developer experiment		
5. Color Comes in	Demo	<u>10</u>
		58

How Experiment Write-ups are Organized

Each Experiment's write-up is presented as follows:

1. **Purpose & General Methodology:** Background on the Experiment.
2. **Introduce the Experiment:** Suggestions for introducing the Experiment to the students.
3. **Performance Details:** How to perform the Experiment in detail.
4. **Conclusions:** Suggested conclusions to draw from the Experiment.
5. **Technical Information (for the Demonstrator):** This information is background info to help you understand what we're trying to accomplish technically in the Experiment. It certainly isn't intended that you give these technical details to the students unless the students ask or request it.

MAKE SURE TO FOLLOW ALL DIRECTIONS IN EXPERIMENTS

If Experiments have special safety concerns due to the materials being used, they will be listed in the section for that Experiment. Eye protection should be worn at all times by everyone, and students should be specifically told not to touch their eyes. Some of the chemicals used this year are household chemicals, and some have been purchased from chemical distributors (see p. 37). If exposure to any chemical should occur, flush with water and report the incident to the librarian and parent. For skin contact, washing with soap and water may suffice. Websites for where to obtain a Safety Data Sheet (SDS) are listed in the Appendix A and also on our NCW website below.

For information about the American Chemical Society's NCW safety guidelines, visit [Lab Safety - ACS Center](#) and [Safety Data Sheets - Safety Basics & RAMP - Lab Safety - ACS Center](#).

Websites of Interest

Cleveland Section:

[American Chemical Society Cleveland Local Section - ACS Cleveland](#)

National American Chemical Society's "National Chemistry Week" website:

www.acs.org/ncw

Presentation Overview for the Demonstrator

This year the NCW theme from National ACS is *Picture Perfect Chemistry: Photography and Imaging*. Our NCW Planning Committee decided that we would implement this theme by using photography to solve a mystery while showing the students some of the chemistry of photography as well as our version of the history of photography. The mystery centers around some strange happenings at the zoo: on various occasions suspicious animal footprints are found after strange noises were heard the night before. We're going to use various techniques that demonstrate the history of photography to photograph these footprints. We'll discuss the chemistry involved, where appropriate. We'll begin with a photographic technique that resembles the original daguerreotypes and end with modern digital techniques. At the conclusion of the Program the students should be surprised to find a very different answer to the mysterious happenings than they expect!

Note: It's your option to use this Story Line during your Program. While it's recommended that you do so, you may omit it and use only the technical aspects of the Program if you wish

Our Story Line (Read to the Students)

Something very strange is going on at the zoo! People who live near the zoo have been complaining around the end of each month about strange noises during the night—it appears that the animals are getting agitated (and noisy) about something. During these times, the zookeepers notice strange footprints around the zoo, and animals whose prints have been found seem to be leaving patterns trying to tell us something. It's all very strange, so the zoo has asked us to help find out what's going on by using our photography skills, especially with Halloween coming soon.

As this year's National Chemistry Week theme is photography, we thought we'd use our photography skills to help get to the bottom of these mysterious happenings. We'll do this by developing photographs of the animal pawprints we find using different techniques that illustrate the different ways people during history took photographs. The zoo has assigned a summer intern named Roy G. Biv to guide us around. Ask the students "Do you know what Roy G. Biv stands for in science?" (*Ans: the first letters of the colors of the rainbow—red, orange, yellow, green, blue, indigo and violet.*)